NYC Department of Education
Carmen Fariña, Chancellor

2016-2017 年 特殊高中 學生手冊

Fiorello H. LaGuardia High School of Music & Art and Performing Arts

The Bronx High School of Science

The Brooklyn Latin School

Brooklyn Technical High School

High School for Mathematics, Science and Engineering at the City College of New York

High School of American Studies at Lehman College

Queens High School for the Sciences at York College

Staten Island Technical High School

Stuyvesant High School

Chinese | 中文

Please visit our website to get a translated version of this document.

نرجو زيارة موقعنا الإلكتروني للحصول على نسخة مترجمة من هذه الوثيقة.

এই নথির অনূদিত সংস্করণের জন্য অনুগ্রহ করে আমাদের ওয়েবসাইট দেখুন।

請瀏覽我們的網站
查看本文件的中文譯本。

Prière de visiter notre site Internet pour avoir une version traduite de ce document.

Tanpri ale sou sit wèb nou an pou w ka jwenn yon kopi dokiman sa a nan lòt lang

본 문서의 번역본은 저희 웹사이트에 있습니다.

Перевод документа помещен на нашем вебсайте.

Sea tan amable de visitar nuestro sitio web si quiere obtener una versión traducida de este documento.

اس دستاویز کی ترجمہ شدہ اشاعت حاصل کرنے کے لیے براہِ کرم ہماری ویب سائٹ ملاحظہ کریں۔

nyc.gov/schools/high

封面設計：HyunJi “Rachel” Yoon，Fiorello H. LaGuardia High School of Music & Art and Performing Arts 的學生。本出版物中的資訊在出版時是正確的，但可能會有所變更。如需最新資訊，請造訪 schools.nyc.gov/ChoicesEnrollment/High/specialized 或致電 718-935-2009。範例測試項目取自材料版權 © 1983-2016 NCS Pearson, Inc. 5601 Green Valley Drive, Bloomington, MN 55437。

紐約市教育局的政策規定，不論事實上或理解上的種族、膚色、宗教、教義、種族來源、國籍、外國人身分、公民狀態、殘疾、體重、性別或性取向為何，人人皆有平等受教育的機會，並要求一如法律所規定，持續防止有人根據上述任何理由作出騷擾之行為，包括性騷擾或報復。有關適用法律的問題，可詢問： 平等機會辦公室 (Office of Equal Opportunity) 主任，65 Court Street, Room 1102, Brooklyn, New York 11201。電話：718-935-3320

目錄

學生及家長/監護人須知 4

第1部分：特殊高中

The Bronx High School of Science 5
The Brooklyn Latin School 5
Brooklyn Technical High School. 6
High School for Mathematics, Science and Engineering at the City College of New York 6
High School of American Studies at Lehman College 7
Queens High School for the Sciences at York College 7
Staten Island Technical High School 8
Stuyvesant High School 8
Fiorello H. LaGuardia High School of Music & Art and Performing Arts 8

第二部分：特殊高中入學測驗（SHSAT）日期和地點

測驗日期 10
別的測驗日期 10
測驗地點 11
測驗結果 11

第三部分：FIORELLO H. LAGUARDIA HIGH SCHOOL OF MUSIC & ART AND PERFORMING ARTS 表演面

表演面試日期 12
表演面試的例外安排 12
新到紐約市的學生參加表演面試 12
錄取過程 12
報名參加拉瓜地亞高中表演面試 13
各工作室表演面試資訊 13

第四部分：申請特殊高中

申請過程中的各步驟 14
SHSAT測驗照顧安排. 15
拉瓜地亞高中表演面試照顧安排 16
SHSAT測驗和拉瓜地亞高中表演面試照顧安排的確認 16
選擇退出測驗照顧安排 16
獲得延長時間的學生在其延長時段結束之前完成測驗. 16
緊急測驗和/或表演面試照顧安排 17
大樓是否有殘障人士設施 17

第五部分：SHSAT測驗說明與測驗材料

測驗說明 18
SHSAT測驗程序 18
到達考場 18
填寫答題紙 19
學生不端行 21
對於測驗不當情況進行彙報 21
SHSAT評分 21
審核程序 21
探索計劃 22

第六部分：SHSAT實用測驗技巧

測驗日之前 23
測驗當天 23
具體策略：語言部分 24
具體策略：數學 30

SHSAT樣本試題

一般說明 32
表格A：樣本答題紙 34
樣本試題-表格A 36
表格A樣本試題正確答案解釋. 60
表格B：樣本答題紙 73
表格B：樣本試題 74
表格B樣本試題正確答案解釋 98
九年級學生樣本數學試題 110
9年級樣本數學試題正確答案解釋 113

特殊高中入學測驗

學生及家長/監護人須知

這份2016-2017學年特殊高中學生手冊含有以下實用資訊：

- 特殊高中入學程序
- 報名參加特殊高中入學測驗（Specialized High Schools Admissions Test，簡稱SHSAT）和拉瓜地亞音樂和藝術及演藝高中（拉瓜地亞高中）表演面試
- 確認SHSAT測驗和拉瓜地亞高中表演面試的測驗照顧
- 重要日期日曆
- 樣本SHSAT試題及應試技巧

紐約市共有九所特殊高中。它們是：

入學由表演面試決定	**拉瓜地亞音樂和藝術及演藝高中**	
	舞蹈	戲劇
	器樂	技術劇場
	美術	聲樂
入學由SHSAT決定	**THE BRONX HIGH SCHOOL OF SCIENCE**	
	THE BROOKLYN LATIN SCHOOL	
	BROOKLYN TECHNICAL HIGH SCHOOL	
	HIGH SCHOOL FOR MATHEMATICS, SCIENCE AND ENGINEERING AT THE CITY COLLEGE OF NEW YORK	
	HIGH SCHOOL OF AMERICAN STUDIES AT LEHMAN COLLEGE	
	QUEENS HIGH SCHOOL FOR THE SCIENCES AT YORK COLLEGE	
	STATEN ISLAND TECHNICAL HIGH SCHOOL	
	STUYVESANT HIGH SCHOOL	

這些學校是根據紐約州法律2590G部分而設立的。除了拉瓜地亞高中是以競爭性的表演面試和學生學業記錄審查為依據錄取學生，其它學校都按SHSAT成績錄取學生。學生必須是紐約市居民並且目前就讀8年級或第一次就讀9年級才能申請、報名、參加特殊高中入學測驗（SHSAT）和拉瓜地亞高中表演面試，並且收到測驗和表演面試結果。

有關特殊高中錄取的最新消息，請造訪： http://schools.nyc.gov/ChoicesEnrollment/High/specialized.

《特殊高中學生手冊》是紐約市教育局的項目。

THE BRONX HIGH SCHOOL OF SCIENCE

75 West 205th Street, Bronx, New York 10468
電話：(718) 817-7700 ■ **網站：** www.bxscience.edu
電子郵箱：golanc@bxscience.edu

概述： 布朗士科學高中（The Bronx High School of Science）以嚴謹的「科學、技術、工程和數學」（Science, Technology, Engineering and Mathematics，簡稱STEM）課程體系為具有學業天賦的學生群體提供教育。所有學科均在質詢的透鏡下教授，注重思考和解決問題的技能。學校培育多元化的終身學習者社區。在學生、教育工作者和校友們的共同協作和支援網絡中，學生發掘自己的興趣。貫徹理論和應用學習的平衡，學生探索複雜問題，並利用學校所提供的豐富資源形成解決方案。布朗士科學高中從傳統久遠的學業成功中汲取資源，幫助學生為在最佳高等教育院校中茁壯成長作好準備。學校創造未來的領袖和設想者。學校著名校友有八名諾貝爾獎獲得者和六名普利策獎獲得者。

學業課程：布朗士科學高中開設30門大學先修（Advanced Placement，簡稱AP）課程和很多「AP後」課程（即第二年大學課程）。學校開設七門外語；生物學、化學、物理學、數學、技術、人文、音樂的多門選修課；還有三年的STEM或社會科學獨立研究課程。學生也可以選擇計算機科學和工程方面的系列，這些課程強調科學原則實際操作的應用。學校網站提供全面的課程說明。

課外活動： 課外活動包括70多個課後俱樂部、43支運動隊、一支享有國際聲譽的演講和辯論隊、模擬審判隊、兩個機器人小組、兩部劇場製作、S!NG、一份報紙和畢業紀念冊及學術期刊。

2016年入學：19,456名學生在SHSAT上將布朗士科學高中列作一項學校選擇，其中962名學生被錄取。

THE BROOKLYN LATIN SCHOOL

223 Graham Avenue, Brooklyn, New York 11206
電話：(718) 366-0154 ■ **網站：** www.brooklynlatin.org
電子郵箱：parents@brooklynlatin.org

概述：以建校於2006年的著名波士頓拉丁學校（Boston Latin school）為模式，布碌崙拉丁學校（Brooklyn Latin School/TBL）開設人文教育課程和拉丁文教學。幼教強調基本學科的核心知識的學習。這些核心知識是學生在高年級進行更深入探索的基礎。國際學士（International Baccalaureate，簡稱IB）課程在世界上被廣泛認同為高中程度學習最嚴謹和最具綜合性的課程，是本校課程體系的重要構成部分。在所有課程中，學生體驗對結構化寫作和公開演講的突出和持續的強調，並擁有各種機會鍛煉自己的分析性思考，這一切都有助於他們為迎接大學功課挑戰而作準備。

學業課程： 所有學生均必須完成四年的拉丁語、歷史、數學、英語和科學學科的學習，並完成至少兩年的一門世界語言的學習和一年的藝術史學習。我們的許多課程設有公開演講鍛煉（如宣講會和蘇格拉底式討論會）和科學實驗室與數學試題集的口頭陳述。此外，我們的許多課程還設有寫作練習（如科學實驗報告）、西班牙語作品集和散文、數學建模論文和拉丁文視譯。IB課程對學生帶頭的質詢、全球視角、國際化思維和個人誠信的強調完美地適應本校建基所在的理想。除了富於挑戰性的課堂功課外，國際學士課程強調獨立思考和社區參與。為獲得IB文憑，學生應完成一個獨立研究項目，並在項目結束時寫完一篇自己所選擇的一個主題的4,000詞論文 一一, 一項與大學程度研究寫作密切相關的任務。他們必須學習一門持續兩年的認識論課程。這門名為「知識理論」（Theory of Knowledge/TOK）的課程，指導學生考慮知識建構的方式；學生在課程結束時寫成一篇研究論文和進行演講。此外，學生必須參加涉及創意、服務和反思且持續18個月的活動。「創意、行動和服務」（Creativity, Action and Service/CAS）可能包括在TBLS社區和更大的社區做志願工或有效參與。IB文憑的這些要求幫助我們的學生成長為這一世界的全面發展公民。

課外活動： 了提供學生課堂之外能力的強化活動，並幫助學生完成其CAS項目的要求，TBLS目前支持40多種課外活動，其中包括運動隊（如男女生越野、羽毛球和足球、男生和女生排球、男生角力和女生排球俱樂部；美術和表演藝術的活動有工作室藝術、攝影、文學雜誌、舞蹈和人聲樂團（a cappella）；另有各種其他團體，如校報、STOKED、數學俱樂部、科學奧林匹亞、模擬聯合國等等。

2016年入學：16,962名學生在SHSAT上將布碌崙拉丁學校列作一項學校選擇，其中409名學生被錄取。

BROOKLYN TECHNICAL HIGH SCHOOL

29 Fort Greene Place, Brooklyn, New York 11217
電話： (718) 804-6400 ■ **網站：**www.bths.edu
電子郵箱：info@bths.edu

概述：布碌崙科技高中（Brooklyn Technical High School，簡稱Brooklyn Tech）是全國最大的公立高中。學校設於一幢在21世紀復蘇的技術設備最先進的工廠，是全國的優異模範和扶持轉變教育和個人成長的的激勵環境。以現代科技為核心，擁有符合大學和工業標準的實驗室和教室，布碌崙科技是教職員工和學生得以探索和接受將塑造未來的新思想、科技和教學方法的活躍知識場所。

學業課程：在9年級和10年級，所有學生都學習一門學業核心（包括設計和製造及數碼電器的大學學分課程）。在11年級和12年級，布碌崙科技學生從下列各大專業領域中選擇一個專業：航空航天學、建築學、生物科學、化學、市政工程、大學準備、經濟與金融、電氣工程、環境科學、醫學之路、工業設計、法律和社會、應用數學、機電與機器人學、媒體和數位動畫、物理學、社會科學研究或者軟件工程。另外，學校開設基於表演的音樂、競賽數學和研究機會等的選修課。

課外活動：布碌崙科技無與倫比的學習環境得到43支PSAL運動隊及120多項活動和俱樂部的進一步增強。工業和高等教育合作機構以及一個十分活躍的校友社區以課堂強化、導師指導和實習等合作方式幫助學校持續著優異的水平。

2016年入學：23,169名學生在SHSAT上將布碌崙科技高中列作一項學校選擇，其中1,939名學生被錄取。

HIGH SCHOOL FOR MATHEMATICS, SCIENCE AND ENGINEERING AT THE CITY COLLEGE OF NEW YORK

240 Convent Avenue, New York, New York 10031
電話： (212) 281-6490 ■ **網站：** www.hsmse.org
電子郵箱：info@hsmse.org

概述：紐約城市學院的數理及工程高中（The High School for Mathematics, Science and Engineering/HSMSE）創辦於2002年9月，提供獨特和無與倫比的協作教育體驗。學校使命在於激勵和培養學生的質詢、寫作和口頭表達以及批判性思考的習慣。HSMSE從全市五大行政區招收450名學生，是紐約市最　多元化的大學之一。本校嚴謹的學業環境著重數學、科學和工程，同時強調作　　源動力的公民責任和知識價值。HSMSE教職員工定期在一起共同合作制訂課程方案、發展課程體系並溝通最佳方法。他們的精深專業和個人經歷豐富著學習社區；很多教職工成員擁有博士學位，所有成員均擁有高級學位。他們很多人在成　教師之前都在商業、工程和其他領域取得了卓越成就。

HSMSE員工定期開展個人和小組諮詢討論會，並協調開展Big Sib/Little Sib計劃，以為高年級學生與低年級學生牽線搭橋，使前者成為後者的朋輩導師。因　與The New York Foundling的合作關係，HSMSE建立了健康保健中心，並在中心配備一位專職心理健康醫師。HSMSE主辦了具有總體主題的研討會，參會的工業合作機構派出了不同部門的發言人，以對某個特定工作或公司進行全方位的分析。參加的學生可以申請合作公司的暑期研究、見習和／或就業機會。

學業課程：HSMSE教職員工規劃的課程包括學生討論和協作學習，旨在培養和提高學生的問題解決技能。所有學生都學習四年的數學和科學課程。核心課程每兩天上90分鐘課，使學生有時間能從事親自實踐的活動和展開深度的討論。學生每天都有一節45分鐘的選修強化課；課程選擇有：烹飪、天文學、微軟辦公室用戶證書、美術、詩歌寫作、爵士樂隊和古典吉他。學生在10年級春季時從三大專業中選擇一項：數學、西奈山（Mount Sinai）醫學生物醫學研究計劃或工程。HSMSE擁有紐約州最大規模的德語課程。學校以多種方式提供大學學分課程：為所有學生開設的大學先修（Advanced Placement）課程及由紐約城市學院（CCNY）和紐約市立大學（CUNY）「現在上大學」（College Now）計劃合作為符合資格的學生開設的紐約市立大學課程。

課外活動： 紐約城市學院的巴斯克維爾大廳（Baskerville Hall）面對學院的方庭，使學生能在陽光明媚的日子身處綠色環境中用午餐、交往和休息。學生可以在課後參與大量課外活動和PSAL運動，包括美國少年政治家（Junior Statesmen of America）、模擬法庭、模擬審判、模擬聯合國和國際鑰匙俱樂部（Key Club International）。另外，HSMSE開設有乒乓、排球、舞蹈、啦啦隊和策略遊戲俱樂部。HSMSE學生參加歌德學院（Goethe Institute）和美國德語教師協會（American Association of Teachers of German）贊助的全國競賽，爭取到德國學習的機會。每一年，HSMSE至少有一名學生能成功勝出，獲得到

德國免費旅行兩個星期的機會。在學年中，學校主辦去波士頓學院、麻省理工學院、普林斯頓、布朗大學和密歇根大學的大學參觀活動。

2016年入學：19,308名學生在SHSAT上將城市學院數理及工程高中列作一項學校選擇，其中184名學生被錄取。

HIGH SCHOOL OF AMERICAN STUDIES AT LEHMAN COLLEGE

2925 Goulden Avenue, Bronx, New York 10468
電話： (718) 329-2144 ■ **網站：** www.hsas-lehman.org
電子郵箱：atrebofiore@schools.nyc.gov

概述：李曼學院美國研究高中（The High School of American Studies at Lehman College/HSAS）注重美國歷史的研究，為學生提供全面的學業課程，目的在於幫助學生做好準備入讀競爭激烈的大學和從事政治、法律、新聞、商業、科學、數學和藝術方面的職業。我們竭盡全力謀求激勵學生的學習熱情和探索精神。

學業課程：所有學生都進行三年的美國歷史編年研究。我們的目標是，在使用主要的來源文件、影片、傳記、文學作品和創造性教學方法中，讓歷史變得栩栩如生。在基達利文學院（Gilder-Lehrman Institute）的支援下，學生透過參觀富有歷史重要意義的地點及城市，參與嘉賓演講人的特別講座，從而取得關於美國歷史重要事件的第一手知識。我們也開設數學、科學、憲法和刑法、文學、影視、外語、歷史以及藝術等學科的優秀生程度課程、大學先修課程和選修課程。我們課程的特色部分是著重大學程度研究技能和方法論的培養，因此，學生在從事個人化研究項目的過程中能得到學校和大學教職員工的支援。因　與李曼學院的合作，學生可以使用該學院的校園圖書館和運動設施，並可在十一年級和十二年級時修讀可計學分的大學課程和研習課。

課外活動：課後，學生可以參與廣泛的俱樂部活動，參加學校眾多運動隊中的一個，並參與模擬法庭、模擬審判、辯論和模擬聯合國等競賽活動。

2016年入學：17,061名學生在SHSAT上將李曼學院美國研究高中列作一項學校選擇，其中159名學生被錄取。

QUEENS HIGH SCHOOL FOR THE SCIENCES AT YORK COLLEGE

94-50 159th Street, Jamaica, New York 11433
電話： (718) 657-3181 ■ **網站：**www.qhss.org
電子郵箱：lgibson4@qhss.org

概述：約克學院皇后區科學高中（Queens High School for the Sciences at York Colleg）與約克學院（York College）合作，致力提供嚴謹課程體系，著重科學和數學學習。學校理念是：學生在一個小型學習社區接受教育時能更加成功。學校使命是：培養勤奮的學習者和獨立思考者，啟發學生取得優異的學業成績，使他們為競爭激烈的環境和高等教育的挑戰做好準備。

學業課程：學校開設小班規模的標準高中課程（如英語、社會知識、科學和數學），也開設所有學業科目的各種選修課以及美術、音樂和語言課程。大學先修（Advanced Placement，簡稱AP）課程有生物學、微積分AB、微積分BC、化學、中文、英語和作文、環境科學、物理學1、西班牙語、美國歷史和世界歷史，合格的學生可以選修。學生還有機會參加紐約市立大學（ity University of New York/CUNY)的「現在上大學」（College Now）課程，包括生物學、社會學、健康服務、營養和健康、微積分預科及心理學。開設的課程每年會有變化。除了開設富有教育效果的小班課程，學生並得到教師和優秀生的輔導。輔導員支持和協助學生，解決其各方面的問題，尤其是大學選擇和申請方面的問題。

課外活動：由於本校設於約克學院的校園內，學生可以在高中時享用一流的設施，例如約克學院的圖書館、體育館、游泳池、劇院和飯堂/飲食廊。學生可以參加各種俱樂部（具體開設情況取決於學生建議和教職工的能力），包括模擬聯合國、國際特赦、棋藝、Sigma女生會、哲學、籃球、Key俱樂部等。學校運動隊有男生和女生游泳、女生保齡球以及男女生網球和手球。

2016年入學：16,592名學生在SHSAT上將約克學院皇后區科學高中列作一項學校選擇，其中157名學生被錄取。

STATEN ISLAND TECHNICAL HIGH SCHOOL

485 Clawson Street, Staten Island, New York 10306
電話： (718) 667-3222 ■ **網站：** www.siths.org
電子郵箱：BMalenfant@schools.nyc.gov

概述：Staten Island Technical High School（史丹頓島科技高中）的大學預備課程提供豐富的人文課程，包括科學、技術、工程、藝術和數學（Science, Technology, Engineering, Arts and Mathematics，簡稱STEM）課程以及最前沿的職業和技術教育（Career and Technical Education，簡稱CTE）課程。因一項1:1數碼教育創新（1:1 Digital Education Initiative）計劃，所有9年級學生都收到一台電腦，這台電腦可供學生在四年高中生涯中在學校和在家裏使用。60%以上的教師執教大學先修課程（Advanced Placement，簡稱AP）以及其它大學程度課程。

學業課程：學生學習四年的數學課程及所有學科領域的大量STEM和AP課程，並能夠選擇參與科學和工程研究（cience & Engineering Research）計劃，這個計劃讓參與者參加紐約市科學和工程展（NYC Science and Engineering Fair）、英特爾科學天才搜尋（Intel Science Talent Search）、Google和生活品質（Quality of Life）諸項競賽，因此其學習程度超出核心課程的學習。所有9年級學生學習一門精進寫作（Intensive Writing）課程和大學委員會制訂的與共同核心相一致的英文「跳板」（Springboard）課程。這些課程幫助所有學生為AP語言及AP文學和作文課程的學習做準備。所有學生在畢業時都通過至少兩門或三門AP社會知識課程，並學習了三年的俄語課程。另外，一個混合學習計劃也在高中第四年開設一門普通話、拉丁文、德語、法語、意大利語或西班牙語的第二語言課程。

職業與技術教育（CTE）課程開設工程預科、AutoCAD、數碼-模擬電子學、電視演播廳工程和計算機科學課程以及一個龐大的工作學習大學和職業探索（Work Based Learning College and Career Exploration）系列。這一探索系列擁有職業討論、工作跟隨學習、職業和大學展覽會以及實習。所有學生都學習CTE課程。

學校與紐約市立大學「現在上大學」（College Now）課程、紐約州立大學高中機會（SUNY University in the High School）、聖約翰大學「大學優勢」（College Advantage）及聖洛斯學院（College of St. Rose）合作，為學生提供獲得在畢業時修得15到60個大學學分的機會。

課外活動：課外活動計劃擁有100多個課後俱樂部和活動（如機器人、辯論、科學/俄語奧林匹亞）及44個PSAL運動隊。學生組織、全國優秀生學會和美國少年政治家（Junior Statesmen of America）這幾個組織是學生領袖的主綫，而對藝術感興趣的學生可以參與九個不同的樂隊（包括爵士、軍樂隊和樂團）以及劇場製作。

2016年入學：15,490名學生在SHSAT上將Staten Island Technical High School（史丹頓島科技高中）列作一項學校選擇，其中346名學生被錄取。

STUYVESANT HIGH SCHOOL

345 Chambers Street, New York, New York 10282-1099
電話： (212) 312-4800 ■ **網站：**www.stuy.edu
電子郵箱：02M475@schools.nyc.gov

概述：史岱文森高中的使命是為學生提供嚴謹學業課程，培養和激發學生的智力探索興趣。雖然史岱文森一向以其數學、科學和技術教學之強得到公認，學校也擁有活躍和多元的文科課程以及獨特的課外教育機會。

學業課程：學校的強化課程包括畢業所要求的必修課程，也讓學生有機會選修不同科目的很多高級課程和選修課。除了大量大學先修課程，這些課程選擇還包括研究、多變數微積分、有機化學、存在主義以及華爾街。

課外活動：學校非常自豪於45支PSAL運動隊及機器人、數學小組、言語和辯論、科學奧利尼亞、棋藝、模擬聯合國、美國少年政治家等課外活動。學校擁有很多主要出版物、100多個由學生主持的俱樂部以及一個十分活躍的學生會。對音樂有興趣的學生可以參加交響樂隊、交響樂團、爵士樂隊以及很多合唱組。

2016年入學：22,476名學生在SHSAT上將史岱文森高中列作一項學校選擇，其中950名學生被錄取。

FIORELLO H. LAGUARDIA HIGH SCHOOL OF MUSIC & ART AND PERFORMING ARTS

100 Amsterdam Avenue, New York, New York 10023
電話：(212) 496-0700 ■ **網站：** www.laguardiahs.org
電子郵箱：admissions@laguardiahs.org

作為第一所也是最頂尖的致力於培育藝術專注學生的高中，拉瓜地亞音樂和藝術及演藝高中享有國際聲譽。拉瓜地亞高中的雙重使命是既貫徹嚴格藝術學校專業訓練又進行嚴謹綜合學業課程教育，為學生提供獨一無二地平衡二者的教育體驗。

工作室課程： 舞蹈課程**學生** 學習芭蕾舞和現代舞；輔助課程包括：舞蹈史、編舞、劇場舞蹈（踢躂舞和爵士舞）、職業管理和專業技能。戲劇課程**學生** 學習演戲、聲線及語言運用、形體技巧、戲劇歷史以及劇本分析，重在為劇場做準備。在**美術**課程中，學生接受兩年的傳統技能和學科訓練，包括繪畫、水性媒介繪畫、平面設計、油畫和丙烯酸繪畫。在學習核心美術課程之後，學生接著學習上述科目和其它選修科目方面的藝術教育高級課程。選修課程有：建築學、藝術史、陶藝、電腦繪圖、壁畫、攝影、版畫以及雕塑。技術劇場課程**學生**接受佈景設置、燈光技術、服裝結構、聲音品質、舞臺管理、技術畫圖以及設計方面的實際訓練。技術劇場學生參與拉瓜地亞高中各種活動的製作和演出兩方面的活動。器樂**和**聲樂課程**學生**學習視唱、音樂理論和音樂史。器樂工作室表演團體包括四個交響樂團、兩個管樂隊、兩個爵士樂隊和三個樂池伴奏團。學生還有機會作曲、指揮和演出原創作品。

聲樂工作室表演團體包括初級、混合、女生、女子以及12年級合唱團；福音合唱隊；舞動合唱團；以及一個歌劇製作組。在聲樂上，學生接受意大利、德國和法國聲樂作品的訓練。音樂選修課有室　樂、吉他、音樂技術和歌詞寫作。

每個工作室都要求學生在放學後大量時間的參與，包括排練和表演，還有劇場技術課的實際應用和畫廊管理技術。在各個表演時間中，教學日會更延長，而學生必須列席和參與課程相關的課後表演和活動內。

表演面試 在本校舉行。學生必須到自己的輔導員處預先報名參加表演面試。請參看第12-13頁關於拉瓜地亞高中表演面試資訊。

學業課程：拉瓜地亞高中學生超過了紐約市教育局大學和職業準備度基準。如DOE所概述，這些基準「定義了學生需要達到的素質和成就，以準備好參加、堅持進行大學和高等教育訓練並在訓練中取得成功，以及進入有意義的職業生涯。」 學校嚴謹的學業課程包括畢業所要求的必修課程、紐約市立大學學分課程以及以下學科的20多個大學先修（Advanced Placement，簡稱AP）課程：英語、英國文學、義大利語、法語和西班牙語語言和文化、微積分、統計學、生物學、化學、環境科學、物理學、心理學、政府與政治、美國歷史、人文地理學、世界歷史、藝術史、工作室藝術和音樂理論。除工作室專業課程外，學生還需完成此課程。

課外活動：學生積極參與21支PSAL運動隊和大量課外活動，如數學小組、言語和辯論、科學奧林匹克、棋藝、模擬聯合國、ARCHON和ARISTA優等生聯合會。學生參加50多個由學生主持的俱樂部以及一個十分活躍的學生會。

2016年入學：1,148名學生從12,826名申請學生中脫穎而出，得到一個或以上課程的錄取。

SHSAT日期和地點

所有目前在公立學校、私立學校和教會學校就讀8年級和首次就讀9年級的學生，如果申請一所或多所紐約市特殊高中（拉瓜地亞高中除外），就必須參加特殊高中入學測驗。大約有28,500參加了甄別2016年9月入學機會的SHSAT測驗。

有興趣參加SHSAT的學生應在「要求參加測驗」（Request for Testing/RFT）時期　與自己的輔導員討論。

學校將給學生發一張准考證，上面將列明規定學生參加考試的日期和時間以及特定地點。

學生必須在所安排的日期和地點參加測驗。測驗地點列於第11頁，學生被安排到就讀學校所在的地理區域的一個考場參加考試。若有時間衝突，學生應在測驗日期之前將這一情況報告給輔導員。

2016年9月8日-10月13日

「要求參加測驗（RFT）」時期

學生到輔導員那兒去登記參加SHSAT和拉瓜地亞高中表演面試。

2016年10月19日

准考證開始發放

測驗日期（考場參看第11頁）	
■ 所有目前就讀八年級的學生	**2016年10月22日（星期六）** **2016年10月23日（星期日）**
■ 所有目前就讀九年級的學生 ■ 8年級或9年級學生中的英語學習生或者擁有個別教育計劃（IEP）或504計劃的殘障學生。* ■ 補考申請	**2016年10月30日（星期日）** **2016年11月5日（星期六）**
■ 新到紐約市的學生（記錄必須顯示學生是在11月考試日後才到紐約市）	**2017年夏季末**

其它測驗日期

- 如果學生需要一個不與自己的星期六或星期日宗教儀式構成衝突的考試日期安排，必須在「要求參加測驗（RFT）」時期內告知輔導員。如果學生的准考證列出的日期錯誤，則應告訴輔導員，這樣准考證可以得到更正。
- 如果學生因生病而不能在預定日期參加考試，則學生必須立即在返校當日通知輔導員，出示醫療證明，並向輔導員要求安排一個補考日期。
- 在確認一則有效的補考申請時會要求提供有關證明。輔導員必須遞交學生要求補考的申請和所要求的醫療證明，10月30日的補考必須在10月26日之前要求，而11月5日的補考必須在11月1日前要求。

*更多有關英語學習生和曾為英語學習生的學生的資格資訊列於第15頁。

測驗地點		
在以下地點上學的8年級和9年級學生：	**測驗地點**	**地址**
Manhattan	Stuyvesant High School	**345 Chambers Street, New York, NY 10282** **電話：**(212) 312-4800 **地鐵：**1號、2號、3號、A、C、E車到Chambers Street；R車到City Hall **巴士：**M20, M22, M5, M9, X1, X10
Bronx	The Bronx High School of Science	**75 West 205 Street, Bronx, NY 10468** **電話：**(718) 817-7700 **地鐵：**4號車到Bedford Park Boulevard-Lehman College；B、D車到Bedford Park Boulevard **巴士：**Bx1, Bx10, Bx2, Bx22, Bx26, Bx28, Bx3
Brooklyn 學區 13, 14, 15, 16, 17, 20, 32	(Brooklyn Technical High School)	**29 Fort Greene Place, Brooklyn, NY 11217** **電話：**(718) 804-6400 **地鐵：**2、3、4、5號車到Nevins Street，A車到Hoyt & Schermerhorn；B、Q、R車到 DeKalb Avenue；C車到Lafayette Avenue；D、N車到Atlantic Avenue-Barclays Center；G車到Fulton Street **巴士：**B103, B25, B37, B38, B41, B45, B52, B54, B62, B63, B65, B69
Brooklyn 學區 18, 21, 22, 23	James Madison High School	**3787 Bedford Avenue, Brooklyn, NY 11229** **電話：** (718) 758-7200 **地鐵：**B、Q車到Kings Highway **巴士：**B100, B2, B31, B44, B49, B7, B82, BM3, BM4
Brooklyn 第19 學區 Queens 學區 27, 28, 29	Hillcrest High School	**160-05 Highland Avenue, Jamaica, NY 11432** **電話：** (718) 658-5407 **地鐵：**E、J、Z車到Jamaica Center-Parsons/Archer；F車到Parsons Boulevard **巴士：**Q1, Q110, Q111, Q112, Q114, Q17, Q2, Q20A, Q20B, Q24, Q3, Q31, Q34, Q36, Q40, Q41, Q43, Q56, Q6, Q65, Q76, Q77, Q8, Q83, Q9, X68
Queens 學區 24, 25, 26, 30	Long Island City High School	**14-30 Broadway, Long Island City, NY 11106** **電話：**(718) 545-7095 **地鐵：**N、Q車到Broadway **巴士：**Q100, Q102, Q103, Q104, Q18, Q66, Q69
Staten Island	史丹頓島科技高中	**485 Clawson Street, Staten Island, New York 10306** **電話：**(718) 667-3222 **地鐵：**乘史丹頓島鐵路（SIR）到New Dorp **巴士：**S57、S74、S76、S78、S79-SBS

註：不是每個考點都在11月5日開放的。請檢查自己的准考證上列出的精確考點。

測驗結果

請注意，入讀拉瓜地亞高中不需要參加SHSAT測驗。有關所有其它特殊高中，錄取一概都根據學生的SHSAT分數、學生在其SHSAT答卷上對特殊高中的志願排序以及學校名額情況決定。SHSAT分數將與2017年3月高中入學第一輪（High School Admissions Round One）結果一起發佈。如何確定學生被一所特殊高中錄取：

- 參加該測驗的全體學生的所有分數被排列成最高分到最低分。
- 獲得最高分的學生被安排到其第一志願學校（其答卷紙上最高優先排序的學校）。
- 按順序從最高分往下排列，每一名學生依次被安排入讀仍有入學名額的、其志願排名最靠前的學校。因此，如果學生首選學校的所有入學名額都已被安排給了得分更高的學生，那麼，如果其第二志願學校仍有入學名額，該學生將被安排到該校。如果其第二志願學校的所有入學名額都已經被安排給了得分更高的學生，那麼，如果該生第三選擇的學校仍有入學名額，該生將被安排到該校。依此類推。這一過程一直繼續，直至這八所入學安排由SHSAT結果決定的高中當中的任何一所學校都不再有入學名額 止。

根據學校自身的招生數量，每一所特殊高中提供的入學安排和預期的名額數量每一年都可能會有變化。

2016年9月8日-10月13日

到你的輔導員那裏報名參加拉瓜地亞高中表演面試。

2016年10月19日

表演面試准考證開始發放

2016-2017學年表演面試日期

所有表演面試都在拉瓜地亞高中舉行。表演面試日期是根據學生就讀學校所在的行政區以及學生姓氏的首字母而安排，而不是根據學生的家庭住址安排的。

行政區	姓氏	表演面試組別	日期	開始時間
Bronx	A–L	參加舞蹈表演面試的學生	2016年11月5日（星期六）	上午08:00
Bronx	M–Z	參加舞蹈表演面試的學生	2016年11月6日（星期日）	上午08:00
Bronx	A–Z	參加一個或多個工作室（但不包括舞蹈）面試的學生	2016年12月3日（星期六）	上午08:00
Brooklyn	A–Z	參加兩個或更多工作室的表演面試的學生或技術劇揚表演面試的學生	2016年10月29日（星期六）	上午08:00
Brooklyn	A–L	參加一個工作室（但不包括技術劇場）的表演面試的學生	2016年10月30日（星期日）	上午08:00
Brooklyn	M–Z	參加一個工作室（但不包括技術劇場）的表演面試的學生	2016年10月30日（星期日）	上午11:30
Manhattan	A–Z	參加兩個或更多工作室的表演面試的學生或技術劇揚表演面試的學生	2016年11月5日（星期六）	上午08:00
Manhattan	A–L	參加一個工作室（但不包括技術劇場）的表演面試的學生	2016年11月6日（星期日）	上午08:00
Manhattan	M–Z	參加一個工作室（但不包括技術劇場）的表演面試的學生	2016年11月6日（星期日）	上午11:30
Queens/ Staten Island	A–Z	參加兩個或更多工作室的表演面試的學生或技術劇揚表演面試的學生	2016年11月19日（星期六）	上午08:00
Queens/ Staten Island	A–K	參加一個工作室或技術劇場的表演面試的學生	2016年11月20日（星期日）	上午08:00
Queens/ Staten Island	L–Z	參加一個工作室或技術劇場的表演面試的學生	2016年11月20日（星期日）	上午11:30

表演面試的例外安排

如果學生的表演面試日期與你遵循的某一宗教節日的日期有衝突，學生可以在其學校所安排的周末（星期六或星期日均可）參加面試。

如果學生的SHSAT日期/時間安排與其拉瓜地亞高中表演面試的時間安排有衝突，學生必須直接打電話或寫電子郵件與拉瓜地亞高中聯絡，要求安排另外的表演面試日期。

若學生由於生病／受傷而需要另作安排，拉瓜地亞高中可能要求學生提供醫生證明。

新到紐約市的學生參加表演面試

2017年暑期結束時（正式記錄必須證明學生是在2016年11月1日之後成　紐約市居民的）。

錄取過程

■ 拉瓜地亞高中入學是根據競爭激列的表演面試和對學生學業記錄的審查，以確保學生在要求嚴格的工作室學習和富有挑戰性的學業課程中均能取得成功。

■ 學生如果要參加拉瓜地亞高中一個或多個工作室的表演面試，必須告訴輔導員有關參加表演面試的意向，並說明希望參加哪個（哪幾個）工作室的表演面試。輔導員將在「要求參加測驗」（RFT）時期為學生提供一張反映學生要求的收條，並在表演面試日期之前給學生發放准考證。

■ 成功的考生應在其表演面試的藝術形式上展現出中級至高級水準。學校根據考生準備表演面試的情況、對自己報考的藝術形式付出努力的程度、技術的熟練程度和藝術性表達來評估學生。收到一項或多項工作室的入學安排的多數學生，除了擁有一個令人滿意的學業記錄之外，一般也獲得工作室表演面試規定80-100分的成績。

■ 所有申請學生都必須攜帶其表演面試准考證，才能進入相應的考場。考場不接受RFT程序所印出的收條。對於就讀非公立學校（私立學校或教會學校）的學生，其報名參加的每一個工作室的表演面試都分別需要一份前一學年的成績報告卡和/或成績單。例如，如果學生在面試兩個工作室，則學生必須提供出示兩張面試准考證和兩份成績報告卡。學校僅只評估學生在前一學年的正式成績。學校將不會根據學生後來提高的任何學業成績進行評估。

報名參加拉瓜迪亞高中面試

■ 如果學生有意申請入讀拉瓜地亞高中六項工作室中的一項或多項課程，學生應仔細閱讀本手冊和 *《2017年紐約市高中指南》中所列的表演面試要求，* 為表演面試做好準備。

■ 拉瓜地亞高中可能會要求那些報名參加兩個以上工作室以上的學生參加一天以上時間的表演面試。如果學生屬於這一情況，應要求輔導員直接跟進拉瓜地亞高中進行諮詢。

■ 有資格獲得測驗照顧的英語學習生（ELL）以及其個別教育計劃（IEP）或504計劃上規定有測驗照顧的殘障學生將獲得拉瓜地亞高中面試測驗照顧，但是這樣的照顧不能對所衡量的　容或技能構成阻礙。

■ 凡是將在拉瓜地亞高中表演面試中使用照顧資格的殘障學生和英語學習生以及符合資格的曾是英語學習生的學生，在「要求參加測驗」（RFT）時期的截止日之前，必須將任何有關照顧資格的材料（如學生的IEP、504計劃，或一份有學校正式信頭的說明學生在學校環境中接受英語學習生支援並經簽名的信函）直接送交拉瓜地亞高中。送交拉瓜地亞高中的材料可以傳真到212-724-5748，也可電郵到 **admissions@laguardiahs.org.**

■ 雖然學生面試准考證上所列的時間可能不是表演面試的實際開始時間，但是學生必須準時到達參加面試。學生應隨帶一份零食和/或飲水。

■ 在面試期間，另設有一個家長/監護人等待/迎候區域，因　他們不可以進入面試區域。家長/監護人也可以選擇在任何時間離開之後又重新進入學校大樓。切記，學生應該自己攜帶有食物/飲水，與家人的其它任何交流都必須發生在面試程序開始之前。

每一個工作室的面試資訊

總計12,826名學生參加了2016-2017學年拉瓜地亞高中六個工作室的一個或多個工作室入學安排的表演面試。學生可以參加以下工作室的表演面試。只有居住在紐約市的學生才有資格申請和參加表演面試。

舞蹈 課程申請學生參加一個芭蕾舞與一個現代舞表演兩者的表演面試。女生必須穿著連身舞衣、無足緊身褲或可變換（Covertible）襪褲和芭蕾舞鞋。男生應該穿著合身T恤衫、黑色長緊身褲襪、合身黑色運動褲或黑色緊身褲和芭蕾舞鞋。申請者將被評估其將在具體的舞蹈訓練中取得成功的潛力程度。

戲劇 課程申請學生應準備好表演兩段有強列對比的一分鐘獨白。申請者將被要求作一次即興誦讀並參與一次面談。申請者應穿著能使自己自由活動的服裝，因為申請者可能會被要求展示肢體動作的靈活程度。

美術 課程申請學生必須攜帶8-15件自己創作的藝術作品，這些作品必須是以多種不同媒介創作的。這些藝術作品應是通過觀察、想像與來自記憶創作的，並標示恰當。三維（3D）作品的相片（非原作）也可放入到作品集內。在面試時，學生將接完成三項繪畫作業，包括觀察速寫人物、記憶靜物素描以及想像創作彩色繪畫。面試所需的所有材料將在面試時間由學校提供。

器樂 課程申請學生應準備一首無伴奏獨奏曲參加面試，並隨帶一份自己用於面試的曲譜。申請者應將自己的樂器帶到面試現場。如果是面試鋼琴、打擊樂器、低音號（tuba）、低音大提琴和豎琴，則不用攜帶樂器。這些樂器將在面試時間由學校提供。學校也將在表演面試時為電子吉他學生提供擴音箱。申請人將接受節奏與音調記憶測驗，並將被要求完成一項指定選段的視讀考試。

技術劇場 課程申請學生應攜帶一份預先準備的3D設計模型/立體圖型和立體圖型照片，在面試時展示。申請者將被要求參與技術劇場一方面或多方面的小組實際操作考評。

聲樂 課程申請學生應準備一首歌曲，在表演面試中無伴奏演唱。所選歌曲可以是古典風格，也可以是流行風格。在面試時，學生將被要求重復唱出考官給出的旋律模式，給考官給出的節奏模式打拍子。拉瓜地亞高中在下列網站上有一些建議歌曲：**www.laguardiahs.org**；但是學校並不要求學生一定從這些歌曲中選擇。

申請特殊高中

1 聯絡輔導員

從9月初開始，在「要求參加測驗」（RFT）時期之 ，學生應聯絡自己的輔導員，說明自己參加SHSAT測驗和/或拉瓜地亞高中表演面試的意願。

2 取得測驗或表演面試的准考證

在測驗/表演面試日期前，學校的輔導員將為學生提供特殊高中入學測驗准考證和/或拉瓜地亞高中表演面試准考證。該准考證上印有測驗/表演面試的考場地點、日期和時間、學生身分號碼以及學生目前就讀學校的學校代碼。如果學生與指定的測驗或表演面試日期有衝突，學生應立即通知自己的輔導員，以便安排另外的測驗或表演面試日期。測驗和表演面試的准考證一旦發出，學生應按照准考證上面的日期和時間到達考試地點。SHSAT考場不是根據學生目前的家庭住址安排的，而是根據學生目前就讀學校的地點分配的。拉瓜地亞高中表演面試日期和時間是根據學生目前所上學校所在的行政區決定的。

3 核實測驗或表演面試准考證

學生和家長/監護人應核測驗或表演面試准考證上的所有資訊，確保精確無誤。英語學習生和殘障學生應核對自己的准考證，確保得到了恰當照顧安排和恰當測驗日期安排（參看第10頁和12頁）如果測驗或表演面試准考證上的資訊有誤，學生應立即通知輔導員。

4 填妥測驗或表演面試准考證並簽名，並獲得家長/監護人簽名

學生及其家長/監護人必須在考試之前在測驗或表演面試准考證上簽名。參加SHSAT測驗的學生，應按照自己對學校選擇的志願次序，將自己希望申請的最多八所特殊高中予以排序。學生將在考試當日把這些選擇按序填到答卷紙上。學生可以選擇只申請一所學校，也可以 了增加自己被其中一所特殊高中錄取的機會而申請多達八所學校。學生應只列出如果得到入學安排自己願意入讀的學校。在測驗當天遞交了這些選擇之後，就不可以更改了。拉瓜地亞高中表演面試准考證將顯示學生在「要求參加測驗」（RFT）時期申請參加的表演面試的工作室。學生應將自己將參加的每一個表演面試的准考證都複印一份。

5 參加SHSAT或表演面試

參加SHSAT的學生必須在測驗當天將測驗准考證帶到指定考場。參加拉瓜地亞高中的一項或多項工作室表演面試的學生也同樣必須把自己的表演面試准考證帶上。

沒有帶准考證到場的學生可能進不了考場。雖然考場將盡一切努力確認某個學生的考試報名並酌情安排那些沒帶准考證的學生，有可能需要另外安排測驗或表演面試日期。學生應按照測驗或表演面試准考證上註明的時間準時到達，但是學生也必須明白，測驗或表演面試也許會在測驗或表演面試准考證上列出的到達時間之後才開始。

學生可以將手機帶到SHSAT考場和/或拉瓜地亞高中，但是在學校大樓 時，必須將手機關機，而且手機不在使用的狀態。不能攜帶其它電子用品。在表演面試或SHSAT開始之前，學生必須準備好在被要求交出手機時要交出手機。

在SHSAT和拉瓜地亞高中表演面試時，學生都可隨帶一份零食和飲水；但是，考場和面試地點的工作人員（包括監考人和面試官）將決定什麼時候可以允許食用。

6 接到考試結果

學生必須是紐約市居民，才可以收到SHSAT測驗的結果和/或拉瓜地亞高中工作室的安排。在2017年三月，學生將收到高中入學第一輪結果通知，該信函將說明學生是否得到了特殊高中的入學安排。參加拉瓜地亞高中一項或多項工作室表演面試的學生，有可能獲得拉瓜地亞高中的一項或多項工作室的錄取。獲得一所特殊高中錄取的學生，也可能同時獲得其在紐約市高中入學申請表上所遞交的選擇志願中的一所高中的錄取。在這一時間，學生將必須在特殊高中入學安排和高中入學申請表上的安排之間做出選擇。

擁有個別教育計劃（IEP）或504計劃的殘障學生和英語學習生（包括過去兩年在紐約州第二語言成績測驗（NYSESLAT）中達到紐約州英語熟練水平的現有和前英語學習生）有資格接受SHSAT和拉瓜地亞高中表演面試的測驗和／或表演面試照顧。

測驗和表演面試的照顧安排

考試照顧安排是對測驗格式的改變和/或測驗實行的方式，這樣符合相關資格的學生就能得到自己需要的有關支援，從而能夠在沒有受到自己殘障或英語能力的不必要干擾的情況下展示自己的技能、知識和能力。學生家庭應查　紐約市教育局有關測驗照顧安排的資源，更多資訊登載於：http://schools.nyc.gov/Academics/SpecialEducation/Classroom/instruction/accommodations.htm。

重要說明：

■ 考試照顧安排根據學生現有的考試照顧安排提供。這些都記錄在學生IEP或504計劃中或以他們的英語學習生身份為基礎。

■ 不可安排僅SHSAT和／或拉瓜地亞高中表演面試要求的照顧安排。學生必須出示需要和使用考試照顧安排的記錄歷史。

■ 擁有504計劃的學生必須每年取得照顧安排的批准。學校和家人必須在學期的最後一天（2016年6月）之前核實（和批准，如適用）學生2016-17年的504計劃。請參看504計劃的常見問題：http://schools.nyc.gov/Offices/Health/SchoolHealthForms

■ 證明在SHSAT前30天時間　發生殘障或臨時殘障的學生，如果得到校長的批准，可以接受某種緊急測驗照顧。請參看「測驗和/或表演面試緊急照顧安排」（第17頁），了解更多資訊。

SHSAT測驗照顧安排

殘障學生將獲得其IEP或504計劃所列出的照顧安排，除非這樣的照顧安排在SHSAT上不允許的，或者這樣的照顧安排在SHSAT上是不需要的（參看下一節）。學生和家長應直接聯絡目前所在學校的輔導員，諮詢有關SHSAT測驗照顧安排方面的問題，確保其准考證上的測驗照顧安排準確無誤。

由於需要時間將學生從大樓入口轉移到測驗教室，因此按測驗開始時間，而非准考證上列明的到達時間計算測驗延長時間。

參加SHSAT的英語學習生和符合資格的前英語學習生，會獲得延長的測驗時間225分鐘（是正常測驗時間的1.5倍）和另外的測驗地點。測驗當天，在每一個測驗場所，教育局也將提供以下九種語言的雙語數學詞彙表：阿拉伯文、孟加拉文、中文（繁體和簡體）、法文、海地克里奧爾語、韓文、俄文、西班牙文和烏爾都語。學生不得攜帶自己的雙語數學詞彙表。樣本詞彙表請參看紐約市教育局特殊高中入學測驗（SHSAT）網站：http://schools.nyc.gov/accountability/resources/testing/shsat.htm。

有IEP或504計劃的英語學習生將獲得自己有資格享受的測驗照顧，只要這些照顧是SHSAT測驗所允許的（參看下一節）。

如果學生的IEP或504計劃上列明使用輔助技術（如頻率調製設備）或其它如定位用的標尺、標記筆或螢光筆（masks, markers, or highlighters）等援助設備，則學生必須在SHSAT和/或表演面試當日將這些輔助設備帶到考場。請注意，考場或面試地點無法在測驗和/或面試當日提供輔助技術和其它援助。

SHSAT不准許的測驗照顧安排

有些照顧安排在SHSAT中對任何學生都不准許的，因　如果提供這些照顧安排就會對測驗衡量某些技能的方式構成阻礙。

■ 學生不得在數學部分使用計算器和/或數學表格，因　SHSAT的這個部分考查學生的數學計算技能。

■ 不會向學生大聲閱讀SHSAT閱讀部分的任何內容，因為SHSAT的這部分內容用於考查學生的閱讀理解技能。這包括說明、段落、問題和回答。

■ 測驗說明、問題和回答均不得予以口譯，因　這樣做會改變測驗的標準化。需要翻譯的英語學習生只可以在SHSAT的數學部分使用雙語數學詞彙表。

SHSAT不需要的測驗照顧安排

另外，學生可能在其它測驗中得到的測驗照顧可能並非SHSAT所需。例如，在文章寫作測驗時使用電腦或文字處理器的學生在SHSAT上不需要這一項照顧，因　測驗不考文章寫作。

書寫機說明：如果學生的IEP或504計劃上列出了書寫機，則務必注意學生是否需要在答題紙上塗黑圓圈的幫助。**如果學生**

測驗和面試照顧安排

可在答題紙上獨立將答案塗黑圓圈，則毋需使用書寫機。**只在學生**無法在草稿紙上寫字或將答案塗黑圓圈時，才需要使用書寫機。在測驗日使用書寫機的學生將進行1:1測驗。因此，家人與IEP或504團隊合作，確保此照顧安排準確列在IEP或504計劃上是非常關鍵的。

拉瓜地亞高中表演面試照顧安排

如果對某個面試是否允許某項照顧有疑問，請要求輔導員直接與拉瓜地亞高中聯絡。聯絡電話：212-496-0700；電子郵箱：**admissions@laguardiahs.org。**關於安排拉瓜地亞高中表演面試的照顧資訊，請參看下一節。

SHSAT測驗和拉瓜地亞高中表演面試照顧安排的確認

■ 在SHSAT的申請（RFT）期間，學生目前所在學校（包括非公立學校，即私立學校和教會學校）負責將正確的測驗照顧要求輸入紐約市教育局的學生入學管理系統 （Student Enrollment Management System，簡稱SEMS）。有504計劃或同類的學校照顧安排計劃（僅適用於不在紐約市教育局系統的學校的學生）的學生，其所有證明文件必須在「要求參加測驗」（RFT）時期的截止日之前至少三（3）週遞交紐約市教育局審核。**遞交文件至：SHSATaccommodations@schools.nyc.gov** 。在此截止日之後收到的證明文件可能無法及時得到審核，因而無法趕上學生的預定測驗日期。如有關於SHSAT測驗照顧安排方面的問題，學生家庭應直接聯絡其目前所在學校的輔導員。

■ 需要安排拉瓜地亞高中表演面試照顧的學生，必須要求其輔導員**在申請（RFT）截止日之前將證明文件** （如學生的IEP、504計劃或者一份有學校正式信頭的說明學生在學校環境中接受英語學習生支援並經簽名的信函）直接送交拉瓜地亞高中。送交拉瓜地亞高中的材料可以傳真到212-724-5748，也可電郵到**admissions@laguardiahs.org。**如有任何關於表演面試照顧安排的問題，輔導員應直接聯絡拉瓜地亞高中。

■ 非公立學校不具有說明其測驗照顧安排需要的IEP或504計劃的殘障學生，必須**與其學校輔導員一起填寫一份紐約市教育局「照顧安排申請」（Request for Accommodations）表格，** 並在申請（RFT）截止日之前將表格和有關證明文件遞交給紐約市教育局審核和批准。學生目前所在學校可提供表格並負責確保能有一個正確的審核程序，並保證學生的照顧安排和相關證明在申請（RFT）截止日之前及時遞交。紐約市教育局有權利索取有關學校關於授予照顧安排程序的更多資訊以及證實所要求的照顧安排因應一項有記錄的需要。參加拉瓜地亞高中表演面試的學生必須擁有獲得學校支援或IEP團隊批准的照顧安排計劃，且證明文件必須直接送交拉瓜地亞高中，以便安排表演面試照顧安排。

選擇退出測驗照顧安排

在申請（RFT）截止日之前，英語學習生和有IEP或504計劃的學生的家長/監護人可以選擇自己的子女不接受SHSAT或拉瓜地亞高中表演面試的某些測驗照顧。在申請（RFT）截止日之前，家長/監護人必須聯絡子女的輔導員，說明自己希望子女不接受測驗照顧。輔導員和學生都不能決定學生不接受測驗照顧；一名家長/監護人必須出具書面同意書。

如果不可能在申請（RFT）截止日之前出具選擇不接受測驗照顧的書面同意書，家長/監護人必須在測驗當日出具書面同意書，表示選擇不接受其子女測驗或面試准考證上列出的測驗照顧。

在測驗當日，對其測驗或面試准考證上列出的測驗照顧，學生既不能更改，也不能選擇不接受（除非出具家長在測驗或面試准考證上提供書面的同意）。

獲得延長時間的學生在其延長時段結束之前完成測驗

■ 除了需要去洗手間之外，所有學生都必須一直待在測驗教室裏，至少直到標準測驗時間（150分鐘）結束　止。

■ 標準測驗時間（150分鐘）一旦結束，凡有照顧安排的測驗延長時間的學生，如果已完成考試，可以離開。

■ 學生如果要在其延長時間結束之前離開，則必須書面說明自己雖有機會利用全部的延長時間，但是自己選擇了提早離開。

測驗和表演面試的照顧安排

■ 如果家長/監護人不希望自己的子女在全部延長時間結束之前離開測驗教室，則必須負責在測驗開始之前與自己的子女做好溝通。

■ 學生若在延長時間結束之前選擇離開，則不會得到重新測驗的機會。

測驗和/或表演面試的緊急照顧安排

緊急測驗照顧適用於那些在特殊高中測驗申請（RFT）截止日之後但又在其指定的測驗/表演面試日期之前發生殘障或受傷並且沒有足夠時間制定一份IEP或504計劃的學生。如果是SHSAT，學生和家長應與輔導員一起填寫緊急測驗申請表格，並在測驗日之前要求輔導員儘快發電子郵件到**SHSATaccommodations@schools.nyc.gov**，說明可能需要獲得緊急照顧安排。

如果學生家庭提出照顧安排要求，但是紐約市教育局沒有足夠時間在正常SHSAT測驗日期之前審核該要求，則可能將學生的SHSAT測驗時間另作安排，以確保這一照顧安排要求得到正確審核。

如果學生要求拉瓜地亞高中表演面試的緊急照顧安排，學生家長或輔導員必須直接聯絡拉瓜地亞高中，要求獲得照顧安排。

有關測驗照顧的更多資訊，學生和家長應與自己目前的輔導員聯絡。

大樓是否有殘障人士設施

紐約市教育局致力於確保員工、學校社區成員、學生和有殘障的家庭成員可使用其課程、服務和活動。紐約市教育局持續評估其所有大樓，以確定殘疾人士可使用哪些學校。有關每所學校是否有殘障人士設施的最新資訊，請直接聯絡學校。建議家人造訪學校，了解殘障人士設施的水準。有關更多資訊，請造訪 http://schools.nyc.gov/Offices/OSP/Accessibility。

這SHSAT考查知識和技能。這些技能包括：理解英文散文；根據所提供的資訊，完整地思考一個語言問題，從而得出經過推理的結論；在數學方面使用問題解決技巧的能力。該測驗考量學生在受教育期間所學到的知識和技能。準備測驗的最佳方法是在整個學年期間都保持功課良好。

SSHSAT測驗分兩個部分：語言和數學。完成測驗的標準測驗時間是150分鐘。

語言部分（45個問題）

語言部分由語言推理和　讀理解構成。語言推理由五個打亂句子順序的段落項目（要求學生將句子按照準確順序排列形成一個段落）和10個邏輯推理問題。閱讀理解部分要求學生閱讀五個選段。每個選段之後有六個問題，考查學生理解、分析和解讀閱讀內容的能力。

數學部分（50道題）

數學部分包括應用題和計算題。

學生無論是先完成語言部分，還是先完成數學部分，都是可以的。提早做完題的學生可以回頭檢查每一個部分的考題，以檢查答題情況。

在測驗結束時，不會為學生提供將答案從試卷轉移到答題紙上的額外時間。所有答案必須在測驗結束之前記錄到答題紙上。

測驗材料

學生必須攜帶下列物品進入考場：

- SHSAT准考證（上面有家長/監護人的簽名和學生的特殊高中選擇排序）
- 削尖的2號鉛筆（圓珠筆或其他墨水筆無法用於機器評分）
- 橡皮
- 輔助技術（如果在IEP和准考證上指示）
- 沒有計算功能的無聲手錶（用來查看考試時間）

考場將提供：

- 一份附有答題紙和草稿紙的考卷
- 學生可以另外索取更多草稿紙

草稿紙可用於解答邏輯推理和數學題目，在測驗結束時將被收回。

SHSAT測驗程序

學生須知：一定要與你的家長/監護人一起查閱以下說明，以確保在測驗之前了解這些問題。

到達考場

- 務必按照SHSAT准考證上指定的時間準時到達考場。請注意，測驗不一定會在指定的到達時間之後立即開始。考場可提供測驗預期結束時間的資訊。你可以帶上零食和飲水，但是考場將決定什麼時間可以食用。在測驗之前，所有手機和電子用品都將由監考官收走存在測驗教室裏，在測驗結束時歸還給考生。你必須等到測驗結束並在你離開大樓之後才能使用手機。

- 測驗開始前，你將被要求閱讀並簽署答卷紙上的一份聲明：這份聲明表示你是紐約市的居民，且身體狀況良好，可以參加測驗，並且你參加的是適合你年級水平的測驗。如果學生簽署這份聲明，但是並不符合這些具體要求，則學生將沒資格獲得任何一所特殊高中的入學安排。

- 如果你覺得身體不適，但是還沒有一份批准的醫療504計劃，則你應立即告知監考官；你不應該開始做題，也不應該簽署該聲明。你一旦開始測驗，就不能提出因病而要求補考的申請。在你開始測驗之後而提出的任何補考要求都不會得到允准。

- 在測驗開始之前，紐約市教育局員工將給每個測驗教室的學生拍照或拍影像。這些照片僅只用於測驗保安目的。

學生不得把相機或有計算功能的手錶、智慧手錶、計算器、MP3 播放器／iPod、平板電腦/iPad或電子書閱讀器之類的個人電子用品帶到考場。

根據紐約市教育局的測驗政策，手機和其它被禁止攜帶的電子用品將在所有學生進入即將進行考試的教室時被收繳，在學生完成測驗並離開測驗教室時歸還給學生。學生不可以在測驗中間（包括休息時間）使用任何被禁的用品。

在測驗中，學校將在測驗進行之前學生進入教室處設立一個收集點。學生被指引把手機/相機／電子用品存放到自己的書包/手袋中，或者放入一個學校設立的容器中。在測驗結束之前，這些東西將被放在教室前方。任何學生若拒絕交出被禁止帶入的用品，則將不得進入考場。如果學生在測驗進行中的任何時候攜帶有一個被禁的用品（即使處於關機狀態），其測驗將被作廢。學生將不能獲得在第二天參加補考的機會。

填寫答題紙

答題紙將附在考卷上。在監考員的指示下，你必須沿穿孔的虛把答題紙和一張草稿紙從考卷上撕下；小心不要把答題紙撕破，也不要把考卷上的封印撕開。

在開始做題前，你將需要在答題紙上填寫姓名、學生身分號碼、學校代碼以及所選學校等資料。

務必要將整個圓圈塗黑，這樣才不會導致評分延誤。下面的這張答卷紙方格陣收集重要的確認資訊以及影響到一所特殊高中的錄取因素的資訊。

在第4格中，你將以塗黑圓圈的方式填寫你的姓名，該姓名要與你的學校記錄以及高中申請表上的姓名一致。你不應使用任何別名。例如，如果你在學校記錄上的名字是Robert，就用塗黑圓圈的方式輸入該姓名，即使大多數人是叫你「Robbie」的。再比如，如果你在學校記錄上的名字是Mei-Ling，就用塗黑圓圈的方式輸入該姓名，即使大多數人都叫你「Melanie」。

第5格只用於你的特殊高中選擇。如果你在第5格標寫錯誤，則你的特殊高中入學會受到影響。入學安排是根據你的分數和你在第5個所排列的學校選擇次序以及每一所學校各自擁有的招生數額而決定的。因此，你務必在測驗日之前決定所選學校的志願次序。與家人討論你有興趣的學校，確定你將在答卷紙上列出的次序。將這一次序依次填寫在准考證上，這樣你就能夠在考場將其小心地抄寫到答題紙上的第5格中。只有在第5格中出現的選項才作準。

第5格正確填寫範例

5. CHOICES OF SPECIALIZED HIGH SCHOOLS

Indicate your school choice in order of preference.
- Fill in only one school for each choice.
- You **must** fill in a first choice school.
- Fill in only one circle in a row and only one circle in a column.

School choices indicated on the answer sheet are final.

SCHOOLS	CHOICES: 1st choice	2nd choice	3rd choice	4th choice	5th choice	6th choice	7th choice	8th choice
Bronx Science	○	○	○	●	○	○	○	○
Brooklyn Latin	○	○	○	○	○	○	○	●
Brooklyn Tech	○	●	○	○	○	○	○	○
HS Math, Sci., & Engineering	○	○	○	○	●	○	○	○
HS American Studies/Lehman	○	○	○	○	○	○	●	○
Queens Sci./York	○	○	○	○	○	●	○	○
Staten Island Tech	●	○	○	○	○	○	○	○
Stuyvesant	○	○	●	○	○	○	○	○

5. CHOICES OF SPECIALIZED HIGH SCHOOLS

Indicate your school choice in order of preference.
- Fill in only one school for each choice.
- You **must** fill in a first choice school.
- Fill in only one circle in a row and only one circle in a column.

School choices indicated on the answer sheet are final.

SCHOOLS	CHOICES: 1st choice	2nd choice	3rd choice	4th choice	5th choice	6th choice	7th choice	8th choice
Bronx Science	○	○	○	○	○	○	○	○
Brooklyn Latin	○	○	○	○	○	○	○	○
Brooklyn Tech	○	○	○	○	○	○	○	○
HS Math, Sci., & Engineering	○	○	○	○	○	○	○	○
HS American Studies/Lehman	○	○	○	○	○	○	○	○
Queens Sci./York	○	●	○	○	○	○	○	○
Staten Island Tech	○	○	○	○	○	○	○	○
Stuyvesant	●	○	○	○	○	○	○	○

你必須將首選學校相應的圓圈塗黑。

第5格不正確的填寫範例

5. CHOICES OF SPECIALIZED HIGH SCHOOLS

Indicate your school choice in order of preference.
- Fill in only one school for each choice.
- You **must** fill in a first choice school.
- Fill in only one circle in a row and only one circle in a column.

School choices indicated on the answer sheet are final.

SCHOOLS	CHOICES: 1st choice	2nd choice	3rd choice	4th choice	5th choice	6th choice	7th choice	8th choice
Bronx Science	○	○	○	○	○	○	○	○
Brooklyn Latin	●	○	○	○	○	○	○	○
Brooklyn Tech	○	○	○	○	○	○	○	○
HS Math, Sci., & Engineering	●	○	○	○	○	○	○	○
HS American Studies/Lehman	○	○	○	○	○	○	○	○
Queens Sci./York	○	●	○	○	○	○	○	○
Staten Island Tech	○	○	○	●	○	○	○	○
Stuyvesant	○	○	○	○	○	○	○	○

請勿在一欄中填充一個以上圓圈。

5. CHOICES OF SPECIALIZED HIGH SCHOOLS

Indicate your school choice in order of preference.
- Fill in only one school for each choice.
- You **must** fill in a first choice school.
- Fill in only one circle in a row and only one circle in a column.

School choices indicated on the answer sheet are final.

SCHOOLS	CHOICES: 1st choice	2nd choice	3rd choice	4th choice	5th choice	6th choice	7th choice	8th choice
Bronx Science	●	○	○	○	○	○	○	○
Brooklyn Latin	○	○	○	●	○	○	○	○
Brooklyn Tech	○	●	○	○	○	●	○	○
HS Math, Sci., & Engineering	○	○	○	○	○	○	○	○
HS American Studies/Lehman	○	○	○	○	○	○	○	○
Queens Sci./York	○	○	○	○	○	○	○	○
Staten Island Tech	○	○	○	○	○	○	○	○
Stuyvesant	○	○	○	○	○	○	○	○

請勿在一行中填充一個以上圓圈。

5. CHOICES OF SPECIALIZED HIGH SCHOOLS

Indicate your school choice in order of preference.
- Fill in only one school for each choice.
- You **must** fill in a first choice school.
- Fill in only one circle in a row and only one circle in a column.

School choices indicated on the answer sheet are final.

SCHOOLS	CHOICES: 1st choice	2nd choice	3rd choice	4th choice	5th choice	6th choice	7th choice	8th choice
Bronx Science	○	○	○	○	○	○	○	○
Brooklyn Latin	○	○	○	○	○	○	○	○
Brooklyn Tech	○	○	○	○	○	○	○	○
HS Math, Sci., & Engineering	○	○	○	○	○	○	○	○
HS American Studies/Lehman	○	○	○	○	○	○	○	○
Queens Sci./York	○	○	○	○	○	○	○	○
Staten Island Tech	●	●	●	●	●	●	●	●
Stuyvesant	○	○	○	○	○	○	○	○

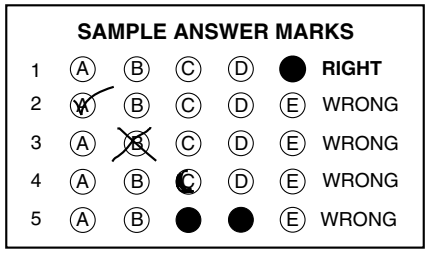
請勿在每個選擇中都填寫同一所學校。

你只能將每一所你希望考慮的學校填充一個圓圈。你最少可以選擇一所學校，最多可以選擇八所學校。為了增加你被其中一所特殊高中錄取的機會，我們建議你選擇一所以上學校。你必須填上一所第一志願學校 ，而且對每一選擇志願，你只能填一所學校。你必須在某一行和某一欄都只填充一個圓圈。你不能將一所學校填寫超過一次。你不能在所有志願中都填寫同一所學校。

在第7格，你必須清楚書寫目前就讀學校的名稱。然後，你將清楚填寫學校的學校代碼，該代碼要與出現在你的准考證上或與監考官備有的生源學校名單上的代碼完全一致。接著，你將該學校代碼中每個數字或英文字母的相應圓圈塗黑。如果你在私立學校或教會學校就讀，請在塗黑與字母「P」相對應的圓圈。例如，就讀布碌崙Abraham Lincoln IS 171 的學生應依照上面顯示的例子填寫第7格。小心填寫第7格：填錯第7格的圓圈可能會推遲你的分數報告。

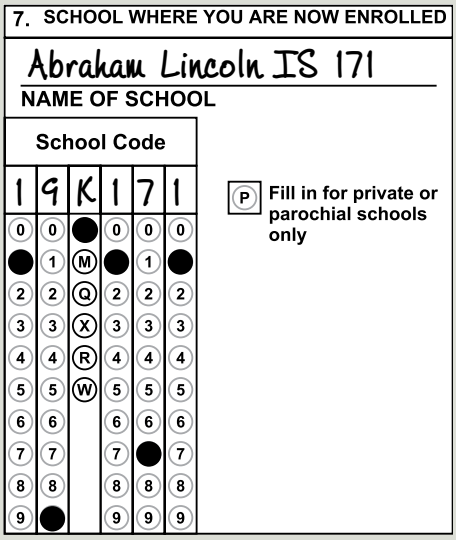
第8格註明「學生身分號碼」。在第8格寫上你的九位數學生號碼。你可在你的SHSAT准考證上找到該號碼。在每個方框的下方填充圓圈，圓圈中包含的數字要與方框中的數字相同。（請看右邊的例子）

當你被告知可以開始答題時，在答題紙上標記答案，即完整地塗黑相應圓圈（參見範例）。請務必用力塗黑答案圈。請小心，不要在答題紙上劃上任何散亂的標記。如果你要變更答案，先將之前的答案擦淨。請勿折疊或撕破答題紙。每道題只有一個正確答案。如果你在答題紙上針對某道題填寫的答案標記超過一個，該題即被批分　錯誤。

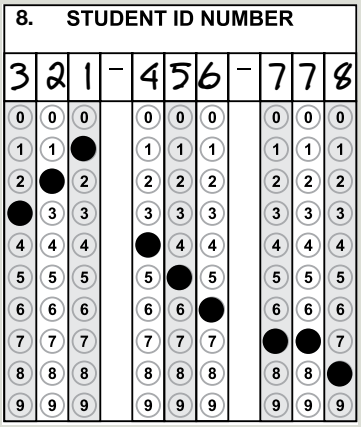


在解答語言或數學題目時，你可以在考卷或草稿紙上書寫答案，但你的答案必須記錄在答題紙上才能計入成績。時間到了之後就不能再在答題紙上寫答案了。寫在考卷或草稿紙上的答案將不計入成績。

第7格



第8格



學生不端行爲

請注意，測驗保安對SHSAT是十分重要的。在測驗期間，你不能嘗試以任何方式與其他學生交流。這包括（但不限於）：說話、書寫和傳遞紙條、合用試卷或答題紙、看其他學生的答案、錄製測驗內容以及/或者帶著相機或個人電子用品。學生如被發現從事這些行　中的任何一個，其測驗將被作廢，並將在直至下一學年之前（適用於目前就讀8年級的學生；9年級學生將不再有任何機會在9年級之後再參加測驗）被禁止再次參加該測驗。

對於測驗不當情況進行彙報

如果你認為在SHSAT測驗期間受到了干擾或有測驗異常情況的出現，你應立即向監考人員報告情況。這可能是試卷印錯、過分引起注意分散或者學生行　不當。監考人員將努力彌補這一情形，可能在結束時需要獲得你的書面聲明。

學生和家長/監護人也用信函的形式報告任何可疑的監考或測驗異常情況。信函可寄到以下學生入學辦公室（Office of Student Enrollment）地址：

Office of Student Enrollment
52 Chambers Street, Room 415
New York, NY 10007

郵件必須以掛號（certified）郵寄，送達證明和郵戳日期要在測驗舉行日期後一星期內。對所有報告，請一定要寫上家長/監護人和學生姓名、電話號碼和/或電子郵箱聯絡資訊。所有關於測驗異常情況的報告，如果郵戳日期晚於測驗日期之後一個星期以上的信件將不予受理。有關報告均將以個案得到分別回應。

SHSAT評分

SHSAT分數取決於所標記的正確答案的數目。答錯不扣分。如果你無法確定某個答案，你應盡最大努力猜測一個並標記該答案。你不應在任何一道題目上花過多的時間。盡你最大努力做好每道題，或跳過去繼續回答其它題目。如果你最後還有時間，你可以回過頭來回答此前未做好的題目。

每張答題紙都接受電子儀器掃描和計分，由此確定每一位考生的正確答案的數目，即原始分數（raw score）。由於特殊高中入學測驗有幾種形式，因此不同測驗形式的原始分數無法直接相互比較。這些測驗形式被設計得儘可能類似，但它們並不完全相同。

要進行有效的分數比較，必須將原始分數轉換成另一種能夠對不同測驗形式之間的差異加以考慮的分數類型。在一種稱作校正的方法中，語言和數學的原始分數被轉換成量表分數（scaled scores）。原始分數與量表分數並不成比例。在分數範圍的中段，原始分數每增加一分，量表分數可能會相應地增加三或四分。在分數範圍的最高或最低部分，原始分數每增加一分，量表分數可能會相應地增加10到20分。造成這一差異的原因在於，量表分數作了調整以符合常態曲線。量表分數的度量是常見於所有測驗形式的量度，因此可以直接對這些分數進行比較。組合分數（composite score ）是語言與數學量表分數的總和。組合分數將決定你是否被特殊高中錄取。

審核程序

在收到測驗解說之後，你和你的家長/監護人可以要求與評估辦公室（Office of Assessment）的一名代表預約會面日期審核自己的答題紙。答題紙不能分發給家長，但是可以在約定的日期接受審核。審核預約可以下面的一種方式安排：

1) 在下面的SHSAT網站上遞交一份電子版申請：
   www.nyc.gov/schools/Accountability/resources/testing/SHSAT， 或者

2) 以掛號郵件（可獲送達證明）郵寄一份書面申請到評估辦公室（Office of Assessment）：

Office of Assessment, SHSAT Review
52 Chambers Street, Room 309
New York, New York 10007

網上遞交電子申請的日期和郵寄信函的郵戳日期不得晚於2017年4月1日。申請必須包含：

- 學生姓名、出生日期和學生身份號碼（OSIS）
- 家長/監護人姓名、電話號碼和電子郵箱

評估辦公室在收到該申請之後的四個星期　，將提供安排細節。學生及至少一位家長／監護人必須出席預約。僅學生和至多兩位家長／監護人准許出席預約。如果學生和家長/監護人在四月到六月幾個月正常辦公時間某些日期或時間是沒法預約的，請一定在申請中註明，因　該辦公室可能無法重新另約時間。

探索計劃

根據紐約州法律，特殊高中可以主辦一項「探索計劃」（Discovery Program），讓明顯具有很大潛力的貧困家庭學生也有機會就讀特殊高中課程。2017年春季，學生將收到關於哪些高中將主辦一項「探索計劃」以及自己是否有資格參加的通知。

要參加該計劃，學生必須符合下列條件：

1. 得分在SHSAT錄取分數線以下的某個範圍內。符合資格的分數每年都有所不同，且視乎學校是否有名額；以及

2. 學生在其2016年SHSAT答題紙上的特殊高中學校選擇中的一所計劃將主辦一項2017年「探索計劃」；並且

3. 被其目前所在學校證明來自弱勢家庭的學生；以及

4. 由其目前所在學校推薦為有很大潛力就讀特殊高中課程的學生。

學生一旦收到通知其符合資格，家長應該與學校的輔導員見面，討論探索計劃的申請。並非所有符合資格的學生都能獲得「探索計劃」的批准。那些在該暑期計劃中成功地達到要求的學生將獲得支援探索計劃的學校的學額。那些未能成功達到要求的學生將入讀之前為其分配的學校。學生如有疑問應諮詢輔導員。有關合資格要求的更多資訊，請造訪http://schools.nyc.gov/ChoicesEnrollment/High/specialized。

SHSAT USEFUL TIPS FOR TESTING

SECTION 6

PARENTS/GUARDIANS ARE ENCOURAGED TO REVIEW THE FOLLOWING TIPS WITH THEIR CHILDREN SO THAT THEY ARE WELL PREPARED FOR THE TEST.

BEFORE TEST DAY

The best way to improve your verbal skills is to read many books and articles on different topics. Reading widely will help you expand your vocabulary and improve your comprehension. While reading, ask yourself: What is the main point? What can be deduced? Why does the author use certain words? Is this article well written?

Knowing what to expect on the test and having some practice in test taking is beneficial. This handbook describes each part of the test and contains two sample tests to use as practice. Each sample test contains questions from previous tests and has been updated to match the 2016 tests as closely as possible. A list of correct answers is provided for each test, along with explanations.

Simulating the actual testing situation helps. You will have two and a half hours (150 minutes) to complete the test. During your practice test, how you allot the time between the verbal and mathematics sections is up to you. You may start with either section. Use the practice test to decide how much time you will spend on each section to keep yourself on pace and manage your time on test day. For example, will you spend 75 minutes on each section, or will you spend more time on one section than another? Will you leave certain questions for the end? You may return to one section if you have time remaining after finishing the other section. Mark your answers on the answer sheet provided in this handbook. Remember, on the actual test, you will not be given extra time to mark your answers on the answer sheet after time is up.

After you complete the practice test, check your answers against the list of correct answers. Read the explanations of the correct answers to see the kinds of mistakes you may have made. Did you read too quickly and misunderstand the question? Did you make careless errors in computation? Did you choose answers that were partially correct, but were not the best answers? Were many of your wrong answers guesses? You also should check to see whether there is a pattern to your errors. For example, did you get all of the inequality questions wrong? Did you leave any answers blank? Seek out opportunities to do more practice in areas that challenged you.

Put this handbook away for a few days, and then take the second sample test, following the same procedure. Be aware that how well you do on these sample tests is not a predictor of your score on the actual test. However, these tests will give you an idea of what to expect when taking the SHSAT.

DAY OF THE TEST

Prepare yourself. The night before the test, remember to get a good night's sleep. Bring your signed Test Ticket with you to your assigned test site and make sure it includes a parent/guardian signature and your ranked choices of Specialized High Schools. Arrive at your assigned test site on time. Wear comfortable clothes and bring a non-calculator watch to keep track of the time. Make sure that you have several sharpened Number 2 pencils and an eraser that erases cleanly. Do not bring personal electronic devices such as an iPod, calculator, tablet/iPad or ebook reader to the test. You may bring a cell phone but it will be turned off and collected by your proctor for the duration of the test.

Plan your time. Be aware of the total number of questions and the amount of time you have to complete the test. Work carefully, but keep moving at a comfortable pace and keep track of the time. Listen carefully to your test proctor and all instructions regarding time. Be sure to place all answers on the answer sheet. You will not be given additional time to transfer your answers from the test booklet or any scrap paper to the answer sheet after time is up.

Read the instructions carefully. Be sure you understand the task before marking your answer sheet. For each question, read all the choices before choosing one. Many questions ask for the best answer; it is important to compare all the choices to determine the choice that best answers the question.

Mark your answers carefully. This is a machine-scored test, and you can lose credit by marking the wrong answer bubble or marking the answers to two questions on the same line. Make sure the number on the answer sheet matches the number of the question in your test booklet. To change an answer, erase the original mark completely. If two bubbles are filled in for a question, that question will be scored as incorrect. Avoid making stray pencil marks on your answer sheet. You may write in your test booklet to solve verbal or mathematics problems, but remember that only answers recorded on the answer sheet will be counted.

There is no penalty for a wrong answer. Your score is based on the number of correct answers marked on the answer sheet. Therefore, omitting a question will not give you an advantage, and wrong answers will not be deducted from your right answers. Fill in any blanks when the time limit is almost up.

Make an educated guess when you do not know the answer to a question. Do this by eliminating the answer choice(s) that are definitely wrong, and then choose one of the remaining answers.

Be considerate of other students during the test. Do not chew gum or make noises or movements that would be distracting to others.

If you finish before time is up, go back over your work to make sure that you followed instructions, did not skip any questions, and did not make careless mistakes. Students must remain in the testing room for the entire duration of the test (150 minutes).

SCRAMBLED PARAGRAPHS

The scrambled paragraph portion of the test measures your ability to organize written material according to the sequence of ideas and/or cues provided by transitional words and phrases. There are five paragraphs, each consisting of six sentences. The first sentence is provided, with the remaining five presented in random order. You are to arrange the sentences in the author's original order using cues contained in the sentences. Only one arrangement of each set of sentences will form a well-organized, cohesive, grammatically correct paragraph. **Each correctly ordered paragraph is worth double the value of a question in any other section of the test.**

The sentences contain words and phrases that help to identify the flow of ideas from one sentence to the next, perhaps describing a procedure or tracing a historical event. The sentences may also provide grammatical cues as to how to construct the paragraph. For example, the pronoun "she" may refer to someone mentioned in a previous sentence. Transitional words such as "although" and "however" also provide cues about how the sentences relate to one another.

As you put the sentences in order, it may help to write the correct position of each sentence in the blank to the left. For example, write "2" next to the sentence that you think follows the first sentence, "3" next to the sentence you think follows "2," and so on.

Read **Example 1**. After reading all the sentences, you should have an idea of what the paragraph is about. Now go back to the given sentence and determine which sentence should come next. The given sentence states that scientists have "long known" that chimpanzees use tools. Sentence Q, with its opening phrase "more recently" creates a contrast with the given sentence. Q also makes a transition from the given sentence, from chimps' use of tools for one purpose (food gathering and preparation) to their use of tools for "other purposes."

U follows Q because "these researchers" in U refers to the researchers introduced in Q. In addition, U names the individual chimp (Kalunde) and adds the information that Kalunde had the flu. R continues the reference to Kalunde's illness by describing his symptoms—cough and congestion. S presents the result of this congestion: Kalunde had to breathe through his mouth, which made eating difficult. T shows how Kalunde used a tool—a twig or plant stem—to clear his congestion, which concludes the paragraph. QURST has made a paragraph that is logically and grammatically correct.

QRUST might look appealing, but its transition from Q to R is poor. Q does not say anything about an illness, nor does it name the chimp, yet R refers to "the afflicted Kalunde," as

Example 1

Scientists have long known that chimpanzees have the ability to invent and use tools for the purpose of gathering and preparing food.

_____**Q.** However, more recently, researchers have observed a Tanzanian mountain chimpanzee demonstrate that chimps are also capable of inventing tools for other purposes.

_____**R.** The afflicted Kalunde suffered from a hacking cough and severely congested nasal passages.

_____**S.** This congestion forced Kalunde to breathe through his mouth, so he needed to clear his nasal passages in order to eat.

_____**T.** On four separate occasions, researchers observed Kalunde accomplish this goal by inserting a twig or plant stem into his nose, thus stimulating his reflex to sneeze.

_____**U.** These researchers were studying Kalunde, who, like many other chimps in his group, had a case of the dry-season flu.

Example 1

The second sentence is	●	R	S	T	U
The third sentence is	Q	R	S	T	●
The fourth sentence is	Q	●	S	T	U
The fifth sentence is	Q	R	●	T	U
The sixth sentence is	Q	R	S	●	U

though Kalunde had already been mentioned, and describes his symptoms. The chimp's illness is not introduced until the following sentence (U). The resulting paragraph is poorly organized.

QUSTR is also incorrect. When R, which describes Kalunde's flu symptoms, is placed last, the paragraph becomes disjointed. The previous sentence (T) has said that Kalunde accomplished his goal of clearing his nasal passages after using a tool. R describes Kalunde's condition **before** he used his tool, so it should appear earlier in the paragraph, as it does in the correct order (QURST).

LOGICAL REASONING

This section consists of 10 questions that assess your ability to reason logically, using the facts, concepts, and information presented. **You must guard against jumping to conclusions that are not warranted from the information given.** There are different types of questions: figuring out codes, determining the relative positions of things or people, identifying correct assumptions, and drawing valid conclusions.

The most important strategy is to read the information carefully and make no assumptions that are not supported by the given information. Certain words must be read carefully. For example, **between** cannot be assumed to mean **between and right next to;** other things may be between these two objects as well. The same may be true of words such as **above, below, before,** and **after.**

Another good strategy is to look for information that is definitely stated, such as, "The red box is the largest," or "Jane is not standing next to Erik." This information makes it easier to determine the relative relationships.

For **Example 2**, draw a diagram to help you determine the order in which the planes departed. Statement 2 contains definite information about the Washington plane, so add that to the diagram:

1st	
2nd	
3rd	Washington
4th	
5th	

The remaining planes fly to Boston, Philadelphia, Cleveland, and Denver. Statement 3 says that the Denver plane left immediately after the Cleveland plane. (That means no planes departed between the Cleveland and Denver planes.) There are two possible orders, shown below:

1st	Cleveland		
2nd	Denver		
3rd	Washington	**OR**	Washington
4th			Cleveland
5th			Denver

The information in Statement 1 helps you determine which possible order is correct. It says that the Boston plane departed earlier than the Cleveland plane. That could not happen in the first possible order, so the second possible order must be correct. Because statement 1 also says that the Boston plane departed later than the Philadelphia plane, the complete order of departure must be:

1st	Philadelphia
2nd	Boston
3rd	Washington
4th	Cleveland
5th	Denver

The question asks how many planes left **between** the departures of the Boston and Denver planes. The answer is two (the planes departing for Washington and Cleveland).

Example 2

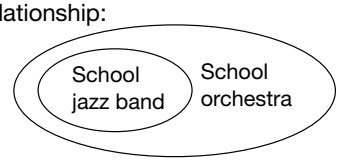
Exactly five planes departed from an airport, one at a time.

1) The Boston plane departed later than the Philadelphia plane, but earlier than the Cleveland plane.
2) The Washington plane departed third.
3) The Denver plane left immediately after the Cleveland plane.

How many planes left between the departures of the Boston plane and the Denver plane?

A. 0
B. 1
C. 2
D. 3
E. Cannot be determined from the information given.

To answer **Example 3** correctly, it is important to understand the relationships among the members of the three musical groups. According to the question, every member of the jazz band is also a member of the orchestra. Draw a diagram to illustrate this relationship:



Some members of the choir are also members of the orchestra. The question says that Patrick is a member of exactly two of these groups, but it does not specify which groups. He could be in the jazz band and the orchestra, or he could be in the orchestra and the choir. He cannot be in the jazz band and the choir because membership in the jazz band implies membership in the orchestra, which adds up to memberships in three musical groups, not two.

Read each option and evaluate whether it **must** be true, based on the information given. Option F must be true; if Patrick is in the jazz band, then his second group is the orchestra, not the choir. The other options may or may not be true, but we cannot conclude that any of them **must** be true. Option H looks appealing, but it has changed the information given in the question. "Every member of the school jazz band is also a member of the school orchestra" does not mean "Every member of the school orchestra is also a member of the school jazz band."

When the question involves a code, as in **Example 4**, do not solve for all parts of the code. Solve only those parts that relate to the question. Read the directions carefully. The letters in a sentence may or may not appear in the same order as the words they represent in that sentence. For example, in the first sentence, the first letter (L) may or may not represent the first word (Michelle).

In **Question 1**, the word "ships" appears only in the fourth sentence, so its corresponding letter must appear only in the fourth sentence. Letters Y and X (Options A and C) appear only in the fourth sentence. Is it possible to determine which letter represents the word "ships"? No, because the fourth sentence also contains another word, "Ivan," that does not appear in any other sentence. It is impossible to determine which letter represents "ships" and which letter represents "Ivan." Thus the correct answer is Option E, "Cannot be determined from the information given." The letters N and W (Options B and D) appear in the fourth sentence, but they can be ruled out because N also appears in the second sentence, and W also appears in the first sentence.

In **Question 2**, the letter V appears in the second and third sentences, but not in the first and fourth sentences. Find a word that also appears only in the second and third sentences.

Example 3

Every member of the school jazz band is also a member of the school orchestra. Some members of the school choir are also members of the school orchestra. Patrick is a member of exactly two of these musical groups.

Based only on the information above, which of the following **must** be true?

F. If Patrick is in the school jazz band, he is not in the school choir.
G. If Patrick is in the school orchestra, he is not in the school choir.
H. If Patrick is in the school orchestra, he must be in the jazz band.
J. All members of the school orchestra are in at least two of these musical groups.
K. All members of the school choir are in at least two of these musical groups.

Example 4

Questions 1 and 2 refer to the following information.

In the code below, (1) each letter always represents the same word, (2) each word is represented by only one letter, and (3) in any given sentence, the letters may or may not be presented in the same order as the words.

L	W	Q	P	R	means
"Michelle	paints	planes	and	birds."	
Z	V	R	U	N	means
"Stuart	draws	cars	and	dogs."	
L	V	P	T	R	means
"Jesús	paints	cars	and	planes."	
Y	X	R	N	W	means
"Ivan	draws	birds	and	ships."	

1. Which letter represents the word "ships"?
A. Y
B. N
C. X
D. W
E. Cannot be determined from the information given.

2. Which word is represented by the letter V?
F. draws
G. paints
H. cars
J. and
K. planes

The word is "cars," which is Option H. The other options cannot be correct. The letter V appears in the same position as "draws" in the second sentence and "paints" in the third sentence, but that does not mean it represents either word. In fact, the word "draws" also appears in the fourth sentence, and "paints" also appears in the first sentence, so neither word can be represented by the letter V. The word "and" (Option J) appears in all four sentences, so it can be ruled out. The word "planes" appears in the first and third sentences, so the letter V cannot represent that word.

READING

This section measures your ability to read and comprehend five informational passages. Each passage is 400 to 500 words long. The subjects include short biographies, discussions of historical events, descriptions of scientific phenomena, brief essays on art or music, discussions with a point of view, and human interest stories.

Example 5

Mary Cassatt defied tradition, family, and public opinion to become one of the most celebrated artists of the United States. Born in 1845, the daughter of a wealthy Pittsburgh banker, Cassatt spent several years of her childhood with her family in Europe. As she grew older, she gave up a life of ease to choose a path that at the time was almost impossible for a woman to follow. In 1861, while many of her friends were entering the social world of the upper classes, Cassatt was beginning her studies at the Pennsylvania Academy of Fine Arts. After four years, however, she felt stifled by the rigid curriculum. Against her father's wishes, she decided to return to Europe to study painting.

Cassatt spent several years, mainly in France and Italy, immersing herself in the works of great European painters of the past. Finally, in 1872, she settled in Paris permanently. There, Cassatt came to admire the work of the French Impressionists, a group of "outsiders" that included Degas, Monet, and Renoir. Unlike mainstream artists who produced the dark, polished, and detailed paintings favored by traditionalists and critics, these artistic revolutionaries applied pigment to the canvas in small dabs of pure color to achieve an illusion of light. Works painted in this manner presented not photograph-like detail but a softer focus that conveyed a highly personalized impression.

This new movement inspired Cassatt. Discarding the traditional European style, she adopted the luminous tones of the impressionists. Particularly interested in the human figure, Cassatt began creating pastels of groups of women—on outings in the park, having tea, and so forth. In 1879, Edgar Degas invited her to exhibit with the impressionists, and her paintings were included in four of their next five shows. Cassatt and Degas admired each other's work and a loyal friendship developed. It was Degas who first suggested the mother-child theme that became the hallmark of Cassatt's later work.

Throughout her years in Europe, Cassatt kept in touch with her wealthy friends in the United States, introducing them to impressionist art. Many of the excellent collections of impressionist paintings in this country are to a great extent the result of her influence. As a woman and as an American, Cassatt stood virtually alone among the impressionist painters. Since her death in 1926, the work of the "Impressionist from Pennsylvania" has been avidly sought by collectors.

Each passage has six questions that ask you to identify and analyze key ideas and details, as well as draw conclusions from the information presented.

In order to ensure a thorough understanding of the text, read the passage carefully rather than skimming it. This will help prevent you from making inaccurate assumptions based on only a few details. After reading the passage, try answering each question before reading the answer choices. Then look at the choices to see which is closest to your answer. If none seem to be your answer, read the question again. You may also reread the passage before you choose your answer.

Ask yourself whether the question requires you to draw a conclusion or inference from statements in the passage or simply to identify a restatement of the facts.

Base your answers only on the information presented in the passage. Do not depend solely on your prior knowledge of the topic. Enough information will be given for you to arrive at the correct answer.

Example 5 *continued...*

1. Which of the following best tells what this passage is about?

A. the barriers faced by women artists
B. the mother-child theme in Cassatt's work
C. why Cassatt is considered an early feminist
D. Cassatt's development as an artist
E. a brief history of impressionism

2. Why did Cassatt leave the Pennsylvania Academy of Fine Arts?

F. Her father wanted her to study in Europe.
G. She felt the program there limited her creativity.
H. She did not want to enter Pittsburgh society.
J. She wanted to study with the French Impressionists.
K. She wished to rejoin her family.

3. What prompted Cassatt to begin using the mother-child theme in her work?

A. It was an appropriate subject for a beginning artist.
B. It was a favorite theme of great European painters of past centuries.
C. It was suggested to her by another artist.
D. It was a common theme in the late nineteenth century.
E. It was favored by the critics.

4. Which of the following best describes Cassatt as a young woman, before 1865?

F. interested in fashion and social standing
G. an independent thinker
H. friend to many French Impressionists
J. a painter in the impressionist style
K. a successful artist in her own right

5. How was Cassatt unusual among impressionist painters?

A. Her painting style created the illusion of light.
B. She was befriended by Degas.
C. She managed to remain in the artistic mainstream of her day.
D. Her paintings have gained in value and popularity.
E. She was an American woman.

6. In what way does the writer suggest that Cassatt influenced art collections in the United States?

F. She was an avid art collector in her own right.
G. She preferred to paint pastels of women and children.
H. She showed impressionist art to her wealthy American friends.
J. She settled in Paris permanently.
K. She exhibited regularly with the impressionists.

QUESTION 1

The correct answer must encompass the main points without being overly broad. Options A and B are details, not the main theme. Option E is too broad. The passage focuses on only one impressionist painter, Mary Cassatt. Option C looks attractive, and while Cassatt is depicted as an independent and confident woman, which might be considered traits of a feminist, that term is not used in the passage and requires an inference that is not supported by the passage. Option D is best. The phrase "development as an artist" includes Cassatt's background, education, artistic style, subject matter, and influence on the art world.

QUESTION 2

The answer to this question is found directly in the reading passage (lines 14-15). "Stifled" in this sense means repressed or held back. Option G restates this idea. Option F is not true, and Option H does not explain why she left her studies. Cassatt had not yet decided to study with French Impressionists (Option J), so that cannot be the reason. Option K is not mentioned.

QUESTION 3

The mother-child theme in Cassatt's work is discussed in lines 45-48. It was first suggested by Edgar Degas, a fellow artist, which is Option C. The other options are not supported by details in the passage.

QUESTION 4

The question asks for a description of Cassatt before 1865. In 1865, she left the Pennsylvania Academy of Fine Arts to study in Europe. Option F cannot be correct; she was never interested in fashion and social standing. Options H, J, and K are descriptive of dates much later than 1865. Option G, "an independent thinker," best describes the young woman who left the social world of the upper classes and returned to Europe against her father's wishes.

QUESTION 5

The answer to this question can be found in the last paragraph. Lines 55-57 state, "As a woman and as an American, Cassatt stood virtually alone among the impressionist painters." In other words, she was unusual as a female American impressionist painter (Option E). Option A was true of all impressionists, not just Cassatt. The passage provides no evidence that her friendship with Degas made her unusual (Option B). Option C is not true; by joining the impressionists (called "outsiders" in line 24), she left, not remained in, the artistic mainstream of her day. Option D is true of many artists, so it is not what made Cassatt unusual.

QUESTION 6

Art collections in the United States are mentioned in the last paragraph. Cassatt introduced impressionist art from Europe to her wealthy American friends, thus influencing many of them to buy it. Option H best summarizes this idea. Option F is not correct; the question asks about art collections in the United States in general and F does not indicate any connection to other art collections. Options G and J, while true, do not explain how Cassatt influenced art collections in the United States. Similarly, the passage does not relate the exhibitions mentioned in Option K to art collections in the United States.

SPECIFIC STRATEGIES MATHEMATICS

This section includes arithmetic, algebra, probability, statistics, and geometry problems. The technical terms and general concepts in these test questions can be found in the New York State Education Department **P-12 Common Core Learning Standards for Mathematics**. Most problems involve application of topics covered in the **Common Core**; however, since the **Common Core** is just an outline, not all details of a topic are provided. Consequently, some aspects of a question may not be mentioned. As one of the purposes of this test is to identify students who will benefit from an education at a Specialized High School, the SHSAT contains many questions that require using mathematical ability to respond to novel situations.
The NYSED P-12 Common Core Learning Standards for Mathematics can be downloaded from the New York State Education Department website: www.nysed.gov.

TIPS FOR TAKING THE MATHEMATICS SECTION OF THE SHSAT

To improve your mathematics skills, choose a mathematics textbook for your grade level and solve five to ten problems every day. Do both routine and challenging problems. Routine problems reinforce basic mathematical skills More challenging problems help you understand mathematics concepts better. Do not give up if you cannot complete some of the problems. Skip them and move on. You may be able to solve them after you have practiced different types of problems. Also, do not limit yourself to types of problems that test what you have learned in your mathematics class only.

YOU MUST KNOW THE MEANINGS OF TECHNICAL TERMS such as "parallel" and "perpendicular" that are appropriate to your grade level, as well as the customary symbols that represent those terms. You also need to **know various formulas** such as those for the perimeter and area of different figures. You can find these technical terms, symbols, and formulas in your mathematics textbook. These terms, symbols, and formulas will **NOT** be given in the test booklet. Practice using them until you are comfortable with the terms and formulas.

READ EACH PROBLEM CAREFULLY and work out the answer on scrap paper or in your test booklet. **Do not calculate on your answer sheet.**

MOST PROBLEMS SHOULD BE DONE by **working out the answer.** This is more efficient than trying out the options to see which one fits the question. The only exception is when you are explicitly asked to look at the options, as in, "Which of the following is an odd number?"

IF THE QUESTION IS A WORD PROBLEM, it often is helpful to **express it as an equation.** When you obtain an answer, look at the choices listed. If your answer is included among the choices, mark it. If it is not, reread the question and solve it again.

THE INCORRECT CHOICES are often answers that people get if they misread the question or make common computational errors. For this reason, it is unwise to solve a problem in your head while looking at the possible choices. It is too easy to be attracted to a wrong choice.

IF YOUR ANSWER IS NOT AMONG THE ANSWER CHOICES, write your answer in a different form. For example, $10(x + 2)$ is equivalent to $10x + 20$.

YOU MAY DRAW FIGURES OR DIAGRAMS for questions that do not have them.

SOME QUESTIONS ASK YOU to combine a series of simple steps. Take **one step at a time,** using what you know and what the question tells you to do.

THE SAMPLE TESTS IN THIS HANDBOOK are Grade 8 forms. If you are taking the Grade 9 test, work the problems on pages 110-112 as well. These problems cover topics that are introduced in the Common Core for Grade 8.

EXAMPLE 6

$$^{-}4(x - 2) \leq 16$$

What is the solution to the inequality shown above?

A. $x \geq {}^{-}6$
B. $x \geq {}^{-}2$
C. $x \leq 2$
D. $x \geq 6$
E. $x \leq {}^{-}2$

IN EXAMPLE 6, $^{-}4(x - 2) \leq 16$
Divide both sides by $^{-}4$, remembering to change the direction of the sign since both sides are divided by a negative number.

$$x - 2 \geq {}^{-}4$$
$$x \geq {}^{-}2$$

EXAMPLE 7

The measures of the angles of a triangle are in the ratio 1:2:3. What is the measure of the largest angle?

F. 30°
G. 60°
H. 90°
J. 150°
K. 180°

IN EXAMPLE 7, let x equal the smallest angle of the triangle. Then, the three angles are x, $2x$, and $3x$. The sum of the angles of a triangle is 180°. Set up an equation using this to find x:

$$x + 2x + 3x = 180$$
$$6x = 180$$
$$x = 30$$

Since the question asks for the measure of the largest angle, $3x = 3(30) = 90°$.

EXAMPLE 8

What is the greatest common factor of 98 and 42?

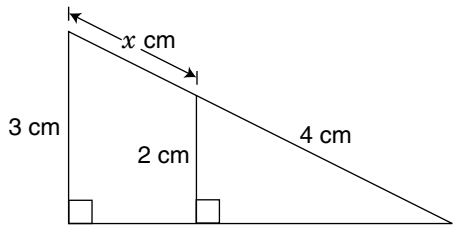
A. 2
B. 3
C. 6
D. 7
E. 14

IN EXAMPLE 8, first find the prime factorizations of 98 and 42:

$$98 = 2 \cdot 7 \cdot 7$$
$$42 = 2 \cdot 3 \cdot 7$$

Next, find the prime numbers that are in both prime factorizations (2 and 7). The product of those prime factors is the greatest common factor ($2 \cdot 7 = 14$)

EXAMPLE 9 **(9th Grade item)**



In the figure above, what is the value of x?

F. $^{-}6$ cm
G. $-\frac{5}{2}$ cm
H. $-\frac{4}{3}$ cm
J. 2 cm
K. 6 cm

IN EXAMPLE 9, the two triangles are similar, so set up a proportion to solve for x:

$$\frac{x + 4}{3} = \frac{4}{2}$$
$$2(x + 4) = 12$$
$$x + 4 = 6$$
$$x = 2$$

TAKING THE SAMPLE TESTS

Now you are ready to try sample test Form A. Begin by carefully reading the Directions on pages 32 and 33 and filling out side 1 of the Answer Sheet on page 34. For Form A, use side 2 of the Answer Sheet (page 35). When you are ready for Form B, use the Answer Sheet on page 73. You may tear out pages 35 and 73 to make it easier to mark your answers.

If you are taking the Grade 9 test, work the problems on pages 110-112 as well.

GRADE 8

A

NEW YORK CITY PUBLIC SCHOOLS

2016 Specialized High Schools

ADMISSIONS TEST

GENERAL DIRECTIONS

Identifying Information

Turn to Side 1 of the answer sheet. **Line 1** says, "I am well enough to take this test and complete it. I understand that once I break the seal of the test booklet, I may not be eligible for a make-up test. I am a New York City resident and a Grade 8 student taking a Grade 8 test. I understand that a student who is not a New York City resident, who takes the test more than once in a given school year, or who takes the test at the wrong grade level will be disqualified from acceptance to any of the specialized high schools." Sign your name in the space following the word "signature." Do not print your name. **Notify the proctor immediately if you are ill or should not be taking this test. Do not sign the statement or begin the test. Return your answer sheet to the proctor.**

On **Line 2**, print today's date, using the numbers of the month, the day, and the year. On **Line 3**, print your birth date with the number of the month first, then the number of the day, then the last two digits of the year. For example, a birth date of March 1, 2002, would be 3-1-02.

In **Grid 4**, print the letters of your first name, or as many as will fit, in the boxes. Write your name exactly as you did on the application. If you have a middle initial, print it in the box labeled "MI." Then print your last name, or as much as will fit, in the boxes provided. Below each box, fill in the circle that contains the same letter as the box. If there is a space in your name, or a hyphen, fill in the circle under the appropriate blank or hyphen.

Make **dark marks** that **completely fill the circles.** If you change a mark, be sure to erase the first mark completely.

Grid 5 is for your choice of specialized high schools. If Grid 5 is not marked correctly, your admission to a specialized high school will be affected because your admission is based on the score you attain and the order in which you rank your school preferences. The school choices indicated on your answer sheet are final. Therefore, carefully copy the order in which you ranked the schools on your admission ticket onto Grid 5.

Fill in one and only one circle for each school for which you wish to be considered. You may make as few as one or as many as eight choices. To increase your chances of being assigned to one of the specialized high schools, you are encouraged to make more than one choice. You **must** fill in a first choice school. Do not fill in a school more than once. Do not fill in the same school for each choice. Fill in only one circle in a row and only one circle in a column.

Grid 6 asks for your date of birth. Print the first three letters of the month in the first box, the number of the day in the next box, and the year in the last box. Then fill in the corresponding circles.

For **Grid 7:**

1. Print the name of the school where you are now enrolled in the space at the top of the grid.
2. In the boxes marked "SCHOOL CODE," print the six-digit code that identifies your school and fill in the circle under the corresponding number or letter for each digit of the school code. (You can find your school code on your Test Ticket. If it is not there, you or the proctor should look in the Feeder School List under the borough in which your school is located to find the code for your school.)
3. If you attend a private or parochial school, fill in the circle marked "P".

Grid 8 is labeled "STUDENT ID NUMBER." All SHSAT test-takers should write their student ID number in Grid 8. The student ID number is found on your Test Ticket. In the boxes, print your nine-digit student ID number. Below each box, fill in the circle containing the same number as in the box.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

TURN YOUR BOOKLET OVER TO THE BACK COVER

Grid 9 is labeled "BOOKLET LETTER AND NUMBER." In most cases, Grid 9 is already filled in for you. If it is not, copy the letter and numbers shown in the upper-right corner of your test booklet into the boxes. Below each box, fill in the circle containing the same letter or number as the box.

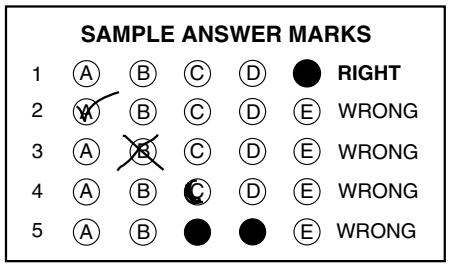
Now review Side 1 to make sure you have completed all lines and grids correctly. Review each column to see that the filled-in circles correspond to the letters or numbers in the boxes above them.

Turn your answer sheet to Side 2. Print your test booklet letter and numbers, and your name, first name **first**, in the spaces provided.

Marking Your Answers

Be sure to mark all your answers in the row of answer circles corresponding to the question number printed in the test booklet. Use a Number 2 pencil. If you change an answer, be sure to erase it completely. **You may write in your test booklet to solve verbal or mathematics problems, but your answers must be recorded on the answer sheet in order to be counted.** Be careful to avoid making any stray pencil marks on your answer sheet.

Each question has only one correct answer. If you mark more than one circle in any answer row, that question will be scored as incorrect. Select the **best** answer for each question. Your score is determined by the number of questions you answered correctly. **It is to your advantage to answer every question, even though you may not be certain which choice is correct.** See the example of correct and incorrect answer marks below



Planning Your Time

You have 150 minutes to complete the entire test. How you allot the time between the Verbal and Mathematics sections is up to you. **If you begin with the Verbal section, you may go on to the Mathematics section as soon as you are ready. Likewise, if you begin with the Mathematics section, you may go on to the Verbal section as soon as you are ready.** It is recommended that you do not spend more than 75 minutes on either section. If you complete the test before the allotted time (150 minutes) is over, you may go back to review questions in either section.

Work as rapidly as you can without making mistakes. Don't spend too much time on a difficult question. Return to it later if you have time.

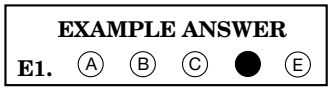
Students must remain for the entire test session.

Example 1

DIRECTIONS: Solve the problem. Find the **best** answer among the answer choices given.

E1. If four ice cream cones cost $2.00, how much will three ice cream cones cost?

A. $0.50
B. $1.00
C. $1.25
D. $1.50
E. $1.75



AA

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

PEARSON Copyright © 2016 NCS Pearson, Inc. All rights reserved. Printed in the U.S.A.

2016

NEW YORK CITY PUBLIC SCHOOLS

SPECIALIZED HIGH SCHOOLS ADMISSIONS TEST

GRADE 8

USE A PENCIL ONLY

SIDE 1

8

1. STUDENT STATEMENT: I am well enough to take this test and complete it. I understand that once I break the seal of the test booklet, I may not be eligible for a make-up test. I am a New York City resident and a Grade 8 student taking a Grade 8 test. I understand that a student who is not a New York City resident, who takes the test more than once in a given school year, or who takes the test at the wrong grade level will be disqualified from acceptance to any of the specialized high schools.

Signature (full name, first name first): _____

2. TODAY'S DATE: _____ Month Day Year

3. DATE OF BIRTH: _____ Month Day Year

CAREFULLY RECORD YOUR NAME, SCHOOL CHOICES, INFORMATION ABOUT THE SCHOOL WHERE YOU ARE NOW ENROLLED, DATE OF BIRTH, AND STUDENT ID NUMBER. USE A PENCIL ONLY. INCORRECT MARKS MAY DELAY THE SCORING OF YOUR ANSWER SHEET.

4. FIRST NAME (please print)

MI

LAST NAME (surname) (please print)

5. CHOICES OF SPECIALIZED HIGH SCHOOLS

Indicate your school choice in order of preference.

- Fill in only one school for each choice.
- You **must** fill in a first choice school.
- Fill in only one circle in a row and only one circle in a column.

School choices indicated on the answer sheet are final.

SCHOOLS	CHOICES: 1st choice	2nd choice	3rd choice	4th choice	5th choice	6th choice	7th choice	8th choice
Bronx Science	○	○	○	○	○	○	○	○
Brooklyn Latin	○	○	○	○	○	○	○	○
Brooklyn Tech	○	○	○	○	○	○	○	○
HS Math, Sci., & Engineering	○	○	○	○	○	○	○	○
HS American Studies/Lehman	○	○	○	○	○	○	○	○
Queens Sci./York	○	○	○	○	○	○	○	○
Staten Island Tech	○	○	○	○	○	○	○	○
Stuyvesant	○	○	○	○	○	○	○	○

6. DATE OF BIRTH

Month	Day			Year		
JAN	1	11	21	19	0	0
FEB	2	12	22	20	1	1
MAR	3	13	23		2	2
APR	4	14	24		3	3
MAY	5	15	25		4	4
JUN	6	16	26		5	5
JUL	7	17	27		6	6
AUG	8	18	28		7	7
SEP	9	19	29		8	8
OCT	10	20	30		9	9
NOV			31			
DEC						

7. SCHOOL WHERE YOU ARE NOW ENROLLED

NAME OF SCHOOL

School Code

0	0	K	0	0	0
1	1	M	1	1	1
2	2	Q	2	2	2
3	3	X	3	3	3
4	4	R	4	4	4
5	5	W	5	5	5
6	6		6	6	6
7	7		7	7	7
8	8		8	8	8
9	9		9	9	9

(P) Fill in for private or parochial schools only

8. STUDENT ID NUMBER

			–				–			
0	0	0		0	0	0		0	0	0
1	1	1		1	1	1		1	1	1
2	2	2		2	2	2		2	2	2
3	3	3		3	3	3		3	3	3
4	4	4		4	4	4		4	4	4
5	5	5		5	5	5		5	5	5
6	6	6		6	6	6		6	6	6
7	7	7		7	7	7		7	7	7
8	8	8		8	8	8		8	8	8
9	9	9		9	9	9		9	9	9

9. BOOKLET LETTER AND NUMBER

A	0	0	0	0	0
B	1	1	1	1	1
C	2	2	2	2	2
D	3	3	3	3	3
E	4	4	4	4	4
F	5	5	5	5	5
G	6	6	6	6	6
H	7	7	7	7	7
J	8	8	8	8	8
K	9	9	9	9	9
L					
P					
Q					
W					

06/16 105336-26 654321

NEW YORK CITY PUBLIC SCHOOLS

USE A PENCIL ONLY

2016 SPECIALIZED HIGH SCHOOLS ADMISSIONS TEST

GRADE 8

SIDE 2

Test Booklet Letter Test Booklet Number

Student's First Name (please print) Student's Last Name (please print)

PART 1 VERBAL

SCRAMBLED PARAGRAPHS

Paragraph 1

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

Paragraph 2

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

Paragraph 3

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

Paragraph 4

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

Paragraph 5

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

LOGICAL REASONING

11	A	B	C	D	E
12	F	G	H	J	K
13	A	B	C	D	E
14	F	G	H	J	K
15	A	B	C	D	E
16	F	G	H	J	K
17	A	B	C	D	E
18	F	G	H	J	K
19	A	B	C	D	E
20	F	G	H	J	K

READING

21	A	B	C	D	E
22	F	G	H	J	K
23	A	B	C	D	E
24	F	G	H	J	K
25	A	B	C	D	E
26	F	G	H	J	K
27	A	B	C	D	E
28	F	G	H	J	K
29	A	B	C	D	E
30	F	G	H	J	K
31	A	B	C	D	E
32	F	G	H	J	K
33	A	B	C	D	E
34	F	G	H	J	K
35	A	B	C	D	E
36	F	G	H	J	K
37	A	B	C	D	E
38	F	G	H	J	K
39	A	B	C	D	E
40	F	G	H	J	K
41	A	B	C	D	E
42	F	G	H	J	K
43	A	B	C	D	E
44	F	G	H	J	K
45	A	B	C	D	E
46	F	G	H	J	K
47	A	B	C	D	E
48	F	G	H	J	K
49	A	B	C	D	E
50	F	G	H	J	K

PART 2 MATHEMATICS

MATHEMATICS PROBLEMS

51	A	B	C	D	E
52	F	G	H	J	K
53	A	B	C	D	E
54	F	G	H	J	K
55	A	B	C	D	E
56	F	G	H	J	K
57	A	B	C	D	E
58	F	G	H	J	K
59	A	B	C	D	E
60	F	G	H	J	K
61	A	B	C	D	E
62	F	G	H	J	K
63	A	B	C	D	E
64	F	G	H	J	K
65	A	B	C	D	E
66	F	G	H	J	K
67	A	B	C	D	E
68	F	G	H	J	K
69	A	B	C	D	E
70	F	G	H	J	K
71	A	B	C	D	E
72	F	G	H	J	K
73	A	B	C	D	E
74	F	G	H	J	K
75	A	B	C	D	E
76	F	G	H	J	K
77	A	B	C	D	E
78	F	G	H	J	K
79	A	B	C	D	E
80	F	G	H	J	K
81	A	B	C	D	E
82	F	G	H	J	K
83	A	B	C	D	E
84	F	G	H	J	K
85	A	B	C	D	E
86	F	G	H	J	K
87	A	B	C	D	E
88	F	G	H	J	K
89	A	B	C	D	E
90	F	G	H	J	K
91	A	B	C	D	E
92	F	G	H	J	K
93	A	B	C	D	E
94	F	G	H	J	K
95	A	B	C	D	E
96	F	G	H	J	K
97	A	B	C	D	E
98	F	G	H	J	K
99	A	B	C	D	E
100	F	G	H	J	K

Copyright © 2016 NCS Pearson, Inc. All Rights Reserved.
Reprinted by Permission—Restricted Edition—Not for Distribution

Sample Test, Form A
Part 1 — Verbal

Suggested Time — 75 Minutes

45 QUESTIONS

Scrambled Paragraphs

PARAGRAPHS 1-5

DIRECTIONS: In this section, arrange each group of sentences to create the best paragraph. The first sentence for each paragraph is given; the remaining five sentences are listed in random order. Choose the order for these five sentences that will create the **best** paragraph, one that is well-organized, logical, and grammatically correct. Each correctly ordered paragraph is worth **double** the value of a question in any other section of the test. No credit will be given for responses that are only partially correct.

To keep track of your sentence order, use the blanks to the left of the sentences. For example, write "2" next to the sentence you think follows the first sentence, write "3" next to the sentence you think follows "2," and so on. You may change these numbers if you decide on a different order. When you are satisfied with your sentence order, mark your choices on your answer sheet.

Paragraph 1

The Codex Mendoza is a fascinating document describing the culture and traditions of the Aztec Indians before the Spanish conquest.

_____ **Q.** A boy was often named for the date of his birth or for an animal or ancestor, or even for some event at the time of his birth.

_____ **R.** The parents would also place in the child's hands the implements that he or she would use in adult life, gently guiding them in the motions of use.

_____ **S.** Instruments used to weave and spin were given to the girls, while tools and weapons were given to the boys.

_____ **T.** One tradition it describes is the feast hosted by the parents of a newborn child to give that child a name.

_____ **U.** Girls' names, on the other hand, were frequently created to include the Aztec word for flower, *xóchitl*.

CONTINUE ON TO THE NEXT PAGE ▶

Paragraph 2

In the remote mountain country of Nepal, a small band of "honey hunters" carry out a tradition so ancient that it is depicted in drawings dating back 10,000 years.

_____ **Q.** Throughout this entire dangerous practice, the hunter is stung repeatedly.

_____ **R.** To harvest the honey from these combs, a honey hunter climbs above the nest, lowers a bamboo-fiber ladder over the cliff, and climbs down.

_____ **S.** The honeybees that colonize the Nepalese mountainsides are among the largest in the world, building huge honeycombs on sheer rock faces that may be hundreds of feet high.

_____ **T.** Only veteran honey hunters, with skin that has been toughened over the years, can return from a hunt without the painful swelling caused by these stings.

_____ **U.** Once he has reached the level of the nest, the hunter uses two sturdy bamboo poles like huge chopsticks to pull it away from the mountainside and into a large basket, which is then lowered to people waiting below.

Paragraph 3

When contemporary Native American tribes meet for a powwow, one of the most popular ceremonies is the women's jingle dress dance.

_____ **Q.** During this type of dance, the dancers blend complicated footwork with a series of gentle hops, done in rhythm to a drumbeat.

_____ **R.** In the past, it is believed, the dress worn by the jingle-dress dancer was adorned by shells.

_____ **S.** These actions cause decorations sewn on the dancer's dress to strike each other as she performs, creating a lovely jingling sound.

_____ **T.** Besides being more readily available than shells, the lids are thought to create a softer, more subtle sound.

_____ **U.** The modern jingle dress no longer has shells, but is decorated with rows of tin cones, made from the lids of snuff cans, rolled up and sewn onto the dress.

CONTINUE ON TO THE NEXT PAGE ▶

Paragraph 4

In the 1880s, John Wesley Powell, an explorer of the Grand Canyon and director of the United States Geological Survey, led the development of the first topographical maps of the entire United States.

_____ **Q.** This is because streams cut into the land, so contour lines will turn upstream, cross the waterway, and return downstream, creating a V shape, with the "V" pointing upstream.

_____ **R.** Waterways, such as streams, are usually marked in blue on topo maps, but even if they were not, the presence of one could still be identified using contour lines.

_____ **S.** Contour lines indicate the slope of the land as well.

_____ **T.** If the lines are close together, the elevation is changing rapidly and the slope is steep, whereas widely spaced lines depict a gently sloping terrain.

_____ **U.** Also called "topo maps," these maps differ from others in using thin brown lines, called contour lines, to connect points of equal elevation.

Paragraph 5

Ancient people of the Mediterranean thought that volcanoes were caused by Vulcan, the Roman blacksmith god.

_____ **Q.** In the same park, Mauna Loa, at 28,000 feet above the ocean's floor, is the largest active volcano in the world.

_____ **R.** There are dozens of active and potentially active volcanoes within the United States, including Kilauea, the most active volcano in the world.

_____ **S.** Both of these are shield volcanoes, which means that they were formed as lava flowed in all directions from a central vent to form low, gently sloping mountains.

_____ **T.** Volcanoes, which were named for Vulcan, are vents in the crust of the earth from which molten lava and ash erupt.

_____ **U.** That volcano, located in Hawaii Volcanoes National Park, has been spewing lava since 1983.

CONTINUE ON TO THE NEXT PAGE ▶

LOGICAL REASONING

QUESTIONS 11-20

DIRECTIONS: Read the information given and choose the **best** answer to each question. Base your answer **only on the information given.**

In a logical reasoning test, certain words must be read with caution. For example, "The red house is **between** the yellow and blue houses" does not necessarily mean "The red house is **between and next to** the yellow and blue houses"; one or more other houses may separate the red house from the yellow house or from the blue house. This precaution also applies to words such as **above, below, before, after, ahead of,** and **behind.**

---

11. The shortest member of the basketball team is 5 feet 11 inches tall. Cheng is 6 feet 2 inches tall.

Based only on the information above, which of the following **must** be true?

A. Only members of the basketball team are taller than 5 feet 11 inches.
B. Cheng is shorter than some members of the basketball team.
C. At least one member of the basketball team is shorter than Cheng.
D. Cheng is a member of the basketball team.
E. Cheng is the tallest member of the basketball team.

---

12. Javon has three pets at home: a hamster, which is active only at night; a dog, which is active only during the day; and a cat, which alternately sleeps for an hour and then is active for an hour.

Based only on the information above, which of the following **must** be true?

F. The hamster and the cat will never be active at the same time.
G. The dog and the cat will never be active at the same time.
H. There are times when none of the pets is active.
J. All three animals are active at alternate hours.
K. There never will be more than two pets active at the same time.

13. There are four towns in Jefferson County: Elmont, Richland, Lendle, and Mopley. Highway 14 is closed from Elmont to Richland because of flooding.

1) Lendle is between Elmont and Richland on Highway 14.
2) Mopley can be reached from Lendle, without going through Elmont or Richland.

Which of the following statements is a valid conclusion from the statements above?

A. Mopley is not flooded.
B. Either Elmont or Richland is flooded.
C. Both Elmont and Richland are flooded.
D. No one can drive to Lendle on Highway 14.
E. Mopley cannot be reached directly from Elmont.

---

14. Six people are seated at a six-sided table, facing inward, one at each side.

1) Jorge sits directly across from Bree.
2) Susana sits directly across from Michael.
3) Darius sits directly across from Lucy.
4) Bree is immediately next to Darius, on his right.
5) Susana is immediately next to Jorge.

Who sits on Michael's immediate left?

F. Susana
G. Bree
H. Lucy
J. Darius
K. Cannot be determined from the information given.

CONTINUE ON TO THE NEXT PAGE ▶

15. One prize was awarded each week in a three-week contest. The prizes were a trip to Disney World, a big-screen television, and a computer.

1) Luis, Michael, and Nadia each won a prize.
2) Michael did not win the computer.

Which of the following pieces of additional information makes it possible to determine who won each prize?

A. Michael won the free trip.
B. Luis won the television.
C. Luis won the computer.
D. Nadia won the computer.
E. Michael won the television.

---

16. When Soon Bae listens to music, she also dances. Whenever she dances, she also sings.

Based only on the information above, which of the following is a valid conclusion?

F. When Soon Bae sings, then she is dancing.
G. Soon Bae sings only when she is dancing.
H. When Soon Bae listens to music, then she is also singing.
J. If Soon Bae is not listening to music, then she is not dancing.
K. If Soon Bae is not dancing, then she is not singing.

---

17. At Midway School, each new student is paired with an older student partner. The new students are Bai, Gloria, Sandro, and Henry. The older student partners are Edgar, Paola, Rakim, and Whitney.

1) Sandro and Whitney are paired.
2) Bai is not paired with Rakim.
3) Edgar is not paired with Gloria or Bai.

Who is paired with Paola?
A. Bai
B. Gloria
C. Henry
D. Edgar
E. Rakim

---

18. Jack played three instruments in the orchestra. He played violin for two years, cello for three years, and bass for three years. He never played more than two instruments during the same year. The first year, Jack played only the violin.

What is the **least** number of years Jack could have played in the orchestra?

F. 4
G. 5
H. 6
J. 7
K. 8

Questions 19 and 20 refer to the following information.

In the code below, (1) each letter always represents the same word, (2) each word is represented by only one letter, and (3) in any given sentence, the letters may or may not be presented in the same order as the words.

L	W	Q	P	R	means
"Michelle	paints	planes	and	birds."	
Z	V	R	U	N	means
"Stuart	draws	cars	and	dogs."	
L	V	P	T	R	means
"Javier	paints	cars	and	planes."	
Y	X	R	N	W	means
"Ivan	draws	birds	and	ships."	

19. Which word is represented by the letter Q?

A. birds
B. planes
C. Michelle
D. paints
E. and

20. Which letter represents the word "paints"?

F. L
G. P
H. R
J. W
K. Cannot be determined from the information given.

CONTINUE ON TO THE NEXT PAGE ▶

READING

QUESTIONS 21-50

DIRECTIONS: Read each passage below and answer the questions following it. Base your answers **on information contained only in the passage.** You may reread a passage if you need to. Mark the **best** answer for each question.

On Monday evening, September 26, 1960, seventy million Americans turned on their TV sets to view the first televised political debate in a campaign for the presidency of the United States. As of that date, it was by far the largest number ever to witness a political discussion. The novelty of the event drew even those with little or no interest in politics.

The candidates, Republican Vice President Richard M. Nixon and Democratic Senator John F. Kennedy, had agreed to face each other and the nation in four one-hour sessions that the press dubbed the "Great Debates." Many expected Vice President Nixon to win the debates easily. He was ahead in the newspaper polls, he was an experienced public speaker, and he had served as vice president for nearly eight years. Senator Kennedy was less well-known and, at forty-three, was the youngest man ever to run for president. Throughout the presidential race, his opponents criticized him for his relative youth and inexperience.

By mutual agreement, the first session was limited to domestic issues within the United States. Each candidate was given eight minutes to make his opening remarks. During the remainder of the hour, the candidates took turns responding to questions posed by selected reporters. Both Kennedy and Nixon dealt with the issues calmly and carefully. Viewers who expected to see a free-for-all were disappointed. The way the two men appeared on the television screen, however, may have been as important as what they said. Kennedy looked at the camera while answering questions, appearing to speak directly to his viewers and give them straight answers. Nixon was recovering from a severe bout of influenza, and he appeared tense and tired. He looked at the reporters who asked the questions instead of at the camera, giving some viewers the impression that he avoided eye contact with his audience, and thus suggesting that he was not trustworthy. Most commentators agreed that Kennedy gained from the encounter: many viewers who had previously felt he lacked the maturity necessary to be president were won over by his charm, poise, and confident manner.

While far fewer people watched the three later sessions, much discussion ensued regarding the influence of the Great Debates on the outcome of the 1960 presidential election. Some feared that the better TV performer was bound to come across as being the better candidate. "Is this a good way to judge a person's ability to serve as president of the United States?" they asked.

Kennedy ultimately won the election, but it was by the narrowest popular vote margin in more than eighty years. Some observers concluded that, had the Great Debates been broadcast on radio and not on television, Nixon would have won.

CONTINUE ON TO THE NEXT PAGE ►

21. Which of the following best tells what this passage is about?

A. the careers of Nixon and Kennedy
B. how elections have changed since 1960
C. domestic issues in the Kennedy-Nixon debates
D. the presidential debates of 1960
E. the qualifications of Nixon and Kennedy

22. According to the passage, which of the following would have been the most likely result if the candidates had **not** debated on television in 1960?

F. Kennedy would have won the election anyway.
G. The election results would have been much closer.
H. Nixon would have had a better chance of winning the election.
J. The candidates would not have debated at all.
K. Nixon would have improved his on-screen performance.

23. Which of the following did critics in 1960 think could be an undesirable consequence of presidential debates on television?

A. Candidates might no longer utilize other media to get their messages across.
B. By being too cautious on television, candidates might fail to debate the issues seriously.
C. Appearing on television might take up too much of a candidate's time.
D. Americans might be persuaded to vote for a presidential candidate because of their television performance.
E. Americans who did not watch every debate might not be fully informed about the candidates' stands.

24. According to the passage, how did Kennedy benefit from the debates?

F. His grasp of domestic issues was shown to be superior to Nixon's.
G. The debates focused on his years of experience in the Senate.
H. He appeared to have attractive personal characteristics.
J. He maintained eye contact with the reporters asking the questions.
K. Nixon was seen as a superficial TV performer.

25. What evidence does the author provide to support the last sentence of the passage?

A. Far fewer people watched the three later debates.
B. Both candidates dealt with the issues calmly and carefully.
C. The candidates did not cause a free-for-all.
D. The first debate session was limited to domestic issues.
E. Nixon was more experienced and well-known than Kennedy.

26. According to the passage, why did people who were not normally interested in politics tune in to the first of the Great Debates?

F. Vice President Nixon was a popular politician.
G. Television had never before been used in this way.
H. They had heard that Kennedy was young and charismatic.
J. They wanted to see if the newspaper polls were correct.
K. The election was expected to be very close.

CONTINUE ON TO THE NEXT PAGE ►

In many cultures, the ugly physical appearance of the bat has given it an unearned reputation as an evil and vicious bearer of diseases. Many people, for example, believe that the little brown bat carries rabies. In fact, it is no more likely to transmit the disease than other animals, such as dogs. Brown bats actually help to prevent disease, not spread it. The basis of their diet is the mosquito, an insect that transmits more diseases than all the bats in the world combined.

A group of bat species known as flying foxes or fruit bats serve another important purpose, as a critical link in the reproduction of many tropical trees and shrubs. In the tropical rain forests of Africa, Asia, and Australia, plants such as avocadoes, date trees, cashews, and mangoes rely in part on flying foxes for pollination. One of Africa's most valuable hardwood trees, the iroko, is entirely dependent on this type of bat for pollination. Flying foxes feed on flowers, fruit, and nectar, flying from one plant to another and pollinating the plants as they go, much as bees do in other parts of the world. Because they are sloppy eaters, flying foxes drop fruit as they go, dispersing the seeds. They can travel great distances and convey pollen and seeds far from their origins, thereby maintaining the genetic biodiversity within a plant species.

Because of the importance of bats' role in pollination and seed distribution, scientists consider them a keystone in the ecosystems of tropical rain forests. Without bats, many bat-pollinated plants—and the animals that depend on them for food and shelter—would be threatened to the point of extinction. Areas outside the rain forests would be impacted as well, since the rain forests' lush vegetation replenishes the oxygen in the global atmosphere.

Unfortunately, many people are determined to get rid of bats. Flying foxes are at particular risk. In the wild, they feed on wild fruit, but when their rain forest habitat is reduced by conversion into farmland or residential areas, they occasionally raid cultivated fruit trees, spoiling the crops. Several flying fox species have been hunted to extinction, while others are seriously endangered.

Conservation groups and government agencies in many countries are attempting to change people's attitudes toward bats. When people learn that bats pollinate the trees and crops that provide their livelihood, they are more likely to appreciate and protect the bats in their area. There are also effective, non-harmful ways to deal with troublesome bats. Orchard owners can cover their trees with netting to discourage the bats, and there are humane methods for moving bats from places where they are not wanted. For the sake of the rain forests, and for life forms everywhere that depend on them, it is urgent that people apply a new twist to an old adage, and realize that ugliness is only skin deep.

27. Which of the following best tells what this passage is about?

A. why plant species in the tropical rain forest are becoming endangered
B. how the misunderstood bat benefits other life forms
C. why rain forests are an important world resource
D. how bats spread rabies and other diseases
E. how bats pollinate tropical plants

28. What does the author intend to convey by the statement "ugliness is only skin deep" (line 70)?

F. Some ugly animals eventually become beautiful.
G. Bats are not as ugly as most people think.
H. People shouldn't think that bats are harmful simply because they are ugly.
J. People who find bats ugly do not believe that bats have an important environmental role.
K. Beneficial animals are often considered ugly.

CONTINUE ON TO THE NEXT PAGE ►

29. Which of the following best describes animal species that function as a "keystone" (line 35)?

A. They are a major factor in disease prevention.
B. They are a food source for other animals.
C. They pollinate every plant species.
D. They are crucial in maintaining the balance of their ecosystem.
E. They generate the oxygen in the atmosphere.

30. What would be the most immediate result if flying foxes became extinct?

F. Other animal species would take their place.
G. Tropical rain forests would become free of disease.
H. Many animals would lose a food source.
J. Many tropical plants would have difficulty with reproduction.
K. The oxygen in the atmosphere would be quickly used up.

31. Why do flying foxes sometimes eat fruit from cultivated fruit trees?

A. They prefer eating cultivated fruit to wild fruit.
B. They are better able to spread pollen from cultivated fruit trees.
C. The number of wild fruit trees has decreased.
D. Cultivated fruit trees are completely dependent on bats for pollination.
E. Declining mosquito populations can no longer feed the bats.

32. What is the most likely reason that the author mentioned the iroko tree?

F. to provide an example of a useful plant that would die out without flying foxes
G. to demonstrate that there are alternate ways to pollinate tropical plants
H. to illustrate how rain forests supply oxygen to the atmosphere
J. to show what flying foxes will do when wild fruit trees are unavailable
K. to encourage farmers to cover their trees with netting

CONTINUE ON TO THE NEXT PAGE ►

Anyone who has watched TV news coverage of a hurricane has seen how destructive wind energy can be. But the power of the wind can also be put to constructive use. From sailboats to old-fashioned windmills to the high-tech, modern wind machines called turbines, people have devised ways to harness wind energy for thousands of years.

The first known attempt to use wind power was the sailboat. Ancient shipbuilders understood how to use forces like lift and momentum, even if they could not explain those forces scientifically. The principles behind sailing led to the development of the windmill. The first known windmills originated in Persia, an area that is now Iran, as early as A.D. 500. They were created to help with the demanding chores of grinding grain and pumping water. By the tenth century, windmills were used throughout central Asia; they were used in China as early as the thirteenth century.

In Europe, windmills came into widespread use during the twelfth century. As in other parts of the world, they were used for milling grain and pumping water. Windmills replaced the water wheel, which was turned by the movement of running water over paddles mounted around a wheel. The windmill was more adaptable and efficient than the water wheel and quickly became popular. For example, Holland, famous for its windmills, used the machines to pump seawater away from low-lying coastal bogs. This allowed the Dutch to reclaim large areas of land from the sea. Windmills eventually became sophisticated enough for use in a broad range of work, from sawmills and drainage pumping to processing goods such as dyes, tobacco, cocoa, and spices.

In the 1700s, as steam engines gained in popularity, the use of wind machines for many types of work declined. However, windmills still played an essential role in pumping water on farms throughout the American West and Midwest. Between 1850 and 1970, over six million small windmills were installed on American farms for watering livestock and meeting other water needs. In many remote areas even today, livestock production would be impossible without the use of windmills to provide water.

Beginning in the late nineteenth century, windmills were adapted to generate electricity. During the 1930s and '40s, thin-bladed windmills provided electricity for hundreds of thousands of farms across the United States. By the 1950s, however, power lines connected almost every household in America to a central power source, such as a utility company. After that, there was little need for wind turbines until the energy crisis of the 1970s. At that time, interest in wind turbines was renewed due to rising energy costs and concern about the future availability of fossil fuels such as oil, coal, and natural gas. The last several decades have seen the development of "wind farms," clusters of wind turbines that generate electricity. Efficient, clean, and fairly inexpensive to operate, wind farms may prove to be as important in the future as earlier windmills were in the past.

33. Which of the following best tells what this passage is about?

A. the destructive power of wind energy
B. the ways people have harnessed wind power throughout history
C. reasons for developing wind farms to generate electricity
D. how windmills are used in the United States
E. the use of the windmill in the present day

34. Where were the first known windmills built?

F. Persia
G. North America
H. Europe
J. China
K. Holland

CONTINUE ON TO THE NEXT PAGE ▶

35. Which of the following best expresses the author's opinion regarding the future use of wind energy?

A. Wind farms will someday be the only source of electricity in the United States.
B. Wind farms will not be successful in providing large amounts of electricity.
C. A new energy source will be discovered that will diminish interest in wind farming.
D. Wind farms will become an important source of electricity in the United States.
E. Different energy sources will be developed because wind farming is too expensive.

36. The adaptation of old-fashioned water-pumping windmills into wind turbines that generate electricity illustrates

F. that modern technology is no improvement over ancient technology.
G. the inability of people to develop new solutions.
H. how wind power will eventually replace all other energy sources.
J. that water cannot be used to produce electricity.
K. the ability of people to think creatively.

37. Why were fewer American farms dependent on windmills for electrical power after the 1950s?

A. Windmills were not used for any purpose after that time.
B. The energy crisis had prompted interest in other fuel sources.
C. The energy crisis had stopped the development of wind turbines.
D. A centralized power system had connected almost all American homes.
E. Wind farms had replaced the need for individual windmills.

38. According to the passage, how did windmills aid the growth of the country of Holland?

F. Windmills helped Dutch shipbuilders use the forces of lift and momentum.
G. By pumping seawater out, the Dutch turned bogs into usable land.
H. Windmills made the country of Holland famous.
J. By pumping seawater, the Dutch flooded coastal bogs in order to improve ship travel.
K. In Holland, windmills led to the use of water wheels.

CONTINUE ON TO THE NEXT PAGE ▶

The decade that began with the stock market crash in 1929 and ended with the declaration of war in Europe in 1939 was a turning point for art in the United States. Rejecting European trends, such as abstract art, American painters searched for a style that was distinctly American. It was a time of great social change—a society based on rural and small town life was rapidly being replaced by a society focused on city life and values. Although members of various groups are all referred to as "American Scene" painters, different groups painted their images of the United States in very different ways.

One group, sometimes called the Regionalists, included Thomas Hart Benton, Grant Wood, and John Steuart Curry, all from the Midwest. Their art was intensely patriotic and frequently glorified an older, simpler America. Their subject matter included church steeples, New England fishing villages, and midwestern cornfields. Grant Wood's most famous canvas is probably *American Gothic*, which shows a stiff and proper farm couple, the husband holding a pitchfork. The Regionalists were often muralists as well, painting local scenes on walls of state capitols and other public buildings. Enormously popular during the 1930s, Regionalist art is still treasured by many as a fond memory of times gone by.

While the Regionalists remembered the past, other American Scene artists painted the drab realities of the contemporary urban environment, testifying to its loneliness and anonymity. The Urban Realists, including Reginald Marsh, Isabel Bishop, and the Soyer brothers, were associated with the Art Students League in New York. These painters showed the high price paid by individual men and women struggling to survive the Depression. The names of some of their works illustrate the style: *Office Girls, Waiting, The Bowery.* For various reasons, their work has been largely forgotten today.

Edward Hopper was an artist who was associated with the American Scene but otherwise escaped further classification. Like the Urban Realists, he painted the tired dinginess of the urban streets during the Depression. Yet Hopper often found beauty in the midst of the city's monotony. For example, one of Hopper's best-known paintings, *Nighthawks*, shows several people sitting like robots in a brightly lit coffee shop at night, each apparently unaware of the others. Hopper was not interested in a return to the past. He presented what he saw without apology or sentimentality.

The American Scene art movement of the 1930s was characterized by realistic paintings that expressed the traditions and interests of people in the United States at that time. Because the paintings presented common images and mirrored the lives of many people, the general public readily identified with the subjects of the paintings. With the onset of World War II, a new spirit of internationalism swept through the art of the United States, and the American Scene painters became out of date. Although the movement did not last, it had reflected its own time with profound understanding.

39. According to the passage, why did ordinary people in the 1930s identify with the art of the American Scene painters?

A. The artists were primarily concerned with painting farm life.
B. People were given hope when they saw the paintings.
C. People wanted social and cultural change shown in their paintings.
D. The paintings suggested solutions to the problems of the period.
E. The paintings reflected the times in ways that were familiar to most viewers.

CONTINUE ON TO THE NEXT PAGE ▶

40. Which of the following subjects would an Urban Realist painter be most likely to represent?

F. factory workers going home from work
G. sunset on a beach
H. a self-portrait
J. a European city scene
K. an abstract painting in black and white

41. Hopper's paintings contrast with the work of the Urban Realist painters by

A. portraying the beauty in America's past.
B. showing the ugliness of a city environment.
C. illustrating the move toward an international style.
D. revealing how dull urban life can include beauty.
E. presenting the trials of working people during the Depression.

42. How does the fourth paragraph contribute to the passage?

F. It describes the end of the American Scene movement.
G. It honors Edward Hopper as a great American Scene painter.
H. It explains why Edward Hopper's work has been forgotten.
J. It contrasts American Scene with Urban Realist styles.
K. It presents an American Scene painter who focused on beauty.

43. The author used the phrase "without apology" (line 62) to explain that Hopper did not feel he needed to justify

A. how he portrayed his subjects.
B. painting scenes from the past.
C. why *Nighthawks* became popular.
D. not joining the international art movement.
E. why he was an emotional painter.

44. What is the most likely reason that Regionalist art has retained some of its popularity while Urban Realist art has not?

F. Regionalist art depicts modern life as well as life in the past, while Urban Realist art depicts only the past.
G. Regionalist art more accurately portrays the time in which it was painted than Urban Realist art does.
H. Regionalist art shows American life as people wish to remember it while Urban Realist art does not.
J. Regionalist art represents the positive side of urban life more than Urban Realist art does.
K. Regionalist art more accurately depicts how Americans overcame the effects of the Depression than Urban Realist art does.

CONTINUE ON TO THE NEXT PAGE ►

If you have ever watched someone fall on the ice, you've seen slipperiness at work. But have you wondered what makes ice slippery, or why skates or skis glide across ice so easily? The answer might seem obvious: ice is smooth. Yet smoothness in itself does not explain slipperiness. Imagine, for example, skating on a smooth surface of glass or sheet metal.

Surprisingly, scientists do not fully understand why ice is slippery. Past explanations of slipperiness have focused on friction and pressure. According to the friction theory, a skate blade rubs across the ice, causing friction. The friction produces heat, melting the ice and creating a slippery, microscopically thin layer of water for the skate to glide on. The friction theory, however, cannot explain why ice is slippery even when someone stands completely motionless, creating no friction.

The pressure theory claims that pressure from a skate blade melts the ice surface, creating a slippery layer of water. The water refreezes when the pressure is lifted. Science textbooks typically cite this explanation, but many scientists disagree, claiming that the pressure effect is not great enough to melt the ice. Nor can the pressure theory explain why someone wearing flat-bottomed shoes—which have a greater surface area than skate blades and thus exert less pressure per square inch—can glide across the ice or even go sprawling.

During the 1990s, another theory found acceptance: the thin top layer of ice is liquid, or "liquid-like," regardless of friction or pressure. This notion was first proposed more than 150 years ago by physicist Michael Faraday. Faraday's simple experiment illustrates this property: two ice cubes held against each other will fuse together. This happens, Faraday explained, because liquid on the cubes' surfaces froze solid when the surfaces made contact.

Faraday's hypothesis was overlooked, in part because scientists did not have the means to detect molecular structures. However, technological advances during recent decades allow scientists to measure the thin layer on the surface of the ice. For example, in 1996, a chemist at Lawrence Berkeley Laboratory shot electrons at an ice surface and recorded how they rebounded. The data suggested that the ice surface remained "liquid-like," even at temperatures far below freezing. Scientists speculate that water molecules on the ice surface are always in motion because there is nothing above them to hold them in place. The vibration creates a slippery layer of molecules. According to this interpretation of the Lawrence Berkeley Laboratory experiments, the molecules move only up and down; if they also moved side to side, they would constitute a true liquid. Thus it could be said that people are skating on wildly vibrating molecules!

The phenomenon of a slippery liquid-like surface is not limited to ice, although ice is the most common example. Lead crystals and even diamond crystals, made of carbon, also show this property under certain temperature and pressure conditions.

45. Which of the following best tells what this passage is about?

A. why ice surfaces are liquid-like
B. how ice changes from a solid to a liquid
C. answers to the question of what makes ice slippery
D. the discoveries of Michael Faraday
E. the processes of freezing and melting

CONTINUE ON TO THE NEXT PAGE ►

46. What is the most likely reason that the author mentioned lead and diamond crystals in the last paragraph?

F. to point out that solids other than ice have slippery surfaces
G. to suggest that ice, lead, and diamonds are composed of the same materials
H. to cast doubt on Faraday's theory of slipperiness
J. to suggest that scientists shoot electrons at lead and diamond surfaces
K. to suggest new uses for slippery substances

47. According to Faraday, why do two ice cubes fuse when held together?

A. Friction causes the ice to melt and refreeze.
B. The pressure melts and refreezes the ice cubes.
C. The liquid layers on their surfaces freeze.
D. The vibrations of the molecules on their surfaces increase.
E. Their surface areas are perfectly smooth.

48. What is the most likely reason that the author mentioned the 1996 experiment at Lawrence Berkeley Laboratory?

F. to provide evidence about the surface of ice
G. to illustrate the weaknesses of scientific technology
H. to show how Faraday tested his theory
J. to suggest that the ice surface was solid, not liquid
K. to explain why ice cubes freeze together

49. According to researchers at the Lawrence Berkeley Laboratory, why is the surface of ice "liquid-like" rather than "liquid"?

A. because electrons rebound from the ice surface
B. because molecules on the ice surface vibrate only up and down
C. because the ice surface is wet
D. because the ice surface is slipperier than a liquid surface
E. because the temperature on the ice surface is slightly above freezing

50. According to the passage, which of the following undermines the friction theory of slipperiness?

F. a person wearing flat-bottomed shoes gliding across the ice
G. two ice cubes fused together
H. electrons bouncing off an ice surface
J. a person trying to skate on a sheet of glass or sheet metal
K. a person slipping while standing immobile on ice

CONTINUE ON TO THE NEXT PAGE ►

PART 2 — MATHEMATICS

Suggested Time — 75 Minutes

50 QUESTIONS

GENERAL INSTRUCTIONS

Solve each problem. Select the **best** answer from the choices given. Mark the letter of your answer on the answer sheet. You can do your figuring in the test booklet or on paper provided by the proctor. **DO NOT MAKE ANY MARKS ON YOUR ANSWER SHEET OTHER THAN FILLING IN YOUR ANSWER CHOICES.**

IMPORTANT NOTES:

(1) Formulas and definitions of mathematical terms and symbols are **not** provided.

(2) Diagrams other than graphs are **not** necessarily drawn to scale. Do not assume any relationship in a diagram unless it is specifically stated or can be figured out from the information given.

(3) Assume that a diagram is in one plane unless the problem specifically states that it is not.

(4) Graphs are drawn to scale. Unless stated otherwise, you can assume relationships according to appearance. For example, (on a graph) lines that appear to be parallel can be assumed to be parallel; likewise for concurrent lines, straight lines, collinear points, right angles, etc.

(5) Reduce all fractions to lowest terms.

---

51. $\frac{4.5}{0.1} \times 0.22 =$

A. 0.99
B. 1.99
C. 9.9
D. 99
E. 990

---

52. If $\frac{4}{5}$ of P is 48, what is $\frac{3}{5}$ of P?

F. 12
G. 15
H. 20
J. 36
K. 60

---

53. If $\frac{a}{b} = 2$ and $a = 8$, what is the value of $3b + a^2$?

A. 28
B. 70
C. 76
D. 88
E. 112

---

54. Carlos is picking colored pencils from a large bin that contains only 480 red pencils, 240 green pencils, and 160 blue pencils. Without looking, Carlos pulls out 22 pencils. If the pencils were distributed randomly in the bin, how many pencils of each color is it most likely that he picked?

F. 8 red, 7 green, 7 blue
G. 10 red, 7 green, 5 blue
H. 10 red, 8 green, 4 blue
J. 11 red, 6 green, 5 blue
K. 12 red, 6 green, 4 blue

---

55. How many positive integers satisfy the inequality $x + 7 < 23$?

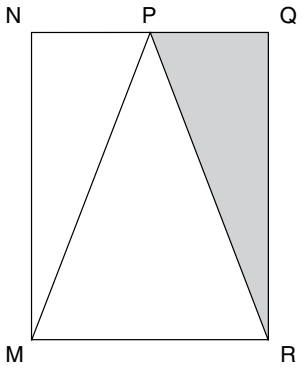
A. 15
B. 16
C. 17
D. 29
E. 30

---

56. $3.99 \div 1.5 =$

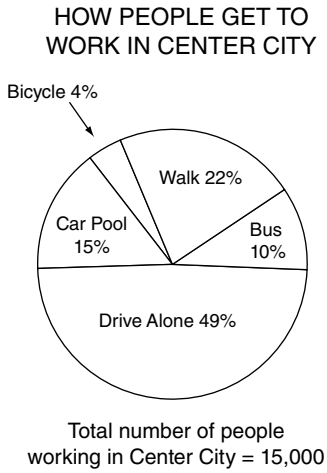
F. 0.266
G. 0.267
H. 2.0
J. 2.66
K. 2.67

57. In the figure above, the base of $\triangle MPR$ is a side of rectangle MNQR, and point P is the midpoint of $\overline{NQ}$. If the area of the shaded region is 24 square centimeters, what is the area of the region that is **not** shaded?



A. 24 sq cm
B. 48 sq cm
C. 64 sq cm
D. 72 sq cm
E. 96 sq cm

58.



How many more people in Center City walk to work than ride their bicycles to work?

F. 18
G. 22
H. 2,700
J. 2,800
K. 3,000

59. If x and y are positive integers such that $0.75 = \frac{x}{y}$, what is the **least** possible value for x?

A. 1
B. 3
C. 4
D. 25
E. 75

60. $|190 - 210| + |19 - 21| + x = 100$

In the equation above, what is the value of x?

F. 78
G. 88
H. 100
J. 122
K. 123

61. Ms. Grant's car gets between 20 and 22 miles per gallon, inclusive. The gasoline she uses costs between \$4.20 and \$4.50 per gallon, inclusive. What is the **greatest** amount Ms. Grant will spend on gasoline to drive her car 200 miles?

A. \$37.27
B. \$40.90
C. \$42.00
D. \$45.00
E. \$99.00

62. The set P consists of all prime numbers greater than 6 and less than 36. What is the median of the numbers in P?

F. 17
G. 17.75
H. 18
J. 18.75
K. 19

63. What is the greatest common factor of 2,205 and 3,675?

A. 147
B. 245
C. 441
D. 735
E. 1,225

CONTINUE ON TO THE NEXT PAGE ▶

64.

$$\begin{array}{r} {}^{-}2 \\ 4 \\ {}^{-}6 \\ 8 \\ \cdot \\ \cdot \\ \cdot \\ {}^{-}22 \\ +\ 24 \\ \hline \end{array}$$

If the missing terms in the problem above were filled in according to the pattern, what would be the sum of all the terms?

F. $^{-}6$
G. 2
H. 6
J. 10
K. 12

65.

SONGS PLAYED DURING ONE HOUR

Number of Songs	Number of Radio Stations
14	8
15	4
16	4
17	5
18	9

The table above shows the number of songs played during a specific hour by 30 different radio stations. What is the mean number of songs played during that hour by these stations?

A. 6
B. 8
C. 16.1
D. 16.5
E. 18

66. The fuel mix for a small engine contains only 2 ingredients: gasoline and oil. If the mix requires 5 ounces of gasoline for every 6 ounces of oil, how many ounces of gasoline are needed to make 33 ounces of fuel mix?

F. 3
G. 6
H. 15
J. $27\frac{1}{2}$
K. 165

67. In the set of consecutive integers from 12 to 30, inclusive, there are 4 integers that are multiples of both 2 and 3. How many integers in the set are multiples of **neither** 2 nor 3?

A. 2
B. 5
C. 6
D. 13
E. 15

68. A pitcher contained 32 ounces of orange juice and 12 ounces of grapefruit juice. More grapefruit juice was added to the pitcher until grapefruit juice represented $\frac{1}{3}$ of the pitcher's contents. How many ounces of grapefruit juice were added?

F. 2 oz
G. 4 oz
H. 8 oz
J. 16 oz
K. 44 oz

69. A roofing contractor uses shingles at a rate of 3 bundles for each 96 square feet of roof covered. At this rate, how many bundles will he need to cover a roof that is 416 square feet?

A. 5
B. 12
C. 13
D. 14
E. 15

70. How many ways can the letters in the word RAIN be arranged horizontally so that the vowels (A and I) are always immediately next to each other (either AI or IA)?

F. 6
G. 8
H. 12
J. 16
K. 24

71. One state has a 6% sales tax on clothing items priced at $75 or higher, and no sales tax on clothing items priced under $75. What is the total tax on the items in the table above?

Item	Quantity Puchased	Price Per Item
Rain Coat	1	$102.00
Slacks	2	$60.00
Shirt	2	$35.00

A. $6.12
B. $6.72
C. $13.32
D. $17.00
E. $203.12

72. There are 45 eighth graders and 20 seventh graders in a school club. The president of this club wants 40% of the club's members to be seventh graders. How many **more** seventh graders must join the club in order to meet the president's wishes? (Assume that the number of eighth graders remains the same.)

F. 6
G. 7
H. 8
J. 10
K. 27

73. If R, S, and T are integers and R + S and T − S are both odd numbers, which of the following must be an **even** number?

A. R + T
B. S + T
C. R
D. S
E. T

74. For what value of z is $z - \frac{1}{3}z = 12$?

F. $^{-}18$
G. 4
H. 8
J. 12
K. 18

75.

Regular Price. $2.49
Discount . . . . . – $0.60
Sale Price. $1.89
6% Tax. $0.15
Total. $2.04

Nikolai bought a packet of pens. His receipt is shown above. Assume that sales tax is rounded to the nearest cent. If the 6% sales tax had been computed on the sale price instead of on the regular price, how much lower would the tax have been?

A. $0.01
B. $0.02
C. $0.03
D. $0.04
E. $0.36

76. The regular price of a 12-ounce bag of candy is $2.90. Lily has a coupon for 30% off one of these bags. What is the price per ounce (to the nearest cent) that Lily will pay if she uses the coupon?

F. $0.07
G. $0.15
H. $0.17
J. $0.22
K. $0.24

77. On a particular vehicle, the front tire makes three revolutions for every one revolution the back tire makes. How many times larger is the radius of the back tire than the radius of the front tire?

A. $\frac{1}{3}$
B. 3
C. $\frac{3}{2}\pi$
D. 3π
E. 9

78. PEOPLE PER VEHICLE AT CHECKPOINT

Number of People in the Vehicle	Percent of Vehicles
1	40%
2	35%
3	15%
4	7%
5 or more	3%

A researcher recorded the number of people in each vehicle that passed through a checkpoint. The table above shows the percent distribution for the 420 vehicles that passed the checkpoint yesterday morning. How many of the 420 vehicles contained **at least** 3 people?

F. 42
G. 63
H. 105
J. 315
K. 378

79. Jack and Roberto were assigned to guard a tower. Each was to watch for 5 hours, then rest 5 hours while the other watched. If Roberto began his first watch at 6:00 p.m., at what time will he begin his third watch?

A. 11:00 p.m.
B. 4:00 a.m.
C. 9:00 a.m.
D. 7:00 p.m.
E. 2:00 p.m.

80.

On the number line above, point E (not shown) is the midpoint of $\overline{AC}$ and point F (not shown) is the midpoint of $\overline{BD}$. What is the length of $\overline{EF}$?

F. 1 unit
G. 2 units
H. 2.5 units
J. 3 units
K. 11 units

81. A video game originally priced at \$44.50 was on sale for 10% off. Julian received a 20% employee discount applied to the sale price. How much did Julian pay for the video game? (Assume that there is no tax.)

A. \$31.15
B. \$32.04
C. \$35.60
D. \$40.05
E. \$43.61

82. If $r = 3q + 2$ and $q = \frac{1}{3^n}$ for $n = 1, 2,$ or 3, what is the **least** possible value of r?

F. 1

G. $2\frac{1}{9}$

H. $2\frac{1}{3}$

J. 3

K. 5

83. $|(^{-}6) - (^{-}5) + 4| - |3 - 11| =$

A. $^{-}7$
B. $^{-}5$
C. $^{-}1$
D. 1
E. 11

84. There are 1,000 cubic centimeters in 1 liter and 1,000 cubic millimeters in 1 milliliter. How many cubic millimeters are there in 1,000 cubic centimeters?

F. 1,000
G. 10,000
H. 100,000
J. 1,000,000
K. 1,000,000,000

CONTINUE ON TO THE NEXT PAGE ▶

85. A radio station plays Samantha's favorite song 6 times each day at random times between 8:00 a.m. and 5:00 p.m. The song is 5 minutes long. If Samantha turns on the radio at a random time between 8:00 a.m. and 5:00 p.m., what is the probability that her favorite song will be playing at that time?

A. $\frac{1}{30}$

B. $\frac{1}{18}$

C. $\frac{1}{6}$

D. $\frac{1}{5}$

E. $\frac{1}{3}$

86. Set R contains all integers from 10 to 125, inclusive, and Set T contains all integers from 82 to 174, inclusive. How many integers are included in R, but **not** in T?

F. 23
G. 48
H. 49
J. 71
K. 72

87. Ryan must read 150 pages for school tomorrow. It took him 30 minutes to read the first 20 of the assigned pages. At this rate, how much **additional** time will it take him to finish the reading?

A. $1\frac{2}{3}$ hr

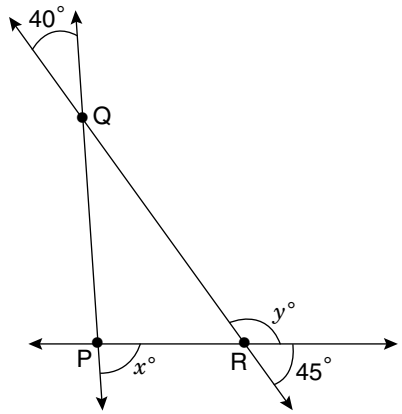
B. $2\frac{1}{6}$ hr

C. $3\frac{1}{4}$ hr

D. $3\frac{3}{4}$ hr

E. $7\frac{1}{2}$ hr

88.



The figure above shows three intersecting straight lines. What is the value of $y - x$?

F. 40
G. 50
H. 85
J. 95
K. 135

89. Joe began to increase the speed of his car at 2:00 p.m. Since that time, the speed of Joe's car has been steadily increasing by $1\frac{1}{2}$ miles per hour for each half minute that has passed. If the car is now traveling $65\frac{1}{2}$ miles per hour, for how many minutes has the car been exceeding the speed limit of 55 miles per hour?

A. $3\frac{1}{3}$ min

B. $3\frac{1}{2}$ min

C. $4\frac{1}{2}$ min

D. 5 min

E. 7 min

CONTINUE ON TO THE NEXT PAGE ▶

90. If x, y, and z are numbers such that $xy + xz = 100$, what is the value of $\frac{x}{5}(3y + 3z) + 10$?

F. $60 + 2x$
G. 62
H. 70
J. 130
K. $130 + 2x$

---

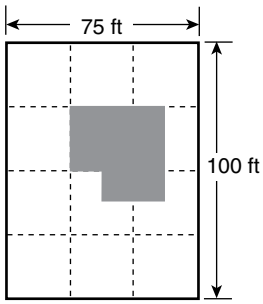
91. Let $N = {}^{-}(|{}^{-}3| - |{}^{-}8| + |{}^{-}4|)$.

What is the value of ${}^{-}|N|$?

A. ${}^{-}9$
B. ${}^{-}4$
C. ${}^{-}1$
D. 1
E. 9

---

92. The drawing above represents a rectangular lot containing a building, indicated by the shaded region. The dashed lines divide the lot into twelve equal-sized squares. If the unshaded portion of the lot is to be paved, about how many square feet will be paved?



F. 4,000 sq ft
G. 5,000 sq ft
H. 6,000 sq ft
J. 7,000 sq ft
K. 8,000 sq ft

---

93. If x can be any integer, what is the greatest possible value of the expression $1 - x^2$?

A. ${}^{-}1$
B. 0
C. 1
D. 2
E. Infinity

---

94. A recent survey asked students what pets they have. Based on the results, the following statements are all true:

23 students have dogs.
20 students have cats.
3 students have both dogs and cats.
5 students have no cats or dogs.

How many students were surveyed?

F. 40
G. 42
H. 45
J. 46
K. 51

---

95. Ang has x dollars in his savings account, and Julia has y dollars in her savings account. Ang gives Julia $\frac{1}{3}$ of the money in his savings account, which Julia deposits into her savings account. Julia then spends $\frac{1}{4}$ of the total in her savings account. Express the amount of money Julia spent in terms of x and y.

A. $\frac{y}{4} + \frac{x}{12}$

B. $\frac{y}{4} + \frac{x}{3}$

C. $\frac{y}{4} + \frac{x}{7}$

D. $\frac{3y}{4} + \frac{x}{4}$

E. $\frac{3y}{4} + \frac{x}{3}$

---

96. Nam worked on a job for 10 days. On each of the last 2 days, he worked 2 hours more than the mean number of hours he worked per day during the first 8 days. If he worked 69 hours in all, how many hours did he work during the last 2 days together?

F. 8.5
G. 10.5
H. 13.0
J. 15.0
K. 17.0

97.

PRICES FOR AD SPACE

Space	Price
$\frac{1}{4}$ page	\$200
$\frac{1}{2}$ page	\$350
full page	\$600

The table above shows prices for newspaper advertising. A store purchased quarter pages, half pages, and full pages of space in equal numbers for a total of \$11,500. What is the total amount of page space the store purchased?

A. $1\frac{3}{4}$ pages

B. 10 pages

C. $16\frac{1}{2}$ pages

D. $17\frac{1}{4}$ pages

E. $17\frac{1}{2}$ pages

98. One week the price of gasoline dropped by \$0.05 per gallon. Madison's car travels 27 miles each way to work, and her car travels 30 miles on each gallon of gasoline. What were her total savings, to the nearest cent, over the 5-day work week?

F. \$0.23
G. \$0.25
H. \$0.30
J. \$0.45
K. \$0.50

99. A rectangular floor is 12 feet wide and 16 feet long. It must be covered with square tiles that are 8 inches on each side. Assume there is no space between adjacent tiles. If the tiles cost \$8 each, how much will it cost to buy the tiles needed to cover the floor?

A. \$24
B. \$64
C. \$192
D. \$2,304
E. \$3,456

100. {1, 2, 3, 4, 5, 6}

Company X wants to assign each employee a 3-digit ID number formed from digits in the set shown above. No digit may appear more than once in an ID number, and no two employees may be assigned the same ID number. What is the greatest total number of possible different ID numbers?

F. 20
G. 120
H. 180
J. 216
K. 720

THIS IS THE END OF THE TEST. IF TIME REMAINS, YOU MAY CHECK YOUR ANSWERS TO PART 2 AND PART 1. BE SURE THAT THERE ARE NO STRAY MARKS, PARTIALLY FILLED ANSWER CIRCLES, OR INCOMPLETE ERASURES ON YOUR ANSWER SHEET. ■

EXPLANATIONS OF CORRECT ANSWERS

SCRAMBLED PARAGRAPHS

Paragraph 1 (TQURS)

The given sentence says that Aztec culture and traditions are described in a document called the Codex Mendoza. T is next; it is an example of one of the Aztec traditions, naming a newborn child. The pronoun "it" in T refers to the Codex in the given sentence. Either of two sentences, Q or U, could logically follow, explaining how baby boys and girls were given names. Q, which describes how boys were named, logically follows T. U, describing how girls were named, contains the phrase "on the other hand," implying that it follows a sentence with contrasting information. The contrasting information is naming boys (vs. naming girls), so U must follow Q. R is next, using the word "also" to introduce another Aztec tradition, the placement of implements in an infant's hands. S follows R by giving examples of the implements given to girls and boys.

Paragraph 2 (SRUQT)

The opening sentence introduces a new term, the "honey hunters" of Nepal, and the paragraph goes on to describe what honey hunters do. Honeybees, the source of honey, are mentioned in S, which also refers to Nepalese mountainsides, a link to the opening sentence. The job of a honey hunter is explained in R and continued in U. "This entire dangerous practice" in Q refers back to the procedures described in R and U. The hunter is stung repeatedly (Q), and T continues the description of the stinging that the hunters endure.

Paragraph 3 (QSRUT)

According to the given sentence, the jingle dress dance is popular at Native American events. Q is next, describing the steps of the dance, which cause the decorations on the dress to jingle (S). Sentence R describes what made the dresses "jingle" in the past—shells striking each other. "The modern jingle-dress" in U contrasts past and present dresses, explaining that nowadays shells have been replaced by the lids of metal cans. T contrasts the sounds of the lids and shells.

Paragraph 4 (USTRQ)

The opening sentence is about topographical maps. U explains how they differ from other maps and defines the term "contour line." S supplies another function of contour lines—to indicate the slope of the land. T explains in more detail how contour lines indicate slope. The last two sentences are about the depiction of streams and other waterways. R says that blue lines represent waterways. Q explains how the course of a waterway can be revealed by V-shaped contour lines.

Paragraph 5 (TRUQS)

Either T or R could follow the given sentence. Try both possibilities and compare the results. When T is placed after the given sentence, it continues the reference made to Vulcan in the given sentence, and it provides a definition of a volcano early in the paragraph. R provides a transition from the discussion of volcanoes in general to a focus on volcanoes in the United States, and Kilauea in particular. U follows R with its reference to "that volcano," referring to Kilauea, and describes its activity. U also names Hawaii Volcanoes National Park. "In the same park" (in Q) logically follows that reference. Q also mentions a second volcano, Mauna Loa. S must follow Q because it refers to two volcanoes ("Both of these . . . "). TRUQS creates a well-organized, cohesive paragraph, and it is the correct answer.

RUQST was a popular incorrect answer. R might be thought to follow the opening sentence because it continues the discussion of volcanoes, including Kilauea. The logic and flow of thought that formed the sequence RUQS remain the same, but the final sentence, T, ends the paragraph on an awkward note. The definition of the paragraph's topic (volcanoes) appears after, not before, further discussion of the topic, and four sentences separate the references to Vulcan. RUQST is neither well-organized nor cohesive.

LOGICAL REASONING

11. (**C**) The first sentence implies that all the members of the basketball team are 5 feet 11 inches or taller. Cheng's height is 6 feet 2 inches. The question does not state whether Cheng is on the basketball team. Options A, B, D, and E might be true, but there is not enough information to determine that they must be true. Only Option C must be true. At least one member of the basketball team (the shortest member, who is 5 feet 11 inches) is shorter than Cheng.

---

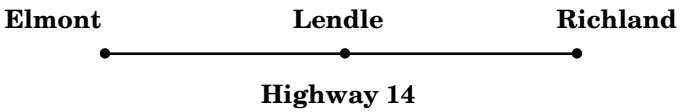
12. (**K**) The activity of Javon's three pets can be represented like this:

Time	Hamster Active?	Dog Active?	Cat Active?
Night	Yes	No	Alternately sleeps for an hour and active for an hour.
Day	No	Yes	Alternately sleeps for an hour and active for an hour.

Options F and G are not true: there will be times when the hamster and the cat—or the dog and the cat—will be active at the same time. H can be ruled out because at least one pet is active at any given time. J is contradicted by the information in the question. Option K is always true. Of the three pets, a maximum of two will be active at any one time.

---

13. (**D**) According to statement 1, the towns of Elmont, Lendle, and Richland are connected by Highway 14. Draw a diagram to show this relationship.



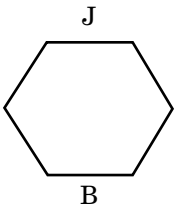
We know that Highway 14 is closed from Elmont to Richland. This stretch of highway includes the town of Lendle.

Statement 2 says that the town of Mopley is connected to Lendle, but does not specify how it is connected. Mopley could be connected to Lendle by another road (not named), or it could be somewhere on Highway 14.

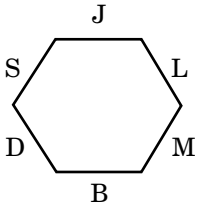
Not enough information is provided to determine whether Mopley is flooded, or whether Mopley can be reached directly from Elmont, ruling out A and E. Highway 14 connecting Elmont and Richland is flooded, but we cannot determine whether the towns themselves are flooded, ruling out B and C. Only Option D is valid. Highway 14 between Elmont and Richland is closed because of flooding, so no one can drive to Lendle on Highway 14. (Notice that the location of Mopley is not relevant to the correct answer.)

---

14. (**G**) Draw a diagram of the six-sided table. There is no definite information about who sits at a particular position—only about the relationship between where people sit—but the correct answer only requires understanding the relationships. Choose a position at the table to start, and use an initial to represent each person. According to Condition 1, Jorge sits directly across from Bree.



Look for another condition that relates to either Jorge or Bree. Condition 4 places Bree immediately next to Darius, on his right, and Condition 3 states that Darius sits directly across from Lucy. According to Condition 5, Susana is immediately next to Jorge. Since Lucy is already on one side of Jorge, Susana must be on the other side. That leaves Michael in the remaining position, opposite Susana. All six people are now seated relative to one another.



Because the question states that the people at the table are facing inward, you know that the person sitting on Michael's immediate left is Bree (Option G).

---

15. (**B**) Draw a grid to illustrate who won each prize. An X indicates that a person did not receive a prize. According to Statement 2, Michael did not win the computer.

	Trip	Television	Computer
Luis			
Michael			X
Nadia			

The question asks which option makes it possible to determine who won each prize, that is, to fill in the rest of the grid. For each option, mark the information on the grid. Are you able to determine who won each prize? If not, erase the marks and evaluate the next option. For example, mark the information for Option A, and fill in X's wherever you can.

	Trip	Television	Computer
Luis	X		
Michael	Yes	X	X
Nadia	X		

We can't figure out who won the television set and the computer, so option A cannot be correct. Only Option B allows us to determine who won each prize.

	Trip	Television	Computer
Luis	X	Yes	X
Michael	Yes	X	X
Nadia	X	X	Yes

---

16. (**H**) This question contains two conditional sentences. You can put them together like this: When Soon Bae listens to music, she is also dancing and singing.

Music ⟶ Dancing ⟶ Singing

The arrows indicate the direction of the condition. Notice that the arrows point in only one direction, ruling out Option F. Music might not be the only thing that causes Soon Bae to dance and sing. Other factors, beside music, might lead to dancing and singing. Thus Options G, J, and K are not valid. The only valid conclusion is Option H.

---

17. (**A**) The question gives the names of four new students and four older student partners. Your task is to match them up correctly. Draw a table to show the four student pairs. Condition 1 says that Sandro and Whitney are paired. Edgar, an older student, is not paired with Gloria or Bai (Condition 3), so he must be paired with Henry.

New students	Bai	Gloria	Sandro	Henry
Older student partners			Whitney	Edgar

Bai is not paired with Rakim (Condition 2), so Rakim must be paired with Gloria, leaving Bai paired with Paola, which is Option A. To answer this question correctly, you must keep track of which students are new and which are older. Otherwise, you might incorrectly pair Paola with Rakim (Option E).

---

18. (**G**) Draw a diagram like the one below. Eight years are shown because eight is the largest option. The question states that Jack played only the violin the first year. Under Year 1, put an X to represent Jack's instrument during the first year. The question does not state the order in which Jack played each instrument. Since he started with the violin, and played violin for two years, add an X under the second year as well.

Year	1	2	3	4	5	6	7	8
Violin	X	X						
Cello								
Bass								

Jack played the cello and the bass for three years each, and he never played more than two instruments during the same year. One possibility is that he played the cello during years, 2, 3, and 4, as marked below. Jack could not have started playing the bass until year 3. After "Bass," place an X under years 3, 4, and 5.

Year	1	2	3	4	5	6	7	8
Violin	X	X						
Cello		X	X	X				
Bass			X	X	X			

This is one possible arrangement, and it requires five years. All other possibilities require at least five years. Option G is correct.

---

19. and 20. Read the directions carefully. The letters in a sentence may or may not appear in the same order as the words in that sentence. For example, in the first sentence, the first letter (L) may or may not represent the first word (Michelle). You need not find out what every letter represents in the code.

19. (**C**) The letter Q appears only in the first sentence. Thus, the word represented by Q must appear only in the first sentence. That word is "Michelle" (Option C).

20. (**K**) The word "paints" appears only in the first and third sentences, so start by identifying the letters that appear in both the first and third sentences—L, P, and R. However, the letter R appears in all four sentences and thus cannot represent the word "paints." Either L or P could represent "paints," but there is no way to figure out which is correct. The answer cannot be determined (Option K).

READING

Debates

21. (**D**) Option A is too broad—the passage focuses on a specific event, not on entire careers. Option B is implied in the second-to-last paragraph, but is not specifically discussed. Option C is a detail, not a main point. The best summary is Option D, which includes considerations prior to the debates, the actual event, and some of the consequences. Option E is an important detail, but not the main idea.

---

22. (**H**) The question asks you to use the information given in the passage to predict what would have happened if the debates had not taken place on television (for example, if they had occurred only on radio or in printed form). To answer the question, review the information given about each candidate before the debate. Nixon was ahead in the polls, an experienced public speaker, and had served as vice president (lines

15-20). Kennedy had been criticized for his relative youth and inexperience (lines 22-25). Without the televised debate, if events had followed their course, it is more likely that Nixon, not Kennedy, would have won the election, which is Option H. This line of reasoning rules out Options F and G. Option J is contradicted by lines 67-68. Nixon would have no reason to consider his on-screen performance, which rules out Option K.

---

23. (**D**) The answer to this question can be found in the fourth paragraph. Lines 58-60 state that "Some feared that the better TV performer was bound to come across as being the better candidate." This concern is best reflected in Option D. Options A, C, and E are not mentioned in the passage as possible concerns. Option B is ruled out by the "calm and careful" way that both candidates debated the issues (lines 32-34).

---

24. (**H**) Kennedy's benefit is summarized in lines 50-53, especially his "charm, poise, and confident manner."These qualities are summarized by Option H: "He appeared to have attractive personal characteristics." Option F is contradicted by lines 32-34, which state that both candidates dealt calmly and carefully with the issues. The debate centered on domestic issues, ruling out Option G. Options J and K describe Nixon, not Kennedy.

---

25. (**E**) Reread the last sentence of the passage, and then read each option before choosing your answer. The first three options are true statements, but they do not say anything about the effect of televising the event. The passage does not supply any information to support Option D. Option E is correct. Nixon's greater experience (lines 15-20) would have been more apparent to radio listeners who were not distracted by his poor television appearance.

---

26. (**G**) The answer is given in lines 7-9, which is summarized in Option G. Option F is a true statement, but it does not explain why people not interested in politics would watch the debates. Kennedy's attractive appearance is not mentioned in the passage, ruling out Option H. Option J does not make sense as a reason for watching the debates, and the passage says that Vice President Nixon was ahead in the polls, which rules out Option K.

Bats

27. (**B**) Option A cannot be correct because the passage discusses animal species, not plants, that are becoming endangered. Option C is an important detail, but it is not the main idea of the passage. Option D is contradicted by lines 4-7. Option E is also important, but the passage is about much more than the pollination of tropical plants. Option B is best. It incorporates the notion of bat stereotypes contrasted with the advantages that bats provide to plants and animals, including humans.

---

28. (**H**) "Ugliness is only skin deep" (line 70) is a play on the expression "Beauty is only skin deep," which means that an attractive outward appearance does not necessarily indicate inward beauty. The intended meaning— that an ugly outward appearance does not always imply evil or harmfulness—is Option H. None of the other options correctly apply to this "new twist to an old adage."

---

29. (**D**) The far-reaching impact of a keystone species is described in the third paragraph. The flying fox, a keystone in the rain forest, pollinates and distributes seeds, and thus helps provide food and shelter for many other plants and animals in its ecosystem. Rain forests in turn help to maintain a balanced global atmosphere for living creatures everywhere. Option D best summarizes the far-reaching impact of a keystone species. The passage says that brown bats help to prevent disease (lines 8-9), but the keystone species, flying foxes, are not described in that way, ruling out Option A. The brown bat's main food source is mosquitos, but bats are not mentioned as food sources for other animals, so Option B is not correct. Lines 23-27 describe how flying foxes help to pollinate plants, but the passage does not claim that they pollinate every plant species. The rain forests' lush vegetation, not flying foxes, replenishes the oxygen in the global atmosphere (lines 41-43), making Option E incorrect.

---

30. (**J**) The question asks for the most immediate result that would occur before other, more distant consequences took place. Read every option before deciding which describes the most immediate result. Options F and H are possible, but they are long-term, not immediate, results. Options G and K are not supported by the passage. Option J is the only immediate result.

---

31. (**C**) The passage discusses bats' consumption of cultivated fruit in lines 46-50. Bats in the wild feed on wild (uncultivated) fruit; they eat cultivated fruit only when wild fruit cannot be found due to reduced habitat for wild fruit trees, which is Option C. Option A is contradicted by the passage. Options B, D, and E are not supported.

---

32. (**F**) The iroko tree is mentioned in lines 20-23 as a valuable tree that depends entirely on flying foxes for pollination. The previous sentence stated the importance of flying foxes for pollination of plants such as avocadoes and date trees. Both sentences are about the importance of flying foxes for the pollination of useful plants, which is Option F. Option G is not mentioned. Options H, J, and K do not explain why the author mentioned the iroko tree.

Wind Energy

33. (**B**) Option A is mentioned only in the first paragraph, and it is not the main idea. Option B best summarizes the passage: it describes how wind energy has been used, from ancient sailboats to medieval windmills to modern turbines. Option C is a detail. Options D and E are important points, but neither is the main idea.

---

34. (**F**) The first known windmills originated in Persia (lines 15-17), which is Option F. The other options (North America, Europe, China, and Holland) are mentioned in the development of wind power around the world, but the first known windmills were not built there.

---

35. (**D**) The future use of wind energy is discussed in the last paragraph. Options A, C, and E are never mentioned. Option D best conveys the author's optimism that wind farms—"efficient, clean, and fairly inexpensive to operate" (lines 70-71)—will be a major source of electricity in the future. Option B is contradicted by the passage.

---

36. (**K**) You are asked which option best illustrates the development of wind energy. In the passage, the author followed the history of wind energy from old-fashioned water-pumping windmills (lines 24-26) to thin-bladed windmills (lines 55-58) to the development of wind farms (lines 67-70). Options F, G, and J are contradicted by the passage. Option H is not supported by the passage. Option K implies that the development from simpler into more complex machines illustrates human creativity, and it is the best answer.

---

37. (**D**) The need for windmills on farms before the 1950s is discussed in lines 53-58. The next two sentences explain that the need decreased in the 1950s because most homes were connected to an electric utility and no longer depended on windmills for electrical power (Option D). Options A and C are contradicted by the passage. Option B incorrectly combines information in the passage, and Option E overlooks the fact that wind turbines are windmills, and thus did not replace windmills.

---

38. (**G**) The country of Holland (lines 32-36) used windmills to pump seawater away from bogs and reclaim large areas of land (Option G). Dutch shipbuilding is not mentioned, ruling out Option F. Although Holland was famous for its windmills, their fame did not aid the country's developments, eliminating Option H. Options J and K are contradicted by the passage.

American Scene

39. (**E**) The correct answer is found in lines 67-70; the general public identified with American Scene art because the paintings presented common images and mirrored the lives of many people, which is Option E. The other options are contradicted by information in the passage. Option B may look appealing, but some American Scene artists, the Urban Realists, painted scenes of loneliness and anonymity, not something to give people hope.

---

40. (**F**) According to the third paragraph, Urban Realists painted the drab realities of the contemporary environment. The subject that best matches that description is Option F. None of the other options fit the description of Urban Realist art. Option J, a European city scene, is incorrect because, while it is an urban scene, it is not American.

---

41. (**D**) The word "contrast" in the question means finding how two things differ from one another. Lines 52-55 provide the correct answer. Edward Hopper, the painter of *Nighthawks*, portrayed dingy urban streets, as did the Urban Realists. Unlike the Urban Realists, however, he often found beauty in the midst of a city's drab surroundings (lines 54-55). Option A is about the past, not the present era depicted in the painting. Options B and E do not provide a contrast. The international style, described in the last paragraph, had not yet developed, ruling out Option C.

---

42. (**G**) The fourth paragraph is about Edward Hopper. It follows the paragraphs about the Regionalists and the Urban Realists and presents Hopper as an American Scene painter who does not fit into either of those groups. Hopper's famous painting *Nighthawks* puts him among the great American Scene painters, which is Option G. The end of the American Scene movement is described in the fifth paragraph, not the fourth, ruling out Option F. Option H is contradicted by the information in the passage, and Option J incorrectly contrasts American Scene and Urban Realist styles. Option K looks appealing but is incorrect because, while Hopper sometimes found beauty in drab surroundings, he did not focus on beauty.

---

43. (**A**) The phrase "without apology" means without explanation or justification. The phrase refers to what Hopper saw (lines 61-62) and thus chose for his subjects, which is Option A. Hopper was not interested in the past, ruling out Option B. Option C might look attractive because Hopper's painting was well-known, but "without apology" doesn't relate to its popularity. Options D and E are not mentioned.

---

44. (**H**) Regionalist art expressed the traditions and interests of many Americans of the time (lines 65-67) and is still treasured by many as a fond memory of times gone by (lines 31-33). Urban Realist artists, on the other hand, painted drab urban scenes (lines 35-37), not the basis for fond memories. Regionalist art, with its pleasant and familiar subjects, showed American life as people wished to remember it (Option H). It did not portray modern life (Option F) or the time in which it was painted, the Depression (Option G). Regionalist artists painted rural and small-town scenes, not city life (Option J). The passage does not explain how Americans overcame the effects of the Depression (Option K).

Ice

45. (**C**) The passage begins by asking why ice is slippery (lines 3-5) and reviews several theories of slipperiness: smoothness, friction, pressure, and Faraday's theory. Option C, "answers to the question of what makes ice slippery," summarizes the main idea of the passage. Option A is not discussed in the first half of the passage, and Options B, D, and E are details, not the main idea.

---

46. (**F**) Read the entire last paragraph. The writer says, "a slippery liquid-like surface is not limited to ice," then mentions lead and diamond crystals. The most likely reason that the author mentions these crystals is to illustrate that solids other than ice have slippery surfaces, which is Option F. Option G cannot be correct because these crystals are not made of frozen water. The properties of lead and diamond crystals are not related to Faraday's theory, ruling out Option H. Options J and K are not mentioned in the passage.

---

47. (**C**) Faraday's experiment is described in the fourth paragraph. The liquid on the ice cubes' surfaces froze solid when the surfaces made contact (lines 45-46). This information is restated in the correct answer, Option C. Option A is incorrect because Faraday's explanation does not include the concept of friction. Options B and D are not supported by the passage. The "smoothness" explanation of slipperiness (Option E) was ruled out in the first paragraph.

---

48. (**F**) The experiment at Lawrence Berkeley Laboratory is mentioned in lines 52-58. The data from this experiment suggested that the ice surface remained "liquid-like," creating a slippery layer of molecules on the ice surface. This conclusion is best summarized by Option F. Option G is wrong because the experiment illustrated the power, not the weaknesses, of scientific technology. Option H is impossible: the experiment was conducted long after Faraday's lifetime. Option J contradicts the scientists' conclusion, and Option K refers to Faraday's experiment, not the Lawrence Berkeley Lab experiment.

---

49. (**B**) The distinction between the two terms is made in lines 65-68. The surface of ice is liquid-like because the surface molecules move only up and down, which is Option B. Option A describes the result of the experiment, not the ice surface itself. Option C can be ruled out because "wet" and "liquid" are synonyms. Option D cannot be evaluated—we do not know from the passage which is slipperier. Option E is contradicted by the passage.

---

50. (**K**) The friction theory of slipperiness is explained in the second paragraph, which concluded that the theory cannot explain why ice is slippery for someone who stands motionless, creating no friction. Something that a theory cannot explain can be said to weaken, or undermine, the theory. Option K, "a person slipping while standing immobile on ice," is the best answer. Option F undermines the pressure theory, not the friction theory, while Option J undermines the "smoothness" explanation. Options G and H neither support nor undermine the friction theory.

---

51. (**C**) $\frac{4.5}{0.1} \times 0.22 = 45 \times 0.22 = 9.9$

---

52. (**J**) $\frac{4}{5}\text{P} = 48$

$\text{P} = (\frac{5}{4})(48) = 60$

$\frac{3}{5}(60) = 36$

---

53. (**C**) First, use the given information to calculate the value of b:

$\frac{a}{b} = 2 \quad \frac{8}{b} = 2 \quad 8 = 2b \quad 4 = b$

Now, calculate $3b + a^2$ by substituting $a = 8$ and $b = 4$:

$3(4) + (8)^2 = 12 + 64 = 76$

---

54. (**K**) First, find the ratio of red to green to blue pencils. Then reduce it to its lowest form by dividing by the greatest common divisor:

480:240:160 = 6:3:2

Since 6 + 3 + 2 = 11, multiply each value by 2 (because 2 × 11 = 22) to get the number of each color pencil in a set of 22 randomly chosen pencils: 12 red, 6 green, 4 blue

---

55. (**A**) First, simplify the inequality:

$x + 7 < 23$
$x < 16$

The positive integers that satisfy the inequality are 1, 2, 3, …, 14, 15. (We cannot include 16 because x must be **less than** 16.) 15 positive integers satisfy this inequality.

---

56. (**J**) Multiply the numerator and denominator by 100 to eliminate the decimals. Then divide the answer by 100 to get the answer in decimal form:

$3.99 \div 1.5 =$

$\left(\frac{3.99}{1.5}\right)\left(\frac{100}{100}\right) = \frac{399}{150} = \frac{133}{50} = \frac{266}{100} = 2.66$

Note: You could also solve this equation using long-division.

---

57. (**D**) The area of triangle MPR is equal to half the area of rectangle MNQP. So, the area of MPR is also equal to the area of triangles MNP + RPQ. Point P is the midpoint of side $\overline{\text{NQ}}$, so triangle MNP is equal in area to triangle RQP. Thus, triangle MPR = 2(RQP). The area of the unshaded region is the sum of the areas of triangles MPR and MNP.

MNP = RQP = 24 sq cm
MPQ = 2(RQP) = 48 sq cm

Thus, the area of the unshaded region is 24 + 48 = 72 sq cm

---

58. (**H**) According to the chart, 22% of people walk to work and 4% ride a bicycle. Subtract to find the percentage of how many more people walk than bicycle:

22% − 4% = 18%

To find the exact number of people, multiply 18% (0.18) by the number of people working in Center City (15,000):

15,000 • 0.18 = 2,700

---

59. (**B**) Write 0.75 as a fraction in lowest terms to find the least value of x: $0.75 = \frac{75}{100} = \frac{3}{4}$

So, the least possible positive integer value of $x = 3$.

---

60. (**F**) $|190 - 210| + |19 - 21| + x = 100$

$|^{-}20| + |^{-}2| + x = 100$

$20 + 2 + x = 100$

$x = 78$

---

61. (**D**) The car gets between 20 and 22 miles per gallon. Ms. Grant would use the most gas if the car gets only 20 miles per gallon, so use this value. Then, use \$4.50 (the highest possible price per gallon) to determine the greatest amount of money she will spend:

200 miles ÷ 20 miles per gallon = 10 gallons of gas
10 gallons • \$4.50 = \$45.00

---

62. (**H**) List in order the prime numbers between 6 and 36: 7, 11, 13, 17, 19, 23, 29, and 31. Since there are 8 numbers, find the middle two and calculate the mean to find the median of all the numbers. The middle two are 17 and 19. The mean is $\frac{17 + 19}{2} = 18$.

---

63. (**D**) First, find the prime factorization of each number:

$2{,}205 = 3 \cdot 3 \cdot 5 \cdot 7 \cdot 7$
$3{,}675 = 3 \cdot 5 \cdot 5 \cdot 7 \cdot 7$

Now, determine what each prime factorization has in common, and multiply those:

$2{,}205 = 3 \cdot (3 \cdot 5 \cdot 7 \cdot 7) = 3 \cdot 735$
$3{,}675 = 5 \cdot (3 \cdot 5 \cdot 7 \cdot 7) = 5 \cdot 735$

The greatest common factor is 735.

---

64. (**K**) The values in the problem can be grouped into 3 terms that each contain a positive and negative value: $(^{-}2, 4)$, $(^{-}6, 8)$, $(^{-}22, 24)$. Arrange the terms into 2 rows to determine the pattern and find the missing terms:

$^{-}2$	$^{-}6$	…	$^{-}22$
4	8	…	24

The values in the top row are decreasing by 4, while the values in the bottom row are increasing by 4. Fill in the remaining values:

$^{-}2$	$^{-}6$	$^{-}10$	$^{-}14$	$^{-}18$	$^{-}22$
4	8	12	16	20	24

To find the sum, combine the terms as follows:

$(^{-}2 + 4) + (^{-}6 + 8) + \ldots + (^{-}22 + 24)$

Note that each pair of parentheses sums to 2. Count the number of pairs of parentheses (6) and multiply by 2 to find the final answer:

$2 + 2 + 2 + \ldots + 2 = 6(2) = 12$

---

65. (**C**) To find the average, multiply each number of songs by the number of radio stations. Then add those products and divide by the total number of radio stations:

$$\frac{(14 \cdot 8) + (15 \cdot 4) + (16 \cdot 4) + (17 \cdot 5) + (18 \cdot 9)}{30}$$
$$= \frac{112 + 60 + 64 + 85 + 162}{30}$$
$$= 16.1$$

---

66. (**H**) If the ratio is 5 ounces of gasoline to 6 ounces of oil, then gasoline makes up $\frac{5}{11}$ of the fuel mix. Use a proportion to calculate the number of ounces of gasoline (x) in 33 ounces of mix:

$$\frac{x}{33} = \frac{5}{11}$$

$x = 15$ ounce

---

67. (**C**) The question asks for integers that are **not** divisible by 2 or 3. Since all even numbers are divisible by 2, begin by listing the odd integers in this set:

13, 15, 17, 19, 21, 23, 25, 27, 29

Then, eliminate those integers that are multiples of 3. The remaining integers are:

13, 17, 19, 23, 25, 29

The answer is 6.

---

68. (**G**) The pitcher originally contained 44 ounces of juice (32 + 12). If x ounces of grapefruit juice is added, the pitcher now contains $44 + x$ ounces of juice. $12 + x$ ounces of that is grapefruit juice, which makes up $\frac{1}{3}$ of the entire juice mix. Use that information to set up a proportion to solve for x:

$$\frac{12 + x}{44 + x} = \frac{1}{3}$$
$$3(12 + x) = 44 + x$$
$$36 + 3x = 44 + x$$
$$2x = 8$$
$$x = 4 \text{ ounces}$$

---

69. (**C**) Let x be the number of bundles needed for the roof's area of 416 square feet. Set up a proportion to find x:

$$\frac{x}{416} = \frac{3}{96}$$

$$x = 416\left(\frac{3}{96}\right) = 13$$

---

70. (**H**) There are three positions for the letters AI in this four-letter combination:

AI _ _, _ AI _, and _ _ AI

For each of these positions of A and I, there are two combinations of the letters R and N: AIRN, AINR, RAIN, NAIR, RNAI, NRAI. Thus, for the letters AI (in that order), there is a total of 6 combinations. The question indicates that IA is also possible, so there are also 6 combinations with the letters in the order IA. The total number of combinations is 6 + 6 = 12.

---

71. (**A**) The only item on the chart that is priced above \$75 is the rain coat. Only one rain coat was purchased. Calculate the sales tax on the price of that rain coat:

$\$102 \times 0.06 = \$6.12$

---

72. (**J**) Let x be the number of seventh grade students that must join to meet the president's wishes. There are 65 students currently in the club. The percentage of seventh graders is calculated by dividing the number of seventh graders by the total number of students in the club. Using the president's desired percentage of 40% (0.40), the equation is:

$$\frac{20 + x}{65 + x} = 0.40$$

$$20 + x = (0.40)(65 + x)$$

$$20 + x = 26 + 0.40x$$

$$0.60x = 6$$

$$x = 10$$

---

73. (**A**) Since R + S is odd, then one of the two variables (R or S) must be odd and the other must be even. Similarly, since T – S is odd, one of the two variables must be odd and the other must be even. Since S is common to both expressions, if S is odd, then R and T are both even; and if S is even, both R and T are odd. It is not possible to determine which of the two possibilities is true, so Options C, D, and E can be eliminated as the correct answer.

Option B (S + T) can be eliminated because if T – S is odd, then S + T is also odd.

Option A (R + T) is the only possible answer. If R and T are both odd, then R + T is even. If R and T are both even, then R + T is even.

---

74. (**K**) $z - \frac{1}{3}z = 12$

$$\frac{2}{3}z = 12$$

$$z = \frac{36}{2} = 18$$

---

75. (**D**) First, find the amount of the tax charged on the sale price:

$\$1.89 \bullet 0.06 = \$0.1134 = \$0.11$ (rounded to the nearest cent)

Then, subtract the original tax from the tax on the sale price calculated above:

$\$0.15 - \$0.11 = \$0.04$

---

76. (**H**) Lily has a coupon for 30% off, which means she will pay 70% of the regular price (100% − 30% = 70%). Lily will pay \$2.90 • 70% = \$2.03 for this bag of candy.

To calculate the price per ounce, divide the final price Lily pays by the number of ounces in the bag:

$\$2.03 \div 12 = \$0.16917$, which rounds to \$0.17

---

77. (**B**) The formula for the circumference of a circle is $C = 2r\pi$. Let f be the radius of the front tire and b equal the radius of the back tire. Then the circumference of the front tire would be $2f\pi$ and the circumference of the back tire would be $2b\pi$.

Since it takes the front tire 3 revolutions for every 1 revolution of the back tire, the circumference of the back tire must be three times the circumference of the front tire:

$2b\pi = 3(2f\pi)$
$b = 3f$

Thus, the radius of the back tire (b) is 3 times larger than the radius of the front tire (f).

---

78. (**H**) First, add the percentage of cars containing 3 people, 4 people, and 5 or more people:

$15\% + 7\% + 3\% = 25\%$

Thus, 25% of the cars contained **at least** 3 people, so use that to calculate the number of cars:

$420 \times 0.25 = 105$ cars

---

79. (**E**) Roberto began his first 5 hour watch at 6:00 p.m. Since he had 5 hours off before he began his second watch, the second watch began 10 hours after the first watch began. Thus, his third watch began 20 hours after his first watch began. 20 hours after 6:00 p.m. is 2:00 p.m. the next day.

---

80. (**J**) First, calculate the midpoints of $\overline{AC}$ and $\overline{BD}$ to find the locations of E and F, respectively. Use the mean of the endpoints to find the midpoint.

$$\text{Point E} = \frac{^{-}4 + 6}{2} = 1$$

$$\text{Point F} = \frac{^{-}2 + 10}{2} = 4$$

Now calculate the length of $\overline{EF}$: $4 - 1 = 3$ units

---

81. (**B**) First, find the sale price. 10% of \$44.50 is \$4.45, so the sale price is \$44.50 − \$4.45 = \$40.05. Next, find the price after Julian's employee discount. 20% × \$40.05 = \$8.01, so the final price of the video game is \$40.05 − \$8.01 = \$32.04.

---

82. (**G**) First, calculate the three possible values of q:

If $n = 1$, then $q = \frac{1}{3^1} = \frac{1}{3}$.

If $n = 2$, then $q = \frac{1}{3^2} = \frac{1}{9}$.

If $n = 3$, then $q = \frac{1}{3^3} = \frac{1}{27}$.

The least value of r will occur when q is the smallest ($q = \frac{1}{27}$). So, the least possible value of r is: $r = 3\left(\frac{1}{27}\right) + 2 = \frac{1}{9} + 2 = 2\frac{1}{9}$

---

83. (**B**) $|(^{-}6) - (^{-}5) + 4| - |3 - 11| =$

$|3| - |^{-}8| = 3 - 8 = {}^{-}5$

---

84. (**J**) 1 L = 1,000 mL
1 L = (1,000)(1,000) = 1,000,000

---

85. (**B**) If the song is 5 minutes long, then it could be played up to $60 \div 5 = 12$ times per hour. There are 9 hours between 8:00 a.m. and 5:00 p.m. So, the song could be played up to $12 \times 9 = 108$ possible times between the given hours. Since the song is played 6 times per day, the probability of Samantha hearing the song is $\frac{6}{108} = \frac{1}{18}$.

---

86. (**K**) The integers that are included in Set R but not in Set T are 10 through 81. (Note that 82 **is** included in Set T.) To calculate the number of integers between 10 and 81, inclusive, subtract the lowest value from the greatest value: $81 - 10 = 71$. However, since each endpoint (10 and 81) is included, add 1 to that number to get an exact count: $71 + 1 = 72$.

---

87. (**C**) Ryan has 130 pages left to read (150 – 20). He read 20 pages in 30 minutes, which means he read at a rate of 40 pages per 1 hour. To find out how much longer it will take him to finish the assignment, divide the total pages remaining by the number of pages he is able to read per hour:

$$\frac{130}{40} = 3\frac{1}{4} \text{ hours}$$

---

88. (**G**) Angle PQR and the marked 40° angle are vertical angles and thus are congruent, so angle PQR is 40°. Similarly, angle QRP is 45° because it is a vertical angle with the one marked 45°. Given those two angles, calculate the third angle of triangle PQR (angle RPQ):

$40 + 45 + \text{RPQ} = 180$
$\text{RPQ} = 95$

Angle RPQ and angle x are supplementary, which means they sum to 180, so $x = 180 - 95 = 85$.

Similarly, angle y and angle QRP are supplementary, so $y = 180 - 45 = 135$.

Thus, the value of $y - x = 135 - 85 = 50$

---

89. (**B**) First, find the amount by which Joe is currently exceeding the speed limit of 55 miles per hour:

$65\frac{1}{2} - 55 = 10\frac{1}{2}$ mph

He increased his speed at a rate of $1\frac{1}{2}$ mph each half-minute. Let x equal the number of whole minutes:

$\frac{1.5}{30} = \frac{x}{60}$

$x = 3$ mph every minute

To determine how many minutes he has been exceeding the speed limit, divide by 3:

$10\frac{1}{2} \div 3 = \frac{7}{2} = 3\frac{1}{2}$ minutes

---

90. (**H**) The left side of the given equation ($xy + xz = 100$) must be rearranged to look like $\frac{x}{5}(3y + 3z) + 10$ to get the answer.

First, factor out the x: $x(y + z) = 100$

Next, multiply both sides of the equation by 3 and only distribute the 3 in the parenthesis, leaving the x factored out.

$3x(y + z) = 3(100)$ $\qquad$ $x(3y + 3z) = 300$

Then, divide both sides by 5:

$\frac{1}{5}x(3y + 3z) = \frac{300}{5}$ $\qquad$ $\frac{x}{5}(3y + 3z) = 60$

Finally, add 10 to both sides:

$\frac{x}{5}(3y + 3z) + 10 = 70$

Now that the left side looks like the expression in the question, the answer is the number on the right side (70).

---

91. (**C**) First, simplify N: $\text{N} = {}^{-}(3 - 8 + 4) = {}^{-}({}^{-}1) = 1$
Then, find ${}^{-}|\text{N}|$: ${}^{-}|\text{N}| = {}^{-}|1| = {}^{-}1$

---

92. (**H**) First, calculate the area of the entire lot:

$75 \times 100 = 7{,}500$ sq ft

There are 12 equal-sized squares, so each square is equal to $7{,}500 \div 12 = 625$ sq ft.

From the figure, it appears the building (shaded region) covers 1 full square, 1 half-square, and 2 quarter-squares, for a total of 2 full squares ($1 + \frac{1}{2} + 2(\frac{1}{4}) = 2$). Two full squares are equal to $625 + 625 = 1{,}250$ sq ft.

To find the area that is **not** shaded, subtract the area of the building from the area of the entire lot: $7{,}500 - 1{,}250 = 6{,}250$ sq ft, which rounds to 6,000 sq ft.

Remember that the question asks you to find out about **how** many square feet and not **exactly how many square feet.**

---

93. (**C**) To answer this question, assign several positive and negative values to x and determine what the value of the expression will be:

x	$1 - x^2$
$^-2$	$^-3$
$^-1$	0
0	1
1	0
2	$^-3$

The pattern shows the largest possible value of the expression is 1, which occurs when $x = 0$.

---

94. (**H**) Let x be the number of students with only cats as pets, and let y be the number of students with only dogs as pets.

Calculate x and y using the given information: There are 20 students who have cats, and of those 20 students, 3 have cats and dogs. Thus, $x = 20 - 3 = 17$. There are 23 students who have dogs, and of those 23 students, 3 have cats and dogs. Thus, $y = 23 - 3 = 20$.

To find the total number of students surveyed, add the numbers in the diagram:

$3 + 5 + x + y = 8 + 17 + 20 = 45$

---

95. (**A**) After Ang gives Julia $\frac{1}{3}$ of his money (which can be expressed as $\frac{1}{3}x$ or $\frac{x}{3}$), Julia has $y + \frac{x}{3}$ in her account. To find $\frac{1}{4}$ of the total in Julia's savings account, multiply $y + \frac{x}{3}$ by $\frac{1}{4}$. Use the distributive property to find the equation that represents the amount of money Julia spent in terms of x and y.

$$\frac{1}{4}\left(y + \frac{x}{3}\right) = \frac{y}{4} + \frac{x}{12}$$

---

96. (**K**) Let x = the mean number of hours Nam worked per day during the first 8 days.

Then, $x + 2$ is the number of hours he worked on each of the last 2 days. Since he worked 69 total hours, set up the equation and solve for x:

$8x + 2(x + 2) = 69$
$10x + 4 = 69$
$10x = 65$
$x = 6.5$

Remember that x is the mean hours worked the first 8 days. The question asked for the number of hours Nam worked the **last** two days:

$2(x + 2) = 2(6.5 + 2) = 2(8.5) = 17.0$ hours

---

97. (**E**) The question says that an equal number (x) of each type of space was purchased. To find the number of each type of space that was purchased, multiply the price per type by x and set it equal to the total amount spent, then solve for x:

$200x + 350x + 600x = 11{,}500$
$1{,}150x = 11{,}500$
$x = 10$

Thus, the store purchased 10 units of each type of space. To find the total **amount** of page space purchased, multiply each type of space by 10 and add:

$(10 \cdot \frac{1}{4}$ page$) + (10 \cdot \frac{1}{2}$ page$) + (10 \cdot 1$ page$)$

$= 2\frac{1}{2} + 5 + 10 = 17\frac{1}{2}$ pages

---

98. (**J**) Madison's car travels 27 miles one way to work, so it travels a total of 54 miles per day. In 5 days, it travels $5 \times 54 = 270$ miles. Her car travels 30 miles on each gallon of gas, so it uses $\frac{270}{30} = 9$ gallons of gas per week. To find the total savings, multiply the number of gallons by the savings per gallon:

9 gallons • \$0.05 = \$0.45

---

99. (**E**) Since the floor measurement is in feet and the tile measurement is in inches, change inches into feet:

$8 \text{ in.} = \frac{8}{12} = \frac{2}{3} \text{ ft}$

The floor is 12 ft wide. To find the number of tiles needed along the width of the floor, divide the width by the size of a tile:

$12 \text{ ft} \div \frac{2}{3} = 12 \bullet \frac{3}{2} = 18 \text{ tiles}$

The floor is 16 ft long. Find the number of tiles needed along the length of the floor:

$16 \text{ ft} \div \frac{2}{3} = 16 \bullet \frac{3}{2} = 24 \text{ tiles}$

To find the total number of tiles needed, multiply the number needed along the width by the number needed along the length:

$18 \bullet 24 = 432$ tiles

To find the total cost, multiply the total tiles by the cost per tile: 432 tiles • \$8 = \$3,456

100. (**G**) Using the counting principle, the first digit has 6 possible values (1 through 6). The second digit then has 5 possible values, and the third digit has 4 possible values. So the total number of possible different ID numbers is $6 \times 5 \times 4 = 120$.

Answer Key for Sample Form A

Paragraph 1	11. C	21. D	31. C	41. D	51. C	61. D	71. A	81. B	91. C
T Q U R S	12. K	22. G	32. F	42. G	52. J	62. H	72. J	82. G	92. H
Paragraph 2	13. D	23. D	33. B	43. A	53. C	63. D	73. A	83. B	93. C
S R U Q T	14. G	24. H	34. F	44. H	54. K	64. K	74. K	84. J	94. H
Paragraph 3	15. B	25. E	35. D	45. C	55. A	65. C	75. D	85. B	95. A
Q S R U T	16. H	26. H	36. K	46. F	56. J	66. H	76. H	86. K	96. K
Paragraph 4	17. A	27. B	37. D	47. C	57. D	67. C	77. B	87. C	97. E
U S T R Q	18. G	28. H	38. G	48. F	58. H	68. G	78. H	88. G	98. J
Paragraph 5	19. C	29. D	39. E	49. B	59. B	69. C	79. E	89. B	99. E
T R U Q S	20. K	30. J	40. F	50. K	60. F	70. H	80. J	90. H	100. G

NEW YORK CITY PUBLIC SCHOOLS

USE A PENCIL ONLY

2016 SPECIALIZED HIGH SCHOOLS ADMISSIONS TEST

GRADE 8

SIDE 2

Test Booklet Letter Test Booklet Number

Student's First Name (please print) Student's Last Name (please print)

PART 1 VERBAL

SCRAMBLED PARAGRAPHS

Paragraph 1

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

Paragraph 2

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

Paragraph 3

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

Paragraph 4

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

Paragraph 5

The second sentence is	Q	R	S	T	U
The third sentence is	Q	R	S	T	U
The fourth sentence is	Q	R	S	T	U
The fifth sentence is	Q	R	S	T	U
The sixth sentence is	Q	R	S	T	U

LOGICAL REASONING

11	A	B	C	D	E
12	F	G	H	J	K
13	A	B	C	D	E
14	F	G	H	J	K
15	A	B	C	D	E
16	F	G	H	J	K
17	A	B	C	D	E
18	F	G	H	J	K
19	A	B	C	D	E
20	F	G	H	J	K

READING

21	A	B	C	D	E
22	F	G	H	J	K
23	A	B	C	D	E
24	F	G	H	J	K
25	A	B	C	D	E
26	F	G	H	J	K
27	A	B	C	D	E
28	F	G	H	J	K
29	A	B	C	D	E
30	F	G	H	J	K
31	A	B	C	D	E
32	F	G	H	J	K
33	A	B	C	D	E
34	F	G	H	J	K
35	A	B	C	D	E
36	F	G	H	J	K
37	A	B	C	D	E
38	F	G	H	J	K
39	A	B	C	D	E
40	F	G	H	J	K
41	A	B	C	D	E
42	F	G	H	J	K
43	A	B	C	D	E
44	F	G	H	J	K
45	A	B	C	D	E
46	F	G	H	J	K
47	A	B	C	D	E
48	F	G	H	J	K
49	A	B	C	D	E
50	F	G	H	J	K

PART 2 MATHEMATICS

MATHEMATICS PROBLEMS

51	A	B	C	D	E	66	F	G	H	J	K	81	A	B	C	D	E	96	F	G	H	J	K
52	F	G	H	J	K	67	A	B	C	D	E	82	F	G	H	J	K	97	A	B	C	D	E
53	A	B	C	D	E	68	F	G	H	J	K	83	A	B	C	D	E	98	F	G	H	J	K
54	F	G	H	J	K	69	A	B	C	D	E	84	F	G	H	J	K	99	A	B	C	D	E
55	A	B	C	D	E	70	F	G	H	J	K	85	A	B	C	D	E	100	F	G	H	J	K
56	F	G	H	J	K	71	A	B	C	D	E	86	F	G	H	J	K						
57	A	B	C	D	E	72	F	G	H	J	K	87	A	B	C	D	E						
58	F	G	H	J	K	73	A	B	C	D	E	88	F	G	H	J	K						
59	A	B	C	D	E	74	F	G	H	J	K	89	A	B	C	D	E						
60	F	G	H	J	K	75	A	B	C	D	E	90	F	G	H	J	K						
61	A	B	C	D	E	76	F	G	H	J	K	91	A	B	C	D	E						
62	F	G	H	J	K	77	A	B	C	D	E	92	F	G	H	J	K						
63	A	B	C	D	E	78	F	G	H	J	K	93	A	B	C	D	E						
64	F	G	H	J	K	79	A	B	C	D	E	94	F	G	H	J	K						
65	A	B	C	D	E	80	F	G	H	J	K	95	A	B	C	D	E						

Copyright © 2016 NCS Pearson, Inc. All Rights Reserved.
Reprinted by Permission—Restricted Edition—Not for Distribution

Sample Test, Form B
Part 1 — Verbal

Suggested Time — 75 Minutes

45 QUESTIONS

Scrambled Paragraphs

PARAGRAPHS 1-5

DIRECTIONS: In this section, arrange each group of sentences to create the best paragraph. The first sentence for each paragraph is given; the remaining five sentences are listed in random order. Choose the order for these five sentences that will create the **best** paragraph, one that is well-organized, logical, and grammatically correct. Each correctly ordered paragraph is worth **double** the value of a question in any other section of the test. No credit will be given for responses that are only partially correct.

To keep track of your sentence order, use the blanks to the left of the sentences. For example, write "2" next to the sentence you think follows the first sentence, write "3" next to the sentence you think follows "2," and so on. You may change these numbers if you decide on a different order. When you are satisfied with your sentence order, mark your choices on your answer sheet.

Paragraph 1

Tycho Brahe, a seventeenth-century Danish astronomer, is more famous for his odd and arrogant personality than for any contribution he made to our knowledge of the stars and planets.

_____ **Q.** That discovery was made by his assistant, Johannes Kepler, who had been denied full access to Brahe's data until after Brahe's death.

_____ **R.** The disagreement turned into a sword fight, and part of Brahe's nose was sliced off.

_____ **S.** As a student, he got into an argument with another student about who was the better mathematician.

_____ **T.** He made a replacement nose for himself out of an alloy of gold and silver, which he reportedly glued to his face.

_____ **U.** Later in his life, his arrogance may have kept him from playing a part in one of the greatest astronomical discoveries in history—the elliptical orbits of the planets around the sun.

CONTINUE ON TO THE NEXT PAGE ▶

Paragraph 2

Stephen Crane was 24 years old when his classic Civil War novel *The Red Badge of Courage* was published in 1895.

_____ **Q.** Unfortunately, his first novel, *Maggie: A Girl of the Streets*, which chronicled life among the poor in New York City's Bowery slums, was not as successful.

_____ **R.** That novel, his second, brought him almost overnight international celebrity status.

_____ **S.** One story says that, in an attempt to recoup his losses, Crane paid people to ride the Manhattan El train carrying copies of the book.

_____ **T.** *Maggie* was self-published by Crane when he was only 21, using money borrowed from his brother.

_____ **U.** The loan became a loss—the gritty social realism of *Maggie* earned Crane praise from critics, but he probably gave away more copies than he sold.

Paragraph 3

Macaws, a type of parrot found in South America, are among the largest and most beautiful birds in the world.

_____ **Q.** Scientists believe that the birds may eat the clay in order to counteract poisons contained in some of these fruit seeds.

_____ **R.** The birds do not appear to eat clay to satisfy hunger; they ingest it even when fruit seeds, their favorite foods, are available.

_____ **S.** Like many other parrot species, they are very intelligent as well, yet some of their behaviors have baffled scientists.

_____ **T.** This theory is supported by the fact that the birds eat more clay in the dry season, when less-poisonous food is scarce.

_____ **U.** For example, macaws regularly flock to riverbanks to eat the clay found in river mud.

CONTINUE ON TO THE NEXT PAGE ▶

Paragraph 4

In the colder regions of the Northern Hemisphere, an energy-efficient house should have most of its windows facing south.

_____ **Q.** The reason that architects and builders want this "southern exposure" is related to the position of the sun in the sky.

_____ **R.** To take advantage of this, during the winter the south-facing windows should be uncovered during the day, allowing sunlight—and heat—to penetrate directly into the living space.

_____ **S.** Though the sun always rises in the east and sets in the west, in the Northern Hemisphere the sun is permanently situated in the southern portion of the sky.

_____ **T.** In these ways, the sun's warmth is retained in the house, a form of passive solar heating.

_____ **U.** At night, when temperatures go down, the windows should be covered by curtains or other insulating materials to prevent the heat from escaping.

Paragraph 5

To the earliest European traders, Africa seemed to be loosely organized into tribal societies, without any great centers of wealth or learning.

_____ **Q.** He described a thriving metropolis with great universities and dozens of private libraries.

_____ **R.** Unfortunately, by the nineteenth century raids by neighboring tribes had made Timbuktu a shadow of its former self.

_____ **S.** This impression began to change in the fifteenth century, as Europeans traveled inland into western Africa.

_____ **T.** In 1470, an Italian merchant named Benedetto Dei traveled to Timbuktu and confirmed these stories.

_____ **U.** The travelers told tales of an enormous city, known as Timbuktu, on the southern edge of the Sahara Desert, where the markets were crowded with goods and gold was bought and sold.

CONTINUE ON TO THE NEXT PAGE ▶

LOGICAL REASONING

QUESTIONS 11-20

DIRECTIONS: Read the information given and choose the **best** answer to each question. Base your answer **only on the information given.**

In a logical reasoning test, certain words must be read with caution. For example, "The red house is **between** the yellow and blue houses" does not necessarily mean "The red house is **between and next to** the yellow and blue houses"; one or more other houses may separate the red house from the yellow house or from the blue house. This precaution also applies to words such as **above, below, before, after, ahead of,** and **behind.**

11. A star named Quil is the center of four orbiting planets, which are named Dorb, Needer, Sly, and Tyne. Each planet travels in a separate orbit, and each orbit is a circle. All four orbits lie in one plane. The farther a planet is from Quil, the faster it travels.

1) Planet Needer is closest to Quil.
2) The orbit of planet Dorb is next to the orbit of Sly.
3) The orbit of Sly is farthest from the orbit of Needer.

Which planet travels fastest?

A. Needer
B. Dorb
C. Sly
D. Tyne
E. Cannot be determined from the information given.

12. Any student who receives a grade lower than B- on the February report card is not permitted to play on a sports team in the spring.

Based only on the information above, which of the following **must** be true?

F. Every student who received all A's on the February report card plays on a sports team in the spring.
G. No student who plays on a sports team in the spring received a grade of C+ or lower on the February report card.
H. The best athletes also get the highest grades.
J. Students who do not play on sports teams in the spring received higher grades in February than those who do.
K. Students who play on sports teams spend a lot of time studying.

CONTINUE ON TO THE NEXT PAGE ▶

13. A one-room school has three grades—6th, 7th, and 8th. Eight students attend the school: Ann, Bob, Carla, Doug, Ed, Filomena, George, and Heidi. In each grade there are either two or three students.

1) Ann, Doug, and Filomena are all in different grades.
2) Bob and Ed are both in the 7th grade.
3) Heidi and Carla are in the same grade.

Based only on the information above, which of the following **must** be true?

A. Exactly two students are in the 6th grade.
B. Carla and Doug are in the same grade.
C. Exactly three students are in the 7th grade.
D. Heidi and Ann are in the same grade.
E. Filomena is in the 8th grade.

---

14. Four bikes are parked in a bike rack.

1) The blue bike is parked on the extreme left.
2) The yellow bike is next to the red bike.
3) The green bike is between the yellow bike and the blue bike.
4) Paul's bike is between the blue bike and the red bike.

Based only on the information above, which of the following **must** be true?

F. Paul's bike is green.
G. The yellow bike is between the red bike and the green bike.
H. Paul's bike is yellow.
J. The red bike is next to the green bike.
K. The color of Paul's bike cannot be determined.

---

15. In the town of Hoxie, the millworkers are all over six feet tall. Every Hoxie millworker is good at math.

Based only on the information above, which of the following **must** be true?

A. At least some people in Hoxie who are over six feet tall are good at math.
B. At least some people in Hoxie who are good at math are not millworkers.
C. Anyone in Hoxie who is over six feet tall works at the mill.
D. Anyone in Hoxie who is good at math is over six feet tall.
E. Anyone in Hoxie who is good at math works at the mill.

---

16. Six houses are next to one another on one side of Park Street. The houses are lettered L, M, N, P, Q, and R, consecutively.

1) The two houses that have fenced yards are immediately next to one another.
2) Three houses have porches.
3) None of the houses with a porch is next to one another.
4) No house has both a fenced yard and a porch.

Based only on the information above, which of the following **must** be true?

F. Houses L and R have porches.
G. House N has a porch.
H. House P has a porch.
J. Houses P and Q have fenced yards.
K. Either House M or House N has a fenced yard, but it is not possible to determine which one.

CONTINUE ON TO THE NEXT PAGE ▶

Questions 17 and 18 refer to the following information.

In the code below, (1) each letter always represents the same word, (2) each word is represented by only one letter, and (3) in any given sentence, the position of a letter is **never** the same as that of the word it represents.

L	W	Q	P	R	means
"Marie	eats	pizza	and	chocolate."	

U	Z	R	V	N	means
"Sean	likes	wings	and	soda."	

L	V	P	T	R	means
"Jackson	eats	wings	and	pizza."	

N	Y	R	X	W	means
"Irena	likes	chocolate	and	juice."	

17. Which letter represents the word "juice"?

A. N
B. Y
C. X
D. W
E. Cannot be determined from the information given.

18. Which word is represented by the letter U?

F. Sean
G. likes
H. wings
J. and
K. soda

19. Most people in the Skydiving Club are not afraid of heights. Everyone in the Skydiving Club makes three parachute jumps a month.

Based only on the information above, which of the following statements **must** be true?

A. Skydivers are less afraid of heights than are non-skydivers.
B. A person must make three parachute jumps a month in order to join the Skydiving Club.
C. Some people who are afraid of heights make three parachute jumps a month.
D. Most people who are not afraid of heights are in the Skydiving Club.
E. Every skydiver makes at least one parachute jump a month.

20. Six students stood in a line. Their names are Larnell, Masha, Nikia, Pedro, Ryan, and Sara, in that order.

1) The two students that wear glasses are immediately next to one another.
2) Three students are wearing school T-shirts.
3) None of the students wearing a school T-shirt is next to each other.
4) No student is wearing both glasses and a school T-shirt.

Based only on the information above, which of the following **must** be true?

F. Pedro and Ryan are wearing glasses.
G. Nikia is wearing a school T-shirt.
H. Pedro is wearing a school T-shirt.
J. Larnell and Sara are wearing school T-shirts.
K. Either Masha or Nikia is wearing a school T-shirt, but it is not possible to determine which one.

CONTINUE ON TO THE NEXT PAGE ▶

READING

QUESTIONS 21-50

DIRECTIONS: Read each passage below and answer the questions following it. Base your answers **on information contained only in the passage.** You may reread a passage if you need to. Mark the **best** answer for each question.

Most people—if they think about bubbles, suds, and lather at all—consider them to be fairly ordinary physical occurrences. But scientists have been studying foams, particularly aqueous (watery) foams, for more than 300 years. The phenomenon of foam creation is quite complex, and only recently have scientists begun to understand how foams are formed.

Aqueous foam is produced when a gas—air, for example—is dispersed within a liquid, such as water. However, a pure liquid produces an unstable froth, so a third ingredient must be added to stabilize the froth into foam. The most common stabilizers, or foaming agents, are soaps and proteins. These stabilizers are also called surfactants, or surface-active agents. Surfactant molecules chemically disturb the surface of the liquid, lowering its surface tension and creating a foam of bubbles, each encased in a watery film. The dispersing gas continues to build bubbles until the liquid is partially or completely converted to foam, with a surface area far greater than that of the original volume of liquid.

Aqueous foams have a characteristic life cycle. During the first stage, the liquid content is high and the foam is characterized by spherical bubbles of nearly uniform size, each with a relatively thick outer film of liquid. As the foam ages, the liquid drains away, and the foam "dries." The bubbles are no longer spherical; they have become polyhedrons with multiple flat surfaces. Eventually, outside forces—usually evaporation or vibration—cause the film walls of the bubbles to collapse, and the foam disappears.

The aqueous foams of shampoo, bubble bath, and dishpan suds were developed largely to satisfy consumer expectations. Protein foaming agents create whipped cream and marshmallows. Still other foams have important practical applications. Perhaps best known of these is the foam used in fire extinguishers. It puts out oil or gasoline fires by smothering them in a blanket of foam made of carbon dioxide bubbles stabilized by a protein-based surfactant. In general, these extinguishers have the advantage of minimizing the extensive water damage caused by more traditional fire-fighting methods.

Less well-known are the applications of foam technology to the recovery of oil from deep wells. Water is often present along with this energy-producing resource, and the water must be removed before the well can become productive. Drillers introduce a gas, along with an appropriate surfactant, into the well, and then pump out the resulting foam. Thus the water is removed, leaving a more productive oil well.

21. Which of the following best tells what this passage is about?

A. the life cycle of an aqueous foam
B. how foam was discovered
C. industrial uses of aqueous foams
D. differences between surfactants and foaming agents
E. the formation and uses of aqueous foams

22. Which of the following occurs only later in the life cycle of foam?

F. addition of a surfactant
G. an increase in surface area
H. bubbles covered in watery film
J. bubbles with many flat sides
K. a decrease in surface tension of the liquid

23. How does a surfactant contribute to the formation of an aqueous foam?

A. It dissolves the gas in the liquid.
B. It changes the surface tension of the liquid.
C. It delays the formation of polyhedron bubbles.
D. It causes the bubbles to disappear.
E. It converts soap into foam.

24. Which of the following is characteristic of a "young" aqueous foam?

F. spherical bubbles
G. polyhedral bubbles
H. bubbles with thin walls
J. "dry" foam, with liquid draining away
K. increased surface tension of the liquid

25. According to the passage, foam is better than water in fighting oil fires because foam

A. results in less damage.
B. is not flammable.
C. does not evaporate.
D. has bubbles that form a film.
E. promotes oil recovery.

26. Which of the following is **not** mentioned in the passage as an ingredient of dishpan suds?

F. protein
G. water
H. soap
J. air
K. a surfactant

CONTINUE ON TO THE NEXT PAGE ►

Most movies about spies and undercover agents feature fascinating special equipment. Many of these gadgets exist only in the imaginations of script writers, but others are actually used in espionage activities. One device with a surprisingly long and colorful history, both in and out of the cloak-and-dagger world, is the concealed camera.

In the late nineteenth century, "detective cameras" were popular with amateur photographers who wanted to take snapshots of unsuspecting people on the street. The camera was usually carried in plain view. Its disguise was simple: it was a plain box resembling a large and rather heavy parcel or a piece of luggage, with no external lens or controls. When people caught on to the deception, though, designers began hiding cameras in other objects, ranging from hats and books to purses and pocket watches. One concealed camera even looked like an ordinary camera, but had mirrors that allowed users to take photographs at a right angle to the direction of whatever the photographer seemed to be viewing.

Although most early spy cameras were meant to be used on the ground, cameras have been hidden in the sky almost from the beginning of photography. In World War I, both sides realized the strategic value of taking aerial photographs of enemy territory from the newly invented airplane. To spy more discreetly, without the use of airplanes, the Germans attached cameras to homing pigeons and sent them over French army positions. Timers were set to trigger the cameras when the pigeons were expected to be flying over their targets. That particular attempt proved impractical, but the idea behind it did not: aerial photography became a staple of World War II.

In the mid-twentieth century, a new era of spying with cameras began under the Cold War. This was a period of worldwide tension and competition between the Communist world, led by the Soviet Union, and the Western world, represented by the United States and its allies. The conflict was expressed through propaganda, arms races, and especially espionage. During the Cold War, both sides competed to develop new technologies to use photography in spying. Sophisticated concealed cameras were put in matchboxes, pens, rings, cigarette lighters, makeup cases, guns, and even hidden in clothing, with the lens concealed in a button. Almost any object that could be carried without attracting attention was probably made into a camera and carried by an undercover agent. Cameras were also hidden in furniture and office machines such as copiers, which took photos of every document that was copied. The development of the long-range telephoto lens even allowed spies to take clear photos from a distance, such as across the street from an embassy.

Today, space has proven to be the ultimate location for hidden cameras, as satellite-mounted cameras can produce highly detailed photographs of objects anywhere on earth.

27. Which of the following best tells what this passage is about?

A. the role of hidden cameras in national security
B. the problems associated with hidden cameras
C. the mechanics of the "detective camera"
D. historical information about the concealed camera
E. how cameras are mounted in satellites

28. According to the passage, "detective cameras" were popular with

F. spies.
G. detectives.
H. the German army.
J. professional photographers.
K. amateur photographers.

CONTINUE ON TO THE NEXT PAGE ►

29. What was the original purpose of the early detective cameras?

A. to resemble an ordinary object such as a box
B. to deceive people into thinking that the box contained a camera
C. to use in espionage activites by secret agents
D. to take pictures without the subjects' knowledge
E. to be carried by homing pigeons for surveillance

30. The camera with mirrors (lines 21-25) allowed the photographer to

F. conceal the camera in a hat or pocket watch.
G. take a picture with no external lens or controls.
H. disguise the camera as a simple box.
J. take a picture of one scene while appearing to take a picture of another.
K. determine whether other photographers were using detective cameras.

31. Photographers stopped using the box-type "detective camera" because

A. people were no longer deceived by them.
B. the cameras could not be used with external lenses.
C. they wanted to avoid being mistaken for secret agents.
D. professional photographers refused to use them.
E. espionage was conducted during the war.

32. What was the "idea" referred to in line 40?

F. taking photographs without permission
G. taking photographs from above
H. disguising a camera as something else
J. using cameras in wartime
K. attaching cameras to homing pigeons

CONTINUE ON TO THE NEXT PAGE ►

One of the books that has done the most to alert the world to the dangers of environmental degradation was George Perkins Marsh's *Man and Nature*. Its message—that Western society was in the process of causing irreparable harm to the environment—greatly influenced ecologists during the beginning of the modern environmentalist movement in the 1960s. Marsh was not, however, part of this movement. Surprisingly, *Man and Nature* was first published in 1864.

Marsh first observed the environmentally destructive effects of human activities while growing up in Vermont in the early nineteenth century. The heavy demand for firewood had depleted the forests, and extensive sheep grazing had stripped the land. The result was flooding and soil erosion. Furthermore, streams were fouled by wastes dumped from numerous mills and dye houses.

Much later in his life, after careers in law, business, farming, and politics, Marsh served as ambassador to Italy. There he noticed land abuse similar to what he had seen in Vermont. Overgrazing and forest mismanagement had rendered desolate areas that had been productive farmland since the days of the Roman Empire. Marsh attributed this to what he called ". . . man's ignorant disregard for the laws of nature."

In Italy, Marsh began to organize his observations and theories. He wrote in a way intended to educate readers about the impact of industrial and agricultural practices on the environment. In *Man and Nature*, he evaluated the important relationships between animals and plants, discussed forestry practices in great detail, and analyzed the ways natural water supplies are affected by human use.

Man and Nature challenged the popular belief that nature can heal any damage that people inflicted upon it. Marsh argued that human beings may use and enjoy, but not destroy, the riches of the earth. Furthermore, he asserted that everything in nature is significant, and that even the tiniest organism affects the fragile environmental balance. His belief that drastic alteration of this balance would be dangerous is now accepted as a fundamental principle of modern environmental science.

Although he pointed out environmental damage caused by irresponsible human activities, Marsh did not oppose every human alteration to the environment. To him, the goal was proper management, not a return to wilderness conditions. People should consider the consequences of their actions, he wrote, and become "co-worker[s] with nature." Marsh praised the Suez Canal, the human-made waterway between the Mediterranean Sea and the Gulf of Aden, as "the greatest and most truly cosmopolite physical improvement ever undertaken by man." He believed that the advantages of the canal—improved transportation and commerce—would outweigh any environmental damage. Yet he also warned of possible unintended consequences, such as destructive plants and animals spreading from one body of water to the other.

Marsh was considered a radical thinker during his lifetime. By the late nineteenth century, however, his writings, along with those of John Muir, Henry David Thoreau, and others, had inspired what became known as the conservation movement. The conservationists of that time sought to educate the public that wilderness areas were worth preserving, and they were responsible for creating the National Park Service and the National Forest Service.

CONTINUE ON TO THE NEXT PAGE ▶

33. What prompted Marsh to write *Man and Nature*?

A. his belief that nature can heal itself
B. his interest in the modern environmentalist movement
C. his own mismanagement of farmland
D. his belief that the Roman Empire was responsible for land abuse in Italy
E. his observations of land mismanagement in Vermont and Italy

34. Marsh attributed people's irresponsible environmental practices to

F. their failure to reclaim land desolated by erosion.
G. their desire to keep the earth unspoiled for future generations.
H. land management practices during the Roman Empire.
J. their lack of understanding of nature.
K. the influence of the modern environmentalist movement.

35. What is the most likely reason the author uses the word "surprisingly" in line 11?

A. to point out that Marsh's theories have been overturned by modern environmentalists
B. to argue that Marsh's ideas, while valid in their time, do not apply to the present
C. to show that Marsh introduced ideas a century before they became well-accepted
D. to suggest that Marsh's ideas were actually taken from other environmentalists
E. to suggest that environmental pollution was not a problem in 1864

36. Which of the following best describes how modern environmentalists view George Perkins Marsh?

F.

37. Which of the following provides support for the author's statement in lines 55-58?

A.

38. Marsh's main contribution to the environmental movement of the 1960s was the

F.

CONTINUE ON TO THE NEXT PAGE ▶

The British novelist Charles Dickens is well known for the colorful and eccentric characters he created in his many novels. But one of his books, *David Copperfield*, seems to have a great deal to do with fact as well as fiction. After attempting to write his autobiography, Dickens abandoned the project and began to work on a novel, the plot of which was loosely based on his own boyhood experiences. Apparently, it was easier for him to weave the events of his own life into the fiction of *David Copperfield* than to write about them in nonfiction.

Some of Dickens' most troubling memories involved a job he held in 1824 as a 12-year-old child. Because his family was deeply in debt, he was forced to quit school and go to work in a London factory, pasting labels on pots of shoe polish. Young Charles lived in a boardinghouse, using his meager wages to support himself and to help pay his family's debts. He worked in the dreary, run-down factory six days a week from 8:00 a.m. to 8:00 p.m. Such long hours were not unusual at the time, for children or adults, but Dickens was miserable during the entire four months he spent working at the factory.

Even when the family finances improved, the boy continued to work at the factory until his father quarreled with Dickens' boss, who promptly dismissed the son. Charles was upset at being fired, but relieved to be out of the factory. Thus he felt betrayed when his mother, anxious for the boy's weekly wage, succeeded in making peace and getting Dickens' job back for him. The father, however, now sided with his son and the boy was sent back to school. "I know how these things have worked together to make me what I am," Dickens later wrote, but he never forgot that his mother was eager for him to return to work.

As an adult, Dickens always remembered the shame and humiliation he felt during those months at the factory. For years afterward, whenever in London, he could not go near the sites of the factory and boardinghouse, going out of his way to avoid those painful reminders of his past. In fact, Dickens never told his wife and children about his childhood work experience. It was only after his death that they heard of it from a family friend whom Dickens had confided in.

Instead, Dickens expressed his feelings by giving his fictional "other self," David Copperfield, a job similar to the one he had so hated. In the novel, ten-year-old David is forced by his harsh stepfather to work as a bottle washer in a factory. Young David, who "suffered exquisitely" as a child manual laborer, was apparently Dickens' way of dealing with his own past. *David Copperfield* was to become Dickens' most popular novel, and Dickens himself called it his "favorite child."

39. Which of the following best tells what this passage is about?

A. Dickens' childhood dreams and desires
B. Dickens' autobiography written while he was a child
C. Dickens' childhood relationship with his parents
D. the autobiographical basis for Dickens' *David Copperfield*
E. the many characters created by Dickens for *David Copperfield*

40. When did Dickens begin writing *David Copperfield*?

F. after giving up work on his own life story
G. shortly after he worked at the shoe polish factory
H. when he decided to resume his long-delayed schooling
J. after revisiting the shoe polish factory as an adult
K. when he no longer felt ashamed about his childhood

CONTINUE ON TO THE NEXT PAGE ►

41. Which of the following is the most reasonable inference about Dickens as a child?

A. He believed that children should learn to work and support themselves.
B. He was dreamy and imaginative.
C. He planned to be a factory owner when he grew up.
D. He thought that all work was worthwhile if done well.
E. He preferred attending school to working in a factory.

42. Which of the following is the primary reason that Dickens wrote *David Copperfield*?

F. He needed money from the novel to help pay his debts.
G. It was too difficult for him to write about his memories directly in an autobiography.
H. He wanted his own children to know of his work in the factory.
J. His autobiography had not been well accepted by the public.
K. He wanted to demonstrate that his childhood job had helped him succeed in later life.

43. What can be concluded about the relationship between Dickens and his mother as described in the third paragraph?

A. He never saw her again after he left to work in the shoe polish factory.
B. He was grateful that she got his job back for him.
C. He resented her for putting the need for his wages above his own happiness.
D. He never included her in any of his novels.
E. He had trouble remembering her role in the unpleasant events of his childhood.

44. What most directly enabled Charles Dickens to return to school?

F. a downturn in the family's finances
G. his father's quarrel with the factory owner
H. getting fired from the factory
J. his mother's desire for his weekly wage
K. his father's intervention

CONTINUE ON TO THE NEXT PAGE ►

The African country of Zimbabwe took its name from the Shona word meaning "stone enclosures" or "venerated houses." In fact, dozens of stone ruins are today scattered throughout Zimbabwe and other areas in southeastern Africa. One of these ruins, known as "Great Zimbabwe," was once a fabled city that inspired tales that circulated throughout Europe. Where was this remarkable city, and who had built it? For centuries the mystery occupied the minds of explorers and treasure-seekers.

The first reports to Europeans of Great Zimbabwe were spread a thousand years ago by Arab traders sailing between the Middle East and the east coast of Africa. They told of the fabulous wealth of a mysterious stone city in the African interior. In their tales, that city became associated with their understanding of Middle Eastern history—with the Queen of Sheba, King Solomon, and his legendary gold mines, long since lost to the world. By the sixteenth century, Portuguese explorers regularly visited East Africa, searching for "King Solomon's gold," but they never found Great Zimbabwe. In 1552, a Portuguese historian, João de Barros, recorded a story told by the Arabs about a city with a "square fortress of masonry within and without, built of stones of marvelous size, and there appears to be no mortar joining them."

In fact, Great Zimbabwe **was** a marvel. In one area, a massive wall, over thirty feet high and twenty feet thick, created a great enclosure. Another area contained a fortress-like series of walls, corridors, and steps built into the bluff above. Throughout the city, each stone was precisely fitted to the others without the use of mortar.

In the 1870s, a German geologist, Karl Mauch, was the first European to see Great Zimbabwe, by then in ruins. Mauch realized that he had "rediscovered" the fabled city from de Barros's story. He jumped to the conclusion that Great Zimbabwe had been built by the Queen of Sheba. British authorities sent a British journalist, Richard Hall, to Great Zimbabwe to investigate Mauch's report. Archaeology was still in its infancy, and Hall, convinced that the structures had been built by ancient people from the Middle East, dug up and discarded archaeological deposits that would have revealed much about the true history of Great Zimbabwe. Later European excavations destroyed even more valuable evidence.

In the twentieth century, after excavating areas that had not been disturbed, David Randall-MacIver, a Scottish Egyptologist, and Gertrude Caton-Thompson, an English archaeologist, concluded that the ruins were unmistakably African in origin. Great Zimbabwe was most likely built during the fourteenth or fifteenth century by the ancestors of the present-day Shona people. Recent carbon-14 dating supports their conclusion. Great Zimbabwe was once home to an estimated 20,000 people, the center of a great Shona kingdom. Wealthy Shona kings traded their ivory and gold in coastal towns for other goods, thus accounting for the discovery of beads and other foreign wares in the ruins.

One mystery of Great Zimbabwe had been solved. Another mystery remains: why was the settlement at Great Zimbabwe abandoned, leaving the magnificent stone architecture to fall into ruins?

45. Which of the following best tells what this passage is about?

A. a brief history of the nation of Zimbabwe
B. inaccuracies in the recording of African history
C. a comparison of Great Zimbabwe with other African archaeological sites
D. the true story of the Great Zimbabwe ruins
E. how Karl Mauch discovered Great Zimbabwe

CONTINUE ON TO THE NEXT PAGE ▶

46. Which of the following statements about Richard Hall's opinion on Great Zimbabwe would the author most likely support?

F. First impressions are generally accurate.
G. Preconceptions can cloud a person's judgment.
H. The history of a people can best be judged by looking at its present culture.
J. Advanced cultures developed first in the Middle East, then spread to the rest of the world.
K. Much of Middle Eastern culture was derived from the culture of the Shona people.

47. What was "one mystery of Great Zimbabwe" (line 77) that had been solved?

A. why foreign wares were found in the ruins
B. why the settlement was abandoned
C. the source of the ivory and gold
D. why it was not discovered by Europeans until the 1870s
E. who had built it and when

48. Which of the following statements about the Shona people is best supported by the passage?

F. They no longer exist as a distinct group.
G. They live along Africa's East Coast.
H. They are descendents of the people who built Great Zimbabwe.
J. They lived in the Middle East before settling in Africa.
K. They were once ruled by King Solomon and the Queen of Sheba.

49. Which of the following best illustrates the statement that "Archaeology was still in its infancy" (lines 51-52)?

A. the stone buildings built without mortar
B. the abandonment of Great Zimbabwe
C. the conclusions of David Randall-MacIver and Gertrude Caton-Thompson
D. the discovery of beads and other foreign materials at Great Zimbabwe
E. the excavations conducted by Richard Hall

50. Which of the following best describes the relationship of Portuguese explorers to Great Zimbabwe?

F. They searched for it but never found it.
G. They told Arab traders where to find it.
H. They found King Solomon's mines but didn't realize it.
J. They destroyed archaeological evidence about its history.
K. They were responsible for its abandonment.

CONTINUE ON TO THE NEXT PAGE ▶

PART 2 — MATHEMATICS

Suggested Time — 75 Minutes

50 QUESTIONS

GENERAL INSTRUCTIONS

Solve each problem. Select the **best** answer from the choices given. Mark the letter of your answer on the answer sheet. You can do your figuring in the test booklet or on paper provided by the proctor. **DO NOT MAKE ANY MARKS ON YOUR ANSWER SHEET OTHER THAN FILLING IN YOUR ANSWER CHOICES.**

IMPORTANT NOTES:

(1) Formulas and definitions of mathematical terms and symbols are **not** provided.

(2) Diagrams other than graphs are **not** necessarily drawn to scale. Do not assume any relationship in a diagram unless it is specifically stated or can be figured out from the information given.

(3) Assume that a diagram is in one plane unless the problem specifically states that it is not.

(4) Graphs are drawn to scale. Unless stated otherwise, you can assume relationships according to appearance. For example, (on a graph) lines that appear to be parallel can be assumed to be parallel; likewise for concurrent lines, straight lines, collinear points, right angles, etc.

(5) Reduce all fractions to lowest terms.

---

51. $100(2 + 0.1)^2 - 100 =$

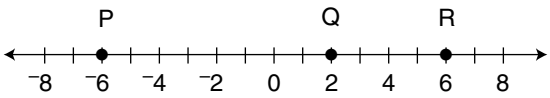
A. 101
B. 141
C. 200
D. 301
E. 341

---

52. Jack scored a mean of 15 points per game in his first 3 basketball games. In his 4th game, he scored 27 points. What was Jack's mean score for the 4 games?

F. 15
G. 16
H. 17
J. 18
K. 21

53.



How many units is it from the midpoint of $\overline{PQ}$ to the midpoint of $\overline{QR}$?

A. 2
B. 4
C. 6
D. 8
E. 10

---

54. Each child in a certain class is required to have school supplies of 1 notebook and 2 pencils. One notebook costs \$1.09 and one pencil costs \$0.59. With \$15, what is the maximum number of children that can be provided with the required supplies? (Assume no tax.)

F. 6
G. 7
H. 8
J. 9
K. 12

55. What time will it be 46 hours after 9:30 p.m. on Friday?

A. 7:30 p.m. Saturday
B. 7:30 a.m. Sunday
C. 6:30 p.m. Sunday
D. 7:30 p.m. Sunday
E. 9:30 p.m. Sunday

56. Judy is n years older than Carmen and twice as old as Frances. If Frances is 15, how old is Carmen?

F. 30
G. $15 + n$
H. $15 + 2n$
J. $15 - n$
K. $30 - n$

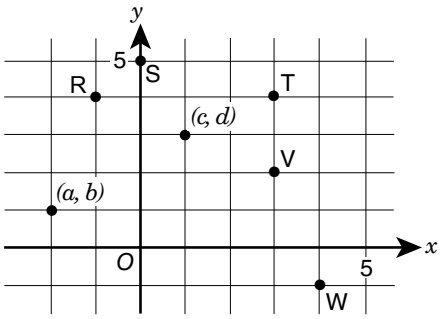
57. If $0.00102 = \frac{102}{N}$, what is the value of N?

A. 10,000
B. 100,000
C. 1,000,000
D. 100,000,000
E. 1,000,000,000

58. On a scale drawing, a distance of 1 foot is represented by a segment 0.25 inch in length. How long must a segment on the scale drawing be to represent a 36-inch distance?

F. 0.25 in.
G. 0.75 in.
H. 3 in.
J. 9 in.
K. 144 in.

59.



The figure above is drawn to scale. Which point best shows the location of $(c + a, d + b)$?

A. R
B. S
C. T
D. V
E. W

60. $\frac{(^{-}51)^2}{17^3} =$

F. $^{-}2$

G. $-\frac{1}{17}$

H. $\frac{9}{17}$

J. $\frac{16}{17}$

K. 2

61.

1 dollar = 7 lorgs
1 dollar = 0.5 dalts

Kwamme has 140 lorgs and 16 dalts. If he exchanges the lorgs and dalts for dollars according to the rates above, how many dollars will he receive? (Assume there are no exchange fees.)

A. \$28
B. \$52
C. \$182
D. \$282
E. \$988

CONTINUE ON TO THE NEXT PAGE ▶

62. DISTRIBUTION OF EYE AND HAIR COLOR FOR 64 CHILDREN

		Eye Color		
		Brown	Blue	Total
Hair Color	Blond	11	18	29
	Black	15	20	35

The table above shows the distribution of eye color and hair color for 64 children. How many of these children have blond hair or brown eyes, but **not both**?

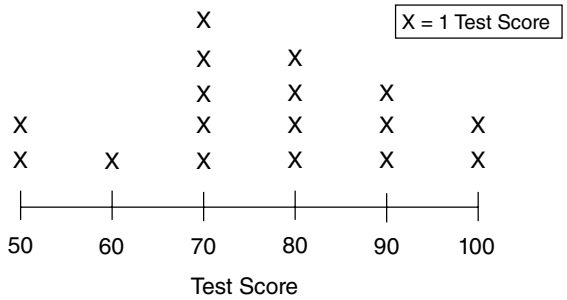
F. 22
G. 33
H. 44
J. 53
K. 55

63. 1 sind = 5.6 ricks
1 sind = 12.88 dalts

Using the conversions above, how many dalts are equivalent to 1 rick?

A. 0.43 dalts
B. 2.3 dalts
C. 7.28 dalts
D. 18.48 dalts
E. 72.128 dalts

64. TEST SCORES FOR 17 STUDENTS



According to the figure above, what was the median score for the test?

F. 70
G. 75
H. $76\frac{8}{17}$
J. 80
K. 90

65. What is the solution to $\frac{0.21}{0.33} = \frac{x}{1.10}$?

A. 0.07
B. 0.67
C. 0.70
D. 6.70
E. 7.00

66. Which of the following shows the fractions $\frac{11}{3}$, $\frac{25}{7}$, and $\frac{18}{5}$ in order from least to greatest?

F. $\frac{25}{7}, \frac{18}{5}, \frac{11}{3}$

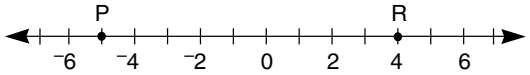
G. $\frac{25}{7}, \frac{11}{3}, \frac{18}{5}$

H. $\frac{18}{5}, \frac{11}{3}, \frac{25}{7}$

J. $\frac{18}{5}, \frac{25}{7}, \frac{11}{3}$

K. $\frac{11}{3}, \frac{18}{5}, \frac{25}{7}$

67.



Point Q is to be placed on the number line one-third of the way from point R to point P. What number will be at the midpoint of segment $\overline{PQ}$?

A. 2
B. 1
C. 0
D. −1
E. −2

CONTINUE ON TO THE NEXT PAGE ▶

68. A prom dress originally priced at \$450 is on sale for $\frac{1}{3}$ off the original price. In addition, Alia has a coupon for 10% off the discounted price. If there is a 6% sales tax on the final price of the dress, what would Alia's total cost be?

F. \$111.30
G. \$143.10
H. \$270.30
J. \$286.20
K. \$297.00

69. How many different two-digit numbers can be formed from the digits 7, 8, 9 if the numbers must be even and no digit can be repeated?

A. 0
B. 1
C. 2
D. 3
E. 6

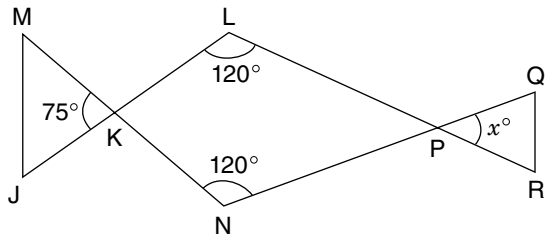
70. A group of mountain climbers started the day at an elevation of 125 feet below sea level. At the end of the day, they camped at 5,348 feet above sea level. What was the climbers' elevation gain for the day?

F. 5,223 ft
G. 5,373 ft
H. 5,377 ft
J. 5,463 ft
K. 5,473 ft

71. How many integers are between $\frac{5}{2}$ and $\frac{20}{3}$?

A. 3
B. 4
C. 5
D. 10
E. 15

72.



In the figure above, $\overline{JKL}$, $\overline{MKN}$, $\overline{NPQ}$, and $\overline{LPR}$ are straight line segments. What is the value of x?

F. 25
G. 45
H. 50
J. 60
K. 75

73.

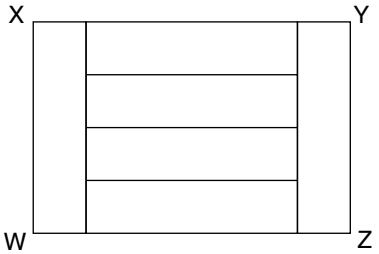


Figure WXYZ above is composed of 6 congruent rectangular panels. The area of figure WXYZ is 54 square centimeters. What is the perimeter of figure WXYZ in centimeters?

A. 24 cm
B. 30 cm
C. 36 cm
D. 45 cm
E. 50 cm

74. What is the prime factorization of 714?

F. 2 • 357
G. 2 • 3 • 119
H. 2 • 7 • 51
J. 6 • 7 • 17
K. 2 • 3 • 7 • 17

CONTINUE ON TO THE NEXT PAGE ▶

75. Three gallons of gasoline are needed to drive 65 miles. At this rate, how many gallons are needed to drive m miles?

A. $\frac{3}{65}$ gal.

B. $\frac{3m}{65}$ gal.

C. $3m$ gal.

D. $\frac{65}{3}$ gal.

E. $\frac{65m}{3}$ gal.

76. If Crystal multiplies her age by 3 and then adds 2, she will get a number equal to her mother's age. If m is her mother's age, what is Crystal's age in terms of m?

F. $-\frac{2}{3}m$

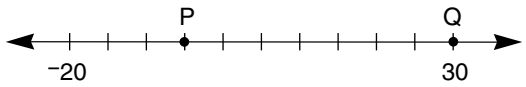
G. $\frac{m-2}{3}$

H. $3m + 2$

J. $\frac{m}{3} - 2$

K. $\frac{3}{m} - 2$

77.



Points P and Q are points on the number line above, which is divided into equal sections. What is the value of PQ?

A. $^-5$
B. 7
C. 30
D. 35
E. 50

78.

8:54 a.m.
9:12 a.m.
9:24 a.m.
10:24 a.m.
11:18 a.m.

Light A flashes every 12 minutes, and light B flashes every 18 minutes. The two lights flash at the same time at 8:00 a.m. At how many of the times listed above will they again both flash at the same time?

F. 1
G. 2
H. 3
J. 4
K. 5

79. Which sum below can be expressed as a non-repeating decimal?

A. $\frac{1}{2} + \frac{1}{6}$

B. $\frac{1}{3} + \frac{1}{4}$

C. $\frac{1}{3} + \frac{1}{5}$

D. $\frac{1}{4} + \frac{1}{5}$

E. $\frac{1}{4} + \frac{1}{6}$

80. To paint a room, Suzanne uses blue and white paint in the ratio of blue:white = 8:3. What was the **total** number of gallons of paint used if she used 6 gallons of blue paint?

F. $2\frac{1}{4}$ gal.

G. $8\frac{1}{4}$ gal.

H. 9 gal.

J. 16 gal.

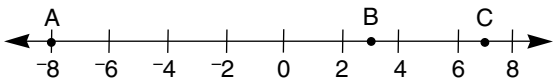
K. 22 gal.

CONTINUE ON TO THE NEXT PAGE ▶

81. A cylindrical oil drum can hold 4,320 liters when it is completely full. Currently, the drum is $\frac{1}{3}$ full of oil. How many kiloliters of oil need to be added to fill the drum completely?

A. 1.44 kL
B. 2.88 kL
C. 4.32 kL
D. 14.40 kL
E. 28.80 kL

82.



On the number line above, A is located at ⁻8, B is located at 3, and C is located at 7. D (not shown) is the midpoint of $\overline{AB}$, and E (not shown) is the midpoint of $\overline{BC}$. What is the midpoint of $\overline{DE}$?

F. ⁻1.5
G. 1.25
H. 1.75
J. 2.25
K. 7.5

83. A certain insect has a mass of 75 milligrams. What is the insect's mass in grams?

A. 0.075 g
B. 0.75 g
C. 7.5 g
D. 75 g
E. 7,500 g

84. A box contains 11 marbles—7 red and 4 green. Five of these marbles are removed at random. If the probability of drawing a green marble is now 0.5, how many red marbles were removed from the box?

F. 1
G. 2
H. 3
J. 4
K. 5

85. A water tank is $\frac{1}{3}$ full; then, 21 gallons of water are added to the tank, making it $\frac{4}{5}$ full. How many gallons of water could the tank hold if it were completely full?

A. 35 gal.
B. 45 gal.
C. 56 gal.
D. 84 gal.
E. 105 gal.

86. RELATIONSHIP BETWEEN ROW A AND ROW B

Row A	1	2	3	4	5	6	7	8	9	10	11
Row B	1	1	2	2	3	3	4	4	5	5	6

The table above shows two rows of integers, Row A and Row B, and the relationship between them. Assume each row continues in the pattern shown. When the number 111 appears in Row A, what is the corresponding number that will appear in Row B?

F. 55
G. 56
H. 57
J. 59
K. 66

87. In a restaurant, the mean annual salary of the 4 chefs is $68,000, and the mean annual salary of the 8 waiters is $47,000. What is the mean annual salary of all 12 employees?

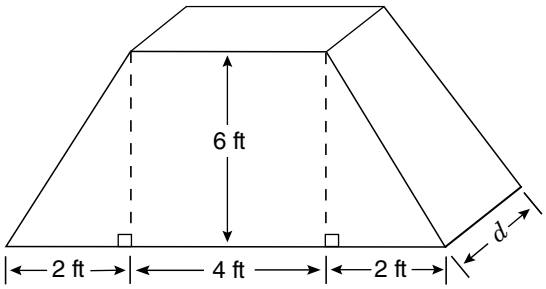
A. $47,000
B. $54,000
C. $55,500
D. $57,500
E. $61,000

CONTINUE ON TO THE NEXT PAGE ▶

88. On the first leg of its trip, a plane flew the 900 miles from New York City to Atlanta in 2 hours. On the second leg, it flew the 1,400 miles from Atlanta to Albuquerque in $2\frac{1}{2}$ hours. How much greater was the plane's mean speed, in miles per hour, on the second leg than on the first?

F. 110 mph
G. 150 mph
H. 200 mph
J. 250 mph
K. 500 mph

89.



The end of a tent has a trapezoidal cross-section as shown above. What is the depth (d) of the tent if its volume is 216 cubic feet?

A. $4\frac{1}{2}$ ft

B. 6 ft

C. $6\frac{1}{2}$ ft

D. 7 ft

E. 8 ft

90. Today, Tom is $\frac{1}{4}$ of Jordan's age. In 2 years, Tom will be $\frac{1}{3}$ of Jordan's age. How old is Jordan today?

F. 4 yr
G. 6 yr
H. 12 yr
J. 16 yr
K. 22 yr

91. How many positive two-digit numbers are evenly divisible by 4?

A. 22
B. 23
C. 24
D. 25
E. 26

92. A steel container is shaped like a cube 10 feet on each side. This container is being filled with water at a rate of 7 cubic feet per minute. At the same time, water is leaking from the bottom of the container at a rate of 2 cubic feet per minute. If the container is exactly half-filled at 9:00 a.m., at what time will the container begin to overflow?

F. 9:55 a.m.
G. 10:00 a.m.
H. 10:11 a.m.
J. 10:40 a.m.
K. 12:20 p.m.

93. Each week, Arnold has fixed expenses of \$1,250 at his furniture shop. It costs Arnold \$150 to make a chair in his shop, and he sells each chair for \$275. What is Arnold's **profit** if he makes and sells 25 chairs in 1 week?

A. \$1,875
B. \$2,500
C. \$3,125
D. \$3,750
E. \$4,375

94. In how many different ways can you make exactly \$0.75 using only nickels, dimes, and quarters, if you must have at least one of each coin?

F. 2
G. 4
H. 6
J. 7
K. 12

CONTINUE ON TO THE NEXT PAGE ▶

95. $(2p + 8) - (5 + 3p) =$

A. $3 - p$
B. $p + 3$
C. $5p - 3$
D. $5p + 3$
E. $5p + 13$

96. A 90-gram mixture contains three items, X, Y, and Z. The ratio of the weights of X and Y is 4:9, and the ratio of the weights of Y and Z is 9:5. If all of item Z were removed, what would be the new weight of the mixture?

F. 60 g
G. 65 g
H. 70 g
J. 72 g
K. 75 g

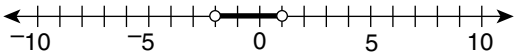
97. Maria is now 16 years old. In 6 years, she will be twice as old as her brother is then. How old is her brother now?

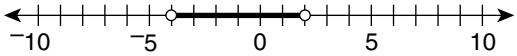
A. 5
B. 6
C. 8
D. 11
E. 12

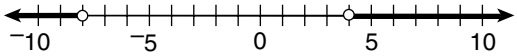
98. A car travels at 4,400 feet per minute. If the radius of each tire on the car is one foot, how many revolutions does one of these tires make in a single minute? (Use the approximation $\frac{22}{7}$ for π.)

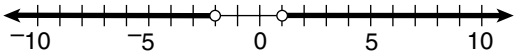
F. 700
G. 1,925
H. 13,828
J. 15,400
K. 27,657

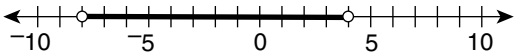
99. Which number line below shows the solution to the inequality $^{-}4 < \frac{x}{2} < 2$?

A.


B.


C.


D.


E.


100. What is the greatest prime factor of 5,355?

F. 17
G. 51
H. 119
J. 131
K. 153

THIS IS THE END OF THE TEST. IF TIME REMAINS, YOU MAY CHECK YOUR ANSWERS TO PART 2 AND PART 1. BE SURE THAT THERE ARE NO STRAY MARKS, PARTIALLY FILLED ANSWER CIRCLES, OR INCOMPLETE ERASURES ON YOUR ANSWER SHEET. ■

EXPLANATIONS OF CORRECT ANSWERS

SCRAMBLED PARAGRAPHS

Paragraph 1 (**SRTUQ**)
The opening sentence introduces the astronomer Tycho Brahe as an "odd and arrogant" person. Arrogance implies pride, and S continues that line of thought by describing Brahe's argument with another student about being the better mathematician. The argument turned into a sword fight in R, and the result was an injury to Brahe's nose. To compensate for his loss, Brahe made a new nose (T). That concludes an episode from Brahe's earlier life. U begins, "Later in his life," and explains how Brahe's arrogance may have prevented him from making a major scientific discovery. Brahe had refused to share data with his assistant, Johannes Kepler (Q), who would later trace the orbits of the planets around the sun.

Paragraph 2 (**RQTUS**)
The given sentence names Crane's novel *The Red Badge of Courage*. Either Q or R could grammatically follow. Create one paragraph starting with Q and another starting with R, and compare them. Q gives the full name of Crane's first novel, *Maggie: A Girl of the Streets*, and comments that it was not successful. Sentence T gives further background information about *Maggie* (a shortened title must be preceded by the full title)—that Crane borrowed money to publish it. The loan is mentioned again in sentence U, plus a comment that Crane gave away copies of the book. S concludes the paragraph with another of Crane's unsuccessful strategies to sell the book. QTUS is now a logical and grammatical four-sentence paragraph about Crane's first novel. R remains, but it cannot follow QTUS, because the unnamed successful second novel in R cannot be *Maggie*. That order did not work, so create a new paragraph with R following the given sentence. R logically and grammatically leads to Q; the success of Crane's second novel in R is contrasted with the failure of his first novel in Q. Sentences TUS logically follow Q, as already explained, to create a coherent and well-organized paragraph.

Paragraph 3 (SURQT)
The given sentence introduces macaws as large, beautiful birds. S is next, referring to an additional attribute of macaws, their intelligence, and claiming that some macaw behaviors are not well understood. U gives an example of such behavior, eating clay in river mud. Why do they eat mud? Not to satisfy their hunger, according to R. Q follows with a theory to explain the behavior: macaws ingest the clay to counteract toxins found in the fruit seeds they have eaten. T provides further evidence to support the theory.

Paragraph 4 (**QSRUT**)
The opening sentence is a generalization about the most energy-efficient orientation for houses in the Northern Hemisphere, but does not explain why it is true. The explanation begins with "The reason that . . ." in Q. "The position of the sun in the sky" in Q is further described in S—the sun is always in the southern portion of the sky. The next sentence is more difficult to identify, but R is the only one that makes sense. "To take advantage of this" in R refers to the sun's position in S. R goes on to say that south-facing windows, uncovered during the day, allow sunlight and heat to enter a house. U, with its reference to covering windows at night to conserve heat, contrasts daytime and nighttime activities. T concludes the paragraph. "In these ways" refers back to uncovering windows during the day and covering them at night in R and U. The result is the retention of the sun's warmth in the house.

Paragraph 5 (SUTQR)
The given sentence states what early European traders thought about Africa, setting the reader up for a contrasting statement. S fills that role, stating that later European travelers to Africa changed their impressions. The reason for that change is given in U—their visits to Timbuktu. The best sentence to follow U is T. Both U and T take place in the fifteenth century, and "these stories" in T refers to the travelers' tales in U. T also names a specific explorer, Benedetto Dei. Q begins with the pronoun "he," which referrs to Dei. Only R is left, and it provides a good conclusion, both chronologically (ending with the nineteenth century) and in terms of content (the rise and fall of Timbuktu).

SUQTR was a popular response, but it contains a grammatical problem. The "he" in Q has no referent in U. Another popular choice, SUTRQ, is incorrect because the sequence RQ does not make sense. R describes the decline of Timbuktu, while Q describes it as a thriving metropolis.

LOGICAL REASONING

11. (**C**) Draw a diagram with four spaces beside Quil, using the initials D, N, S, and T to represent the names of the planets. Needer is closest to Quil (Statement 1), so write "N" in the first space. The orbit of planet Sly is farthest from the orbit of Needer (Statement 3), so write "S" in the last space.

Quil	____	____	____	____
	N			S

We can stop here. The question asks for the planet that travels fastest, which is also the planet farthest from Quil. That planet is Sly (Option C).

---

12. (**G**) Evaluate each option to determine the option that must be true. Options F, H, J, and K might be true, but there is not enough information given to conclude that any of them must be true. We cannot conclude that every student who received all A's plays on a team (Option F), or determine whether the best athletes always get the highest grades (Option H). Option J can be ruled out because no information is given that compares grades received by students who do or do not play on sports teams. Nor is there any information about how much time students spend studying, ruling out Option K. Only Option G must be true. A student who receives a grade of C+, which is lower than a B-, is not permitted to play.

---

13. (**C**) Draw a diagram showing the three grades and the students in each grade. There are a total of eight students, with either two or three students per grade. Two grades must have three students, and one grade must have two students, but we do not know which grades these are. Start by filling in the definite information provided in Statement 2, that Bob and Ed are both in Grade 7. Statement 1 says that Ann, Doug, and Filomena are all in different grades, but does not say which grade each student is in. Write the letter combination ADF (their initials) in each grade as a placeholder because we know that one of these three must be in each grade.

Grade	Student	Student	Student
6	ADF		
7	Bob	Ed	ADF
8	ADF		

According to Statement 3, Heidi and Carla are in the same grade. They cannot be in Grade 7—that would put five students in that grade, and the maximum number of students per grade is three. Heidi and Carla must be in either Grade 6 or Grade 8. There is no information about George. He could be in either Grade 6 or 8, whichever grade Heidi and Carla are not in. Options A, B, D, and E might be true, but none of them must be true. For example, Option A would not be true if three students (ADF, Carla, and Heidi) are in Grade 6. Only Option C must be true. Grade 7 contains Bob, Ed, and one other student (Ann, Doug, or Filomena), for a total of three students.

---

14. (**K**) Draw a diagram to help solve this problem. Write "left" on the left-hand side of your scrap paper, followed by four spaces, one for each bike. Let an initial stand for each bike color—B, Y, G, and R. Then look for specific information about the location of a bike. The blue bike is on the extreme left (Statement 1). Fill in the left-most blank with a "B."

Left __B__ _____ _____ _____

Based on Statement 3, there are three possible orders. (Remember that "between" does not necessarily mean "between and next to." Another bike could also be between the blue and yellow bikes.)

BGYR BGRY BRGY

Based on Statement 2, we can eliminate the third possible order because the red bike must be next to the yellow bike. There are now two possible orders:

BGYR BGRY

Paul's bike is between the blue bike and the red bike. However, we can't determine which of the two orders is correct, so his bike could be either green or yellow.

Options F, G, H, and J **might** be true, but we cannot conclude that they **must** be true. Only Option K **must** be true.

---

15. (**A**) According to the question, every millworker in Hoxie is over six feet tall and good at math. There must be other people in Hoxie besides millworkers, but we do not know how tall they are, or whether they are good at math. Option A must be true. At least some people in Hoxie (the millworkers) are over six feet tall and good at math. Options B, C, D, and E might be true, but we cannot conclude that they **must** be true.

---

16. (**F**) This question asks you to determine which of the six houses have fenced yards and which have porches. Start with the most definite information—that three houses have porches (Statement 2), and they are not next to one another (Statement 3). This creates four possible arrangements of houses with porches:

L	M	N	P	Q	R
Yes	No	No	Yes	No	Yes
Yes	No	Yes	No	No	Yes
Yes	No	Yes	No	Yes	No
No	Yes	No	Yes	No	Yes

Statement 1 says that the two houses with fenced yards are immediately next to one another. The third and fourth arrangements above do not allow this condition, because a house with a porch cannot have a fenced yard (Statement 4). Two possibilities remain, as shown below, and we cannot determine which is correct.

House	L	M	N	P	Q	R
Porch?	Yes	No	No	Yes	No	Yes
Fenced yard?	No	Yes	Yes	No	No	No

or

House	L	M	N	P	Q	R
Porch?	Yes	No	Yes	No	No	Yes
Fenced yard?	No	No	No	Yes	Yes	No

Options G, H, J, and K are true for one of the possibilities, but not the other. None of them **must** be true for both possibilities. Option F is true for both possibilities, and it is the correct answer.

---

*17. and 18. These directions differ from the directions for the code in Sample Form A. They state that the position of a letter is **never** the same as that of the word it represents. For example, in the first sentence, L cannot represent "Marie." To answer these questions, you need not find out what every letter represents.*

17. (**E**) The word "juice" appears only once in the code, in the fourth sentence, so the letter representing "juice" must appear only in the fourth sentence. W can be ruled out because it appears in two of the statements and is in the same position as "juice." N cannot be correct because it also appears in the second sentence, which does not contain the word "juice." The letters Y and X appear only in the fourth sentence, but neither letter can be ruled out. Thus, the correct answer is E, "Cannot be determined from the information given."

18. (**K**) The letter U appears only in the second sentence. Thus, the word it represents must appear only in the second sentence. Option F ("Sean") is incorrect because it appears in the same position (first) as the letter U, and the directions state that the position of a letter can never be the same as the word it represents. Options G, H, and J can be ruled out because they appear in other sentences as well as the second sentence. Option K ("soda") appears only in the second sentence and it does not appear in the same position as the letter U, so it is correct.

---

19. (**C**) Read each option to determine whether it must be true. Option A is ruled out because the question does not mention non-skydivers. The question does not state the requirements for joining the Skydiving Club (Option B), only for maintaining membership. Option C is correct; some people who are afraid of heights belong to the Skydiving Club, and these people make three jumps a month. There is no support for Option D, and Option E applies to skydivers in general, not to members of the Skydiving Club.

---

20. (**J**) One way to solve this problem is to create a grid with a row for each of the six students, in the order presented in the question. According to the conditions, two students wear glasses and three students wear school T-shirts. None of the students wearing school T-shirts is next to each other (Condition 3) and the two students wearing glasses are next to each other (Condition 1). No student wears both glasses and a school T-shirt (Condition 4). These conditions allow two possibilities:

Place in line	Name	Wearing Glasses?	Wearing school T-shirt?
1	Larnell		yes
2	Masha		
3	Nikia		yes
4	Pedro	yes	
5	Ryan	yes	
6	Sara		yes

or

Place in line	Name	Wearing Glasses?	Wearing school T-shirt?
1	Larnell		yes
2	Masha	yes	
3	Nikia	yes	
4	Pedro		yes
5	Ryan		
6	Sara		yes

There is no information to determine which possibility is correct. Check the options one by one. Options F, G, H, and K are true for one possibility but not the other, so you cannot conclude that any of them must be true. Option J is always true—Larnell and Sara wear school T-shirts in both possibilities.

READING

Foams

21. (**E**) Options A and C are important details, but they are not the main ideas of the passage. Option B is not discussed, and Option D does not make sense—the terms "surfactants" and "foaming agents" are synonymous. Option E is the best answer. "The formation and uses of aqueous foams" provides a good summary of the passage from beginning to end.

---

22. (**J**) The characteristic life cycle of an aqueous foam is outlined in the third paragraph. The later stages of a foam occur when the foam dries, as described beginning in line 32. As this happens, the foam's bubbles become "polyhedrons with multiple flat surfaces" (lines 35-36), which is restated in the correct answer, Option J. Options F, G, and K occur during the early stages in a foam's life cycle, as discussed in the second paragraph. Option H describes one property of a bubble (lines 21-22) and is not directly related to its life cycle.

---

23. (**B**) The role of the surfactant in the formation of aqueous foam is discussed in the second paragraph. Surfactants are necessary to stabilize an aqueous foam. They work by lowering the surface tension of a liquid (lines 19-21), which is Option B. Option A is not mentioned in the passage (although dispersal of a gas in the liquid is an important point). Options C and D are stages in the life cycle of a foam, not the results of a surfactant. Option E might look appealing because it refers to the formation of foam, but it incorrectly states that soap, a surfactant, is converted into foam.

---

24. (**F**) The "life cycle" of aqueous foam is outlined in the third paragraph. A "young" foam occurs early in the life cycle, in which foam is characterized by "spherical bubbles of nearly uniform size, each with a relatively thick outer film of liquid" (lines 30-32). Only Option F, "spherical bubbles," is characteristic of a "young" foam. Options G, H, and J are characteristics of later stages. Option K is not part of the foam life cycle.

---

25. (**A**) The use of foam-based extinguishers to put out oil or gasoline fires is described in the fourth paragraph. The paragraph concludes, "these extinguishers have the advantage of minimizing the extensive water damage caused by more traditional fire-fighting methods." Option A restates this information.

---

26. (**F**) Read all five options to choose the one that is not an ingredient of dishpan suds. Dishpan suds are mentioned as one of several examples of soap foams in lines 40-41. The second paragraph explains that soap foams consist of soap (Option H), which is a surfactant (Option K), added to an aqueous foam formed of water (Option G) and air (Option J). Option F, "protein," is an ingredient of whipped cream and marshmallows (lines 42-44), but not of dishpan suds.

Camera

27. (**D**) Options A, B, and C are mentioned in passing, but none of them are the main idea of the passage. Option E is mentioned only in the last paragraph. Option D best describes what the passage is about—early versions of the concealed camera, examples of its uses, and its role in spy craft.

---

28. (**K**) The answer, Option K, is found in lines 9-11. Despite the name of the camera, amateur photographers, not detectives, used this camera.

---

29. (**D**) The correct answer, Option D, is found in lines 9-12. Early detective cameras resembled boxes (Option A), but that was not their purpose. Options B, C, and E refer to other kinds of cameras, not early detective cameras.

---

30. (**J**) According to lines 21-25, the camera with mirrors allowed the photographer to aim the camera in one direction while photographing something in another direction (Option J). Options F, G, and H refer to early detective cameras, not the camera with mirrors, which resembled an ordinary camera. Option K is not mentioned.

---

31. (**A**) The correct answer is found in lines 17-19. Option A restates the idea that people were no longer deceived by detective cameras. None of the other options are supported by the passage.

---

32. (**G**) Reread the third paragraph to understand the "idea" in line 40. The attempt to use pigeons to photograph the enemy's army position was impractical, but the "idea behind it"—taking photographs from overhead, without detection—was practical, which is Option G. The passage gives the example of satellite-mounted cameras to illustrate its practicality. Options F and H were true for photography in general, not to "the idea" in line 40. Option J describes a use for aerial photography, not the "idea." Option K refers to the impractical attempt, not to the idea behind it.

Marsh

33. (**E**) The fourth paragraph describes how Marsh began to organize his observations and write *Man and Nature* following both his time in Vermont (described in the second paragraph) and in Italy (third paragraph). Thus, the correct answer is Option E. Option D is not correct because it

mentions only Italy. There is no evidence in the passage to support Options A or C, and Option B cannot be correct because the modern environmentalist movement occurred after he wrote the book.

---

34. (**J**) Marsh attributed people's practices to "man's ignorant disregard for the laws of nature" (lines 31-32). "Ignorant disregard" implies lack of understanding, which is Option J. Option F is not mentioned. Option G may seem attractive, but it does not make sense—irresponsible environmental practices cannot be explained by people's desire to keep the earth unspoiled. Marsh observed mismanagement in Vermont as well as Italy, ruling out Option H. Option K cannot be correct because the modern environmentalist movement did not begin for another one hundred years.

---

35. (**C**) Read the entire first paragraph to understand how the word "surprisingly" was used. Lines 1-8 lead the reader to expect that Marsh was part of the modern environmentalist movement that began in the 1960s. The fact that Marsh's influential book was published 100 years earlier is unexpected and thus surprising. Option C restates that idea. The other options are contradicted by the information in the passage.

---

36. (**H**) Marsh was not optimistic about nature's ability to heal itself (lines 43-46), ruling out Option F. Marsh's book was influential long after his lifetime, demonstrating that his work never became outdated (Option G). Option H is correct. Marsh was considered a radical thinker (lines 76-77), implying that his ideas were unusual for his time. Marsh was not a politician (Option J) and did not desire a return to wilderness conditions, ruling out Option K.

---

37. (**E**) The sentence in lines 55-58 is a transition between Marsh's warnings in the fifth paragraph and his positive attitude toward some, but not all, alterations to the environment presented in the sixth paragraph. In the example given, Marsh approved of the Suez Canal (lines 68-71) because its advantages—improved transportation and commerce—benefited human life. Option E best summarizes that idea. Marsh's concerns (Option A) undermine, not support, the author's statement in lines 55-58. Option B is not relevant to the statement, and Option C incorrectly describes Marsh as a conservationist. Option D is contradicted by lines 59-60.

---

38. (**H**) Marsh's main contribution to the modern environmental movement is given in lines 5-7—the idea that Western society was causing irreparable harm to the environment. Option H restates that idea. Option F is incorrect because environmental damage began long before the twentieth century. Marsh's work inspired the conservation movement which sought to preserve wilderness areas, but Marsh himself did not advocate for conservation, ruling out Option G. The growth of the conservation movement (Option J) occurred long after Marsh's lifetime, ruling out Option J. Marsh observed serious environmental degradation in Italy as well as the United States, indicating that it was not chiefly an American problem (Option K).

Dickens

39. (**D**) Options A, C, and E are important details, but they are not the main ideas. Option D correctly combines the information in the passage about Dickens' childhood and the novel *David Copperfield*. Option B might look appealing because it also contains the ideas of Dickens' childhood and an autobiography, but his autobiography was never written, either in childhood or in adulthood.

---

40. (**F**) Dickens began writing *David Copperfield* after abandoning work on his own life story, or autobiography (lines 6-8), which is Option F. He wrote the book well into adulthood, ruling out Options G and H. The events in Options J and K never occurred.

---

41. (**E**) Dickens' childhood is described in the second and third paragraphs. Read each option to determine whether it is a reasonable inference, based on the information in the passage. Option E is a reasonable inference, based on line 17 (Dickens was "forced to quit school") and lines 26-27 (he was miserable at his job). Options A, B, C, and D are not supported by the passage.

---

42. (**G**) The correct answer is found in lines 10-13 and in the fourth paragraph. Dickens wrote *David Copperfield* because he was unable to complete his autobiography, and writing the novel helped him deal with painful childhood memories. Option G is the best summary. Dickens' father had debts, not Charles Dickens himself, ruling out Option F. Options H and K are contradicted by the passage. Dickens never wrote his autobiography, eliminating Option J.

---

43. (**C**) The passage says little about the relationship between Dickens and his mother, only that Charles felt betrayed when his mother, anxious for the boy's wages, got his job back for him (lines 33-36). Option C best expresses this information. Options B and E are contradicted by the passage. The passage does not address the issues presented in Options A and D.

---

44. (**K**) The passage states, "The father, however, now sided with his son and the boy was sent back to school" (lines 37-38). In other words, Charles was able to return to school because of his father's intervention (Option K). Options F and J were obstacles, not aids, to his returning to school. Option G led to dismissal from his job, not to his return to school. Option H occurred before Dickens returned to school, but was not the direct reason for it.

Great Zimbabwe

45. (**D**) You are asked to identify the general topic of the passage. Options B and E refer to only parts of the passage. Option C is not mentioned at all. Option A is too broad; most of the passage is about Great Zimbabwe, not the nation of Zimbabwe. Option D, "the true story of the Great Zimbabwe ruins," is best.

---

46. (**G**) The basis for the correct answer is found in several places in the passage. First, find the section that mentions Richard Hall's opinion. Lines 52-54 state that Hall was "convinced that the structures had been built by ancient people from the Middle East." Later, Hall's opinion was discredited by archaeologists who demonstrated that Great Zimbabwe was African in origin (lines 64-65). In other words, Hall's opinion was inaccurate. All five options must be evaluated to find the option with which the passage's author would most likely agree. Option F is not correct: Hall's first impression was inaccurate. The author would not agree with Option H: the present culture of the Shona people is not illustrative of their past. The author does not take any stand on whether advanced cultures developed first in the Middle East, ruling out Option J, nor does the author claim that Middle Eastern culture was derived from Shona culture (Option K). The best answer is Option G. A preconception is an opinion formed in advance of actual knowledge, which perfectly describes Hall's belief. Hall's preconception had clouded his judgment.

---

47. (**E**) Read the entire last paragraph, which implies that discussion of "one mystery of Great Zimbabwe" has just been concluded, and the author is making a transition to another mystery. The previous paragraph showed that Great Zimbabwe was built by ancestors of the Shona people, not by people from the Middle East. Thus, the mystery that had been solved was who had built Great Zimbabwe and when (Option E). Option A is incorrect because the mystery comprised much more than the foreign wares discovered in the ruins. Option B, "why the settlement was abandoned," has not been solved. The source of gold and ivory (Option C) and the reason that Europeans did not discover Great Zimbabwe until the 1870s (Option D) are not presented as mysteries.

---

48. (**H**) The Shona people are discussed in the fifth paragraph. Since the question is open-ended, we must evaluate each option to find the best answer. The Shona people still exist as a distinct group (line 68), ruling out Option F. Shona kings traded their goods in coastal towns (lines 72-74), implying that they lived in the African interior, not the coast, eliminating Option G. Lines 65-68 state that Great Zimbabwe was most likely built by ancestors of the present-day Shona people, which supports Option H. Options J and K confuse the histories of the Shona people and ancient Middle Eastern people. Option H is the best answer.

---

49. (**E**) This statement implies that the field of archaeology was new and immature in the 1870s. The statement is followed by descriptions of how early explorers, including Richard Hall, discarded valuable archaeological material. Thus, the "infancy" of archaeology is illustrated by Option E, "the excavations conducted by Richard Hall." Options A and B are events in Shona history, not the history of archaeology, and Options C and D are references to more advanced stages of archaeology, not to its infancy.

---

50. (**F**) Each option should be evaluated in turn. Option F is correct; the Portuguese searched for Great Zimbabwe but never found it (lines 26-27). It is a good idea to read the remaining options to be sure that none of them is better than Option F. Options G, H, and K are incorrect because the Portuguese never found Great Zimbabwe or King Solomon's mines. The destruction of archaeological evidence was committed by subsequent explorers, not the Portuguese, which rules out Option J. Option F is the best answer.

---

51. (**E**) $100(2 + 0.1)^2 - 100$
$= 100(2.1)^2 - 100$
$= 100(4.41) - 100$
$= 441 - 100$
$= 341$

---

52. (**J**) Since Jack scored a mean of 15 points per game in each of the first 3 games, he must have earned a total of 45 points for the first three games by definition. Use that information to calculate the mean over the four games:

$$\frac{45 + 27}{4} = \frac{72}{4} = 18$$

---

53. (**C**) To calculate the midpoint of a segment, find the mean of the endpoints (add the values of the two endpoints and divide by 2):

$$\text{Midpoint of } \overline{PQ} = \frac{2 + (^-6)}{2} = {}^-2$$

$$\text{Midpoint of } \overline{QR} = \frac{6 + 2}{2} = 4$$

To find how many units from one midpoint to the other, subtract the midpoint values:

$4 - (^-2) = 6$

---

54. (**F**) The cost for one child's supplies is:

$\$1.09 + 2(\$0.59) = \$2.27$

Divide the total money available ($15) by the cost for one child's supplies ($2.27) to get the number of children that can be provided with the supplies: $\$15 \div \$2.27 = 6.6\ldots$

You do not need to complete the division, because the number of children must be a whole number. Six children can be provided with the complete requirement of supplies.

---

55. (**D**) The quickest solution is to first "round up" from 46 hours to 48 hours, because 48 hours is 2 full days. Thus, 48 hours after 9:30 p.m. on Friday would be 9:30 p.m. on Sunday. Since the question asks for 46 hours, subtract 2 hours from 9:30 p.m. Sunday to get 7:30 p.m. Sunday.

---

56. (**K**) Since Frances' age (F) is given, use that information to find Judy's age (J):

$J = 2F = 2 \bullet 15 = 30$

So, Judy is 30 years old. Now, use that information to calculate Carmen's age (C):

$C + n = J$
$C + n = 30$
$C = 30 - n$

---

57. (**B**) $0.00102 = \frac{102}{N}$

Multiply the numerator and denominator by 100,000 to remove the decimal.

$$\frac{100{,}000}{100{,}000} \bullet (0.00102) = \frac{102}{N}$$

$$\frac{102}{100{,}000} = \frac{102}{N}$$

$N = 100{,}000$

---

58. (**G**) The scale is 1 foot = 0.25 inch. Since the rest of the question is in inches, change the scale conversion into inches: 1 foot is equal to 12 inches, so 12 inches = 0.25 inch.

Next, set up a proportion, where x represents the scale inches for a distance of 36 inches:

$$\frac{12}{0.25} = \frac{36}{x}$$

$12x = 36(0.25)$

$12x = 9$

$$x = \frac{9}{12} = \frac{3}{4} = 0.75 \text{ in.}$$

---

59. (**A**) Since the figure is drawn to scale, use the values from the grid to solve:

$(c, d) = (1, 3)$ and $(a, b) = (^-2, 1)$

Then, $c + a = 1 + (^-2) = {}^-1$, and

$d + b = 3 + 1 = 4$.

The point $(^-1, 4)$ is point R on the graph.

---

60. (**H**) $$\frac{(^-51)(^-51)}{17 \bullet 17 \bullet 17} = \frac{(^-3)(^-3)}{17} = \frac{9}{17}$$

---

61. (**B**) Use proportions to make the conversions:

Lorgs to dollars

$\frac{140}{x} = \frac{7}{1}$ $\quad 7x = 140 \quad x = \$20$

Dalts to dollars

$\frac{16}{x} = \frac{0.5}{1}$ $\quad 0.5x = 16 \quad x = \$32$

Total dollars = 20 + 32 = \$52

---

62. (**G**) The question asks for the number of children with blond hair or brown eyes, but **not both**. According to the chart, 18 children have blond hair and *blue* eyes, and 15 children have brown eyes and *black* hair. 18 + 15 = 33 children with blond hair or brown eyes, but not both.

---

63. (**B**) Since 5.6 ricks and 12.88 dalts are both equal to 1 sind, then 5.6 ricks = 12.88 dalts. To calculate the number of dalts (d) in 1 rick, set up a proportion:

$\frac{5.6}{12.88} = \frac{1}{d}$

$5.6d = 12.88$

$d = 2.3$

---

64. (**J**) To find the median, first count the number of tests (Xs) in the figure, which is 17. The median is the middle value. The middle value of 17 is 9. Counting from the left, find the ninth X in the figure to determine the median score (80).

---

65. (**C**) To eliminate the decimals in this equation, multiply the numerators and denominators by 100:

$(\frac{0.21}{0.33})(\frac{100}{100}) = (\frac{x}{1.10})(\frac{100}{100})$

$\frac{21}{33} = \frac{100x}{110}$

$x = (\frac{110}{100})(\frac{21}{33}) = \frac{70}{100} = 0.70$

---

66. (**F**) It may be easier to see the order of the fractions by changing them to mixed numbers or decimals:

$\frac{11}{3} = 3\frac{2}{3} = 3.666\ldots$

$\frac{25}{7} = 3\frac{4}{7} = 3.57\ldots$

$\frac{18}{5} = 3\frac{3}{5} = 3.6$

The smallest fraction is $\frac{25}{7}$, followed by $\frac{18}{5}$, and finally $\frac{11}{3}$.

---

67. (**E**) First, find the length of $\overline{PR}$: $4 - (^{-}5) = 9$ units

Point Q is located $\frac{1}{3}$ of the way from R to P, so calculate where that point would be:

$9 \times \frac{1}{3} = 3$ units

So, point Q is located at $4 - 3 = 1$. Finally, calculate the midpoint of $\overline{PQ}$:

Midpoint PQ = $\frac{^{-}5 + 1}{2} = {}^{-}2$

---

68. (**J**) First, find the sale price of the dress. If it is on sale for $\frac{1}{3}$ off the original price, the sale price is $\frac{2}{3}$ of the original price: $\$450 \times \frac{2}{3} = \$300$

Alia has a 10% discount on the sale price. 10% of \$300 is \$30, so the discounted price will be:

\$300 − \$30 = \$270

Next, calculate the sales tax on the discounted price: $\$270 \times 0.06 = \$16.20$

So, the total cost that Alia pays for the dress is:

\$270 + \$16.20 = \$286.20

---

69. (**C**) The two-digit numbers must be even, so the only possible two-digit numbers must end in 8, since 8 is the only even digit given in the problem. Since the numbers cannot be repeated, the only possibilities for two-digit even numbers are 78 and 98. Thus, the answer is two possible two-digit numbers.

---

70. (**K**) The climbers started at 125 feet below sea level, which can be expressed as $^{-}125$. They stopped at 5,348 feet above sea level, which is expressed as a positive number. The elevation gain for the day is $5{,}348 - (^{-}125) = 5{,}473$ feet.

---

71. (**B**) First, change the improper fractions into mixed numbers:

$\frac{5}{2} = 2\frac{1}{2}$ and $\frac{20}{3} = 6\frac{2}{3}$

The integers between these two values are 3, 4, 5, and 6. So, there are 4 integers between $\frac{5}{2}$ and $\frac{20}{3}$.

---

72. (**G**) Angle LKN = 75° because vertical angles are congruent. The interior angles of quadrilateral KLPN sum to 360°. So, angle LPN = 360 – (120 + 120 + 75) = 45°. Angle LPN and angle QPR are vertical angles, so $x = 45$.

---

73. (**B**) All 6 of the smaller rectangles are congruent. Let the shorter side of one of these small rectangles be x. Based on the figure, the longer side is then $4x$, because the shorter side of four rectangles stacked together is the same length as the longer side of one rectangle. Using this information, you can now figure out the length and width of WXYZ:

Width of WXYZ = $4x$
Length of WXYZ = $x + 4x + x = 6x$

Use the area of WXYZ to calculate x:

$(4x)(6x) = 54$

$24x^2 = 54$

$x^2 = \frac{9}{4}$

$x = \frac{3}{2}$

Now that x is known, use that to find the length and width of WXYZ:

Width of WXYZ = $4(\frac{3}{2}) = 6$
Length of WXYZ = $6x = 6(\frac{3}{2}) = 9$

So, the perimeter of WXYZ = 2(6) + 2(9)
= 12 + 18 = 30 cm

---

74. (**K**) Since 714 is even, factor out a 2:
714 = 2 • 357. The sum of the digits of 357 is 15, so we know 357 is a multiple of 3:
714 = 2 • 3 • 119
Finally, 119 is divisible by 7, so
714 = 2 • 3 • 7 • 17

---

75. (**B**) Let x equal the number of gallons needed to drive m miles. Set up a proportion to solve for x:

$\frac{x}{m} = \frac{3}{65}$

$x = \frac{3m}{65}$

---

76. (**G**) Let c be Crystal's age:

$3c + 2 = m$

$3c = m - 2$

$c = \frac{m - 2}{3}$

---

77. (**D**) The line between $^{-}20$ and 30 is divided into 10 sections. Calculate the length of 1 section by finding the distance between $^{-}20$ and 30, and dividing by the number of sections:

$\frac{30 - (^{-}20)}{10} = 5$

So, the length of 1 section is 5 units and Point P is located at $^{-}5$. To find the value of PQ, subtract the value of P from the value of Q:

$30 - (^{-}5) = 35$

---

78. (**G**) To find when the two flashes occur at the same time, find the least common multiple of 12 and 18, which is 36. Every 36 minutes, the lights flash at the same time. The first time is 8:00 a.m. The next 6 times would be 8:36, 9:12, 9:48, 10:24, 11:00, and 11:36. Only 2 of those times are listed (9:12 a.m. and 10:24 a.m.).

---

79. (**D**) Of the fractions listed in the options $\left(\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \text{ and } \frac{1}{6}\right)$, $\frac{1}{3}$ and $\frac{1}{6}$ are the only fractions that can be written as repeating decimals. Adding a non-repeating decimal to a repeating decimal will result in a repeating decimal. Thus, the correct answer must contain two non-repeating decimals, which is option D: $\frac{1}{4} + \frac{1}{5}$

---

80. (**G**) Create a proportion to calculate the total number of gallons of paint used:

$$\frac{\text{Gallons of blue}}{\text{total gallons}} = \frac{8}{8+3} = \frac{6}{x}$$

$8x = 6(11)$

$x = 8\frac{1}{4}$ gallons

---

81. (**B**) First, find the number of liters that need to be added:

$\frac{2}{3} \bullet 4{,}320 = 2{,}880$ liters

Use the conversion 1 kiloliter = 1,000 liters to find the number of kiloliters:

$\frac{2{,}880}{1{,}000} = 2.88$ kL

---

82. (**G**) First, calculate the midpoints of $\overline{AB}$ and $\overline{BC}$ to find the locations of D and E, respectively:

$$D = \frac{^{-}8 + 3}{2} = -\frac{5}{2}$$

$$E = \frac{3 + 7}{2} = 5$$

Now, find the midpoint of $\overline{DE}$:

$$\frac{-\frac{5}{2} + 5}{2} = \frac{\frac{5}{2}}{2} = \frac{5}{4} = 1.25$$

---

83. (**A**) One gram is equal to 1,000 milligrams, or 1 milligram is equal to $\frac{1}{1{,}000}$ gram.

Thus, 75 milligrams $= \frac{75}{1{,}000} = 0.075$ gram.

---

84. (**J**) There were 11 marbles in the box. After 5 were removed, the total number of marbles in the box is now 6. The probability of drawing a green marble is now $\frac{1}{2}$, which is equivalent to $\frac{3}{6}$. Thus, 3 green marbles remain in the box. Originally, there were 4 green marbles in the box, so only 1 green marble was removed. Since a total of 5 marbles were removed from the box, that means 4 of those marbles were red.

---

85. (**B**) Let x be the number of gallons of water the tank holds when completely full. Use the information in the first sentence to set up the equation:

$\frac{4}{5}x = \frac{1}{3}x + 21$

$\frac{12}{15}x - \frac{5}{15}x = 21$

$7x = 15 \bullet 21$

$x = 45$ gallons

---

86. (**G**) In row B, a number appears twice—first under an odd number in row A, and then under the next even number in row A. So, the number 112 in row A would have a corresponding number 56 in row B. The numbers 111 and 112 in row A would both have 56 under them in row B.

---

87. (**B**) To find the mean salary for all 12 employees, find the sum for each group. Thus, 4 people earned a total of \$272,000 and 8 people earned a total of \$376,000. Use the mean formula:

$$272{,}000 + 376{,}000 = \frac{648{,}000}{12} = \$54{,}000$$

---

88. (**F**) To find the speed of the plane, divide the miles travelled by the number of hours:

First leg: 900 miles ÷ 2 hours = 450 mph

Second leg: 1,400 miles ÷ $2\frac{1}{2}$ hours = 560 mph

The question asks how much greater the speed was in the second leg than in the first, so subtract: 560 − 450 = 110 mph

---

89. (**B**) Because the volume of the tent is calculated using the area of the cross-section × depth (d), you can also use this formula to find d.

The area of the cross-section is the sum of the areas of the two triangles and the rectangle.

The two triangles have the same base length (2 ft) and height (6 ft), so the area of one of the triangles is:

$A = \frac{1}{2} \times 2 \times 6 = 6$ sq ft

The area of the center rectangle is:
$A = 4 \times 6 = 24$ sq ft

So the total area of the cross-section is:
$A = 6 + 6 + 24 = 36$ sq ft

Use that to calculate the depth of the tent:
$V = 36d$
$216 = 36d$
$6 = d$

---

90. (**J**) First, set up an equation to express Tom's age (T) and Jordan's age (J) today:

$T = \frac{1}{4} J$

Two years from now, Tom's age will be T + 2 and Jordan's age will be J + 2. Use that information and the information from the second sentence in the question to set up an equation about the relationship between Tom's age and Jordan's age in two years:

$T + 2 = \frac{1}{3}(J + 2)$

Simplify the above equation for T:

$T = \frac{1}{3}(J + 2) - 2$

Now, set the two equations equal to each other and solve for J:

$\frac{1}{4}J = \frac{1}{3}(J + 2) - 2$

$\frac{1}{4}J = \frac{1}{3}J - \frac{4}{3}$

Multiply both sides of the equation by the common denominator (12):

$12(\frac{1}{4}J) = 12(\frac{1}{3}J - \frac{4}{3})$

$3J = 4J - 16$

$J = 16$

91. (**A**) The question asks for the number of positive two-digit numbers evenly divisible by 4. The smallest such number is 12 (4 × 3), and the largest is 96 (4 × 24). Thus, the two-digit numbers evenly divisible by 4 are 4 × 3, 4 × 4, 4 × 5, and so on up to 4 × 24.

To find how many such numbers there are, subtract the lowest value from the greatest value: 24 – 3 = 21.

However, since each endpoint is included (4 × 3 and 4 × 24), add 1 to that value to get the exact count of the numbers: 21 + 1 = 22

---

92. (**J**) The volume of the container is 10 × 10 × 10 = 1,000 cubic feet. Since it is already half full at 9:00 a.m., it will begin to overflow after 500 cubic feet of water is added to it.

7 cubic feet of water are being added per minute, but 2 cubic feet of water leak out per minute. That means 7 – 2 = 5 cubic feet of water are being added to the tank each minute.

500 cubic feet ÷ 5 cubic feet per minute = 100 minutes

100 minutes is equal to 1 hour 40 minutes. 1 hour 40 minutes after 9:00 a.m. is 10:40 a.m.

---

93. (**A**) Each chair costs Arnold \$150 to make, and he sells the chair for \$275. His profit is found by subtracting the cost from the price:

\$275 − \$150 = \$125 per chair

If Arnold makes and sells 25 chairs in a week, his initial profit is 25 • \$125 = \$3,125. However, Arnold has additional fixed expenses of \$1,250 per week, so this cost must also be subtracted. Thus, his final profit is:

\$3,125 − \$1,250 = \$1,875

---

94. (**H**) The question asks for the number of different ways to create \$0.75 using at least one of each coin. One of each coin (one quarter, one dime, one nickel) is \$0.25 + \$0.10 + \$0.05 = \$0.40. Thus, the first \$0.40 of any solution is already determined. Subtract \$0.40 from \$0.75 (\$0.75 – \$0.40 = \$0.35), so the question becomes "how many different ways can you make \$0.35 using nickels, dimes, and quarters?" There are 6 ways to create \$0.35 using nickels, dimes and quarters:

7 nickels
5 nickels + 1 dime
3 nickels + 2 dimes
1 nickel + 3 dimes
1 quarter + 1 dime
1 quarter + 2 nickels

---

95. (**A**) $(2p + 8) - (5 + 3p) = 2p + 8 - 5 - 3p = 3 - p$

---

96. (**G**) The ratios of X:Y and Y:Z can be combined because Y has the same value in both ratios. So, X:Y:Z = 4:9:5. The proportion of X and Y in the mixture is $\frac{4+9}{4+9+5} = \frac{13}{18}$. Multiply the total weight of the mixture by the proportion to find the weight of the mixture after Z has been removed: $90 \times \frac{13}{18} = 65$ g

---

97. (**A**) If Maria is 16 now, in 6 years she will be 22. Since she will then (in 6 years) be twice as old as her brother, he will be 11 (in 6 years). To find his present age, subtract 6 from 11. Thus, he is now 5 years old.

---

98. (**F**) One revolution is equal to the circumference of the tire:

$C = 2r\pi = 2(1)(\frac{22}{7}) = \frac{44}{7}$ feet

The car travels at 4,400 feet per minute. To calculate the number of revolutions, divide the speed by the circumference:

$4{,}400 \div \frac{44}{7} = 4{,}400 \bullet \frac{7}{44} = 700$ revolutions

---

99. (**E**) First, multiply each term by 2 to eliminate the fraction:

$^{-}4(2) < (\frac{x}{2})(2) < 2(2)$

$^{-}8 < x < 4$

Therefore, x must be between $^{-}8$ and 4, which is Option E.

---

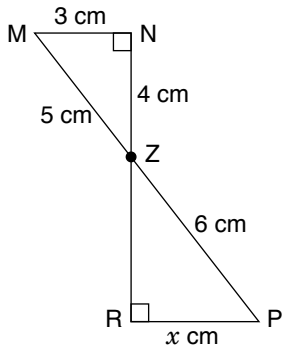
100. (**F**) First, find the prime factorization of 5,355:
5,355 = 5 • 1,071 = 5 • 9 • 119 =
3 • 3 • 5 • 7 • 17
The greatest prime factor is 17.

Answer Key for Sample Form B

Paragraph 1	11. C	20. J	29. D	38. H	47. E	56. K	65. C	74. K	83. A	92. J
S R T U Q	12. G	21. E	30. J	39. D	48. H	57. B	66. F	75. B	84. J	93. A
Paragraph 2	13. C	22. J	31. A	40. F	49. E	58. G	67. E	76. G	85. B	94. H
R Q T U S	14. K	23. B	32. G	41. E	50. F	59. A	68. J	77. D	86. G	95. A
Paragraph 3	15. A	24. F	33. E	42. G	51. E	60. H	69. C	78. G	87. B	96. G
S U R Q T	16. F	25. A	34. J	43. C	52. J	61. B	70. K	79. D	88. F	97. A
Paragraph 4	17. E	26. F	35. C	44. K	53. C	62. G	71. B	80. G	89. B	98. F
Q S R U T	18. K	27. D	36. H	45. D	54. F	63. B	72. G	81. B	90. J	99. E
Paragraph 5	19. C	28. K	37. E	46. G	55. D	64. J	73. B	82. G	91. A	100. F
S U T Q R										

DIRECTIONS: This section provides sample mathematics problems for the Grade 9 test forms. These problems are based on material included in the New York City curriculum for Grade 8. (The Grade 8 problems on sample forms A and B cover mathematics material through Grade 7.) General directions for how to answer math questions are located on pages 52 and 90. There is no sample answer sheet for this section; mark your answers directly on this page or on a separate piece of paper.

1.



In the figure above, all lines are straight. $\overline{MP}$ and $\overline{RN}$ intersect at point Z. What is the value of x?

A. 3

B. $3\frac{3}{5}$

C. 4

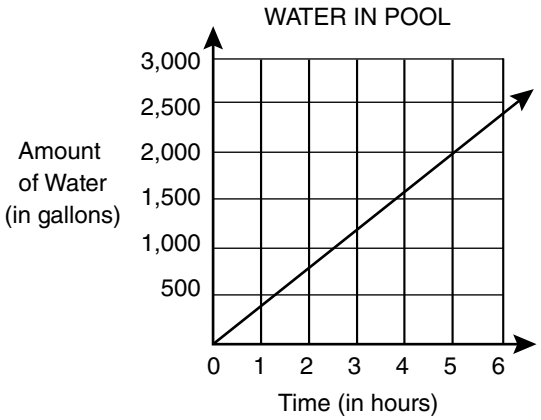
D. $4\frac{4}{5}$

E. 5

2. The translation of point P (3, 5) to P′ (5, ⁻3) is equivalent to rotating point P by which of the following clockwise rotations about the origin?

F. 45°
G. 90°
H. 135°
J. 180°
K. 225°

3. A



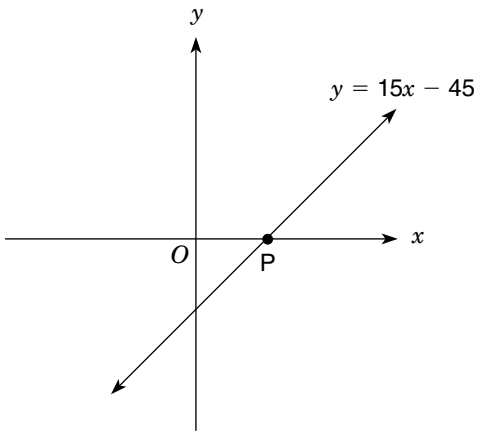
swimming pool is being filled with water at a constant rate. The figure above is a portion of a graph that shows how the number of gallons of water in the pool changes over time. Starting with an empty pool, at the end of hour 5 there are 2,000 gallons in the pool. If the pool continues to fill at this rate, how much water will be in the pool at the end of hour 20? (Assume that the pool holds a total of 100,000 gallons.)

A. 5,600 gal.
B. 6,000 gal.
C. 8,000 gal.
D. 40,000 gal.
E. 80,000 gal.

4. If $(4^3)(8^2) = 2^x$, what is the value of x?

F. 12
G. 10
H. 7
J. 6
K. 5

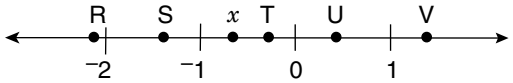
5.



The line defined by the equation $y = 15x - 45$ intercepts the x-axis at point P as shown above. What are the coordinates of point P?

A. (45, 0)
B. (3, 0)
C. ($^{-}$3, 0)
D. (0, $^{-}$3)
E. (0, $^{-}$45)

6.



On the number line above, which letter could represent the location of x^2 ?

F. R
G. S
H. T
J. U
K. V

7. If $(12.6 \times 10^{18}) - (1.1 \times 10^{17}) = k \times 10^{19}$, what is the value of k?

A. 0.016
B. 1.150
C. 1.249
D. 11.500
E. 16.000

8.

STUDENTS OWNING PETS

Number of Pets Owned	Number of Students
0	5
1	7
2	3
3	4
4	0
5	1

There are 20 students in a class. The frequency table above shows the number of these students that own 0, 1, 2, 3, 4, or 5 pets. What is the mean number of pets owned per student in this class?

F. $1\frac{1}{2}$

G. 3

H. $3\frac{1}{3}$

J. 4

K. 5

9. The temperature inside an oven when it is off is 60ºF. When Gail turns the oven on, it heats at a constant rate, reaching a temperature of 350ºF in 5 minutes. Which equation indicates the temperature (y) of the oven x minutes after it is turned on?

A. $y = 5x + 60$
B. $y = 60x + 350$
C. $y = 58x + 60$
D. $y = 70x + 60$
E. $y = 350x + 58$

10.

$$|x - 1| < 3$$
$$|x + 2| < 4$$

How many integer values of x satisfy both inequalities shown above?

F. 0
G. 1
H. 3
J. 4
K. 5

11. $\frac{p}{q},\ p+q,\ p-q,\ p^2+q^2,\ \frac{p^2}{q^2}$

If $p = q = \frac{1}{\sqrt{2}}$, which one of the expressions above does **not** represent a rational number?

A. $\frac{p}{q}$

B. $p + q$

C. $p - q$

D. $p^2 + q^2$

E. $\frac{p^2}{q^2}$

12. Let $(x, y) \rightarrow (x + 10, y - 10)$. Using that rule, if $(n, r) \rightarrow (100, 100)$, what is (n, r)?

F. (90, 90)
G. (90, 110)
H. (100, 100)
J. (110, 90)
K. (110, 110)

13. Seven consecutive integers are arranged in increasing order. Their sum is $7k$. What is the value of the second integer in terms of k?

A. $k - 6$
B. $k - 2$
C. k
D. $k + 1$
E. $7k - 6$

14. Define the operation ◘ as follows:

$a \text{ ◘ } \left(\frac{b}{c}\right) = \frac{a}{\left(\frac{b}{c}\right)}$, where b and c are not zero.

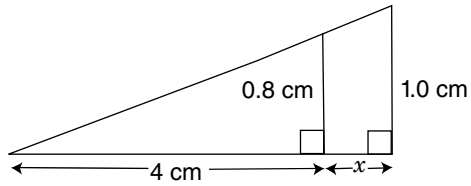
If $2 \text{ ◘ } \left(\frac{4}{x}\right) = \frac{3}{2}$, what is the value of x?

F. 1
G. 2
H. 3
J. 6
K. 12

15. Raul has two containers. One is a cylinder with an inner radius of 4 inches and an inner height of 8 inches. The other is a cube with inner height, width, and length each equal to 8 inches. The cylinder is filled with water and the cube is empty. If Raul pours the contents of the cylinder into the cube, how deep will the water be in the cube?

A. 2 in.
B. $\frac{2}{3}\pi$ in.
C. 4 in.
D. 2π in.
E. 4π in.

16.



In the figure above, what is the value of x?

F. 1 cm
G. 1.2 cm
H. 3.2 cm
J. 4 cm
K. 5 cm

17. Straight line k passes through the point $(-3, 4)$ with an x-intercept of 3. What is the equation of line k?

A. $y = -\frac{3}{2}x + 3$

B. $y = -\frac{2}{3}x - 3$

C. $y = -\frac{2}{3}x + 2$

D. $y = -\frac{1}{3}x + 3$

E. $y = \frac{2}{3}x - 2$

1. (**B**) Each triangle is a right triangle, and the angles formed at point Z are congruent because they are vertical angles. Thus, the two triangles are similar by definition. Set up the following proportion between similar sides to find x:

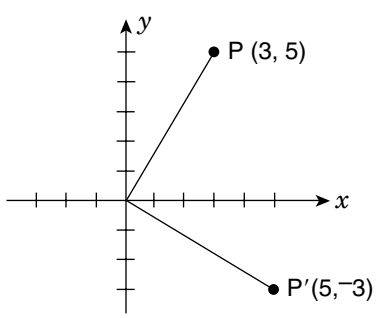
$$\frac{5}{3} = \frac{6}{x}$$
$$5x = 18$$
$$x = \frac{18}{5} = 3\frac{3}{5}$$

---

2. (**G**) If the coordinates of a point labeled R are (a, b), then a 90° counterclockwise rotation about the origin would make the coordinates of point R′ $(^{-}b, a)$. A 90° clockwise rotation about the origin would make the coordinates of R′ $(b, ^{-}a)$.

In the question, P is (3, 5) and P′ is (5, ⁻3). Using the rule stated above, P′ is the image after point P is rotated 90° clockwise.

Alternatively, it may help to make a sketch of this problem. Place the two points on the coordinate grid: Point P is in the first quadrant, and point P′ is in the fourth quadrant. Draw a line from each point to the origin. The angle formed at the origin should resemble a right angle, which is option G (90°).



---

3. (**C**) At the beginning (hour 0), the pool is empty. After 5 hours, the pool holds 2,000 gallons. Thus, the rate of change (or slope of the line) is $\frac{2{,}000 - 0}{5 - 0} = \frac{2{,}000}{5} = 400$ gallons per hour.

To find the number of gallons after 20 hours, multiply the rate by the number of hours: $400 \times 20 = 8{,}000$ gallons.

4. (**F**) Begin by finding a common base for each term. In this case, the common base is 2.

$$4 = 2^2$$
$$8 = 2^3$$
$$(4^3)(8^2) = (2^2)^3(2^3)^2$$
$$= (2^6)(2^6)$$
$$= 2^{12}$$
$$\text{So, } x = 12.$$

Alternatively, you could multiply the left side of the equation and then factor it:

$(4^3)(8^2) = (4 \times 4 \times 4)(8 \times 8)$

$= (2 \times 2 \times 2 \times 2 \times 2 \times 2)\,(2 \times 2 \times 2 \times 2 \times 2 \times 2)$

$= 2^{12}$

---

5. (**B**) Since P is on the x-axis, we know its y-value must equal 0. Use that in the equation to solve for x:

$$y = 15x - 45$$
$$0 = 15x - 45$$
$$45 = 15x$$
$$3 = x$$

So, the coordinates for P are (3, 0).

---

6. (**J**) Since x is a negative number between ⁻1 and 0, assign a value to x in that range and calculate x^2. For example, let $x = -\frac{2}{3}$. Then $x^2 = \frac{4}{9}$, which roughly corresponds to point U.

---

7. (**C**) In order to add or subtract two numbers in scientific notation, the exponent on the 10 must be the same. Since the question asks for the value of $k \times 10^{19}$, change both terms into this same power of 10:

$12.6 \times 10^{18} = (1.26 \times 10) \times 10^{18} = 1.26 \times 10^{19}$

$1.1 \times 10^{17} = (0.011 \times 10^2) \times 10^{17} = 0.011 \times 10^{19}$

Now, perform the subtraction:

$(1.26 \times 10^{19}) - (0.011 \times 10^{19})$
$= (1.26 - 0.011) \times 10^{19}$
$= 1.249 \times 10^{19}$

Thus, $k = 1.249$

8. (**F**) First, determine the total number of pets that the students own by multiplying the number of pets owned by the number of students in each row of the table. Then add that column to get the total number of pets.

Number of Pets Owned	Number of Students	Number of Pets × Number of Students
0	5	0
1	7	7
2	3	6
3	4	12
4	0	0
5	1	5

Total: 30

Now, calculate the mean by dividing the total number of pets owned by the total number of students:

$$\frac{30}{20} = 1\frac{1}{2}$$

---

9. (**C**) Since y is temperature and x is time, we can set up two points with the given information. The first point (0, 60) is when the oven is off. The second point (5, 350) indicates when the oven reaches the temperature of 350° which occurs after 5 minutes. Use these two points to find the slope (m) of the line:

$$m = \frac{350 - 60}{5 - 0} = \frac{290}{5} = 58$$

The first point (0, 60) indicates that the y-intercept (b) is 60.

Using slope-intercept form ($y = mx + b$), the equation is $y = 58x + 60$.

---

10. (**H**) First, determine which integer values of x would make each inequality true:

$|x - 1| < 3$ can also be written as

$^{-}3 < x - 1 < 3$

Add 1 to each term to simplify the inequality
$^{-}2 < x < 4$

Since these are only "less than" and not "less than or equal to," the possible values of x for this inequality are $^{-}1$, 0, 1, 2, and 3.

Similarly, $|x + 2| < 4$ can also be written as
$^{-}4 < x + 2 < 4$

Subtract 2 from each term to simplify the inequality
$^{-}2 < x < 2$

The possible values of x in this inequality are $^{-}1$, 0, and 1.

The possible x values in common between the two inequalities are $^{-}1$, 0, and 1, so the answer is 3.

---

11. (**B**) A rational number is a number that can be written as a fraction. Since $p = q$, then $\frac{p}{q} = 1$, $\frac{p^2}{q^2} = 1$, and $p - q = 0$, all of which are rational. That leaves two expressions to test:

$$p + q = \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} = \frac{2}{\sqrt{2}}$$

(irrational because $\sqrt{2}$ is irrational)

$$p^2 + q^2 = \left(\frac{1}{\sqrt{2}}\right)^2 + \left(\frac{1}{\sqrt{2}}\right)^2 = \frac{1}{2} + \frac{1}{2} = 1 \text{ (rational)}$$

Thus, $p + q$ is not a rational expression.

---

12. (**G**) Using the translation equation given in the question, set up two small equations to find n and r:

For n:
$x + 10 = 100$
$x = 90$

For r:
$y - 10 = 100$
$y = 110$

So, $(n, r) = (90, 110)$

---

13. (**B**) The question asks for the second integer, so let n be the second integer. Then, the sum of the 7 integers is:

$(n - 1) + n + (n + 1) + (n + 2) + (n + 3) + (n + 4) + (n + 5) = 7k$

$7n + 14 = 7k$

$7(n + 2) = 7k$

$n + 2 = k$

$n = k - 2$

---

14. (**H**) Since $a \blacksquare \frac{b}{c} = \frac{a}{\left(\frac{b}{c}\right)}$ then $2 \blacksquare \frac{4}{x} = \frac{2}{\left(\frac{4}{x}\right)}$

$\frac{2}{\left(\frac{4}{x}\right)} = \frac{3}{2}$

$4 = 3\left(\frac{4}{x}\right)$

$4 = \frac{12}{x}$

$4x = 12$

$x = 3$

---

15. (**D**) First, calculate the volume of the cylinder:

$V = \pi r^2 h = \pi(4)^2(8) = 128\pi$ cubic inches

The volume of water in the cube will be the same as the volume of water in the full cylinder. Use the volume formula of a cube to calculate the depth (h) of the water in the cube:

$V = lwh$

$128\pi = (8)(8)h$

$128\pi = 64h$

$2\pi = h$

---

16. (**F**) Because both triangles are right triangles that share a vertex, they are similar. To find x, set up a proportion using the two known sides of each triangle:

$$\frac{(4 + x)}{1.0} = \frac{4}{0.8}$$

$$0.8\,(4 + x) = 4$$

$$4 + x = 5$$

$$x = 1$$

---

17. (**C**) An x-intercept of 3 means the point (3, 0) is on line k. Using (3, 0) and ($^-3$, 4), calculate the slope (m) of the line:

$m = \frac{(4-0)}{(^-3-3)} = \frac{4}{^-6} = -\frac{2}{3}$

The equation of line k must contain slope $-\frac{2}{3}$, so only Options B and C are potentially correct.

Next, find which of the two equations is true for the point (3, 0). To solve, substitute 3 for x in each equation and find the one in which $y = 0$.

Option B: $y = -\frac{2}{3}(3) - 3 = {}^-2 - 3 = {}^-5$

Option C: $y = -\frac{2}{3}(3) + 2 = {}^-2 + 2 = 0$

Option C is the correct answer.

Answer Key for Grade 9 Mathematics

1. B	7. C	13. B
2. G	8. F	14. H
3. C	9. C	15. D
4. F	10. H	16. F
5. B	11. B	17. C
6. J	12. G	

NYC Department of Education

Carmen Fariña, Chancellor