

2012-13 NAEP Training

High School Mathematics Sample Items

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Part 1:
Prior Year Regents Items

Regents Integrated Algebra Items for Comparison



Regents IA.1.11.34 (CCSSM F-BF.1A)

A line having a slope of $\frac{3}{4}$ passes through the point $(-8,4)$.
Write the equation of this line in slope-intercept form.

Regents IA.1.11.34 (CCSSM F-BF.1A)

Which equation represents a line parallel to the y -axis?

- | | |
|-------------|--------------|
| (1) $y = x$ | (3) $x = -y$ |
| (2) $y = 3$ | (4) $x = -4$ |
-

Regents IA.6.11.12 (CCSSM F-BF.3)

Melissa graphed the equation $y = x^2$ and Dave graphed the equation $y = -3x^2$ on the same coordinate grid. What is the relationship between the graphs that Melissa and Dave drew?

- (1) Dave's graph is wider and opens in the opposite direction from Melissa's graph.
 - (2) Dave's graph is narrower and opens in the opposite direction from Melissa's graph.
 - (3) Dave's graph is wider and is three units below Melissa's graph.
 - (4) Dave's graph is narrower and is three units to the left of Melissa's graph.
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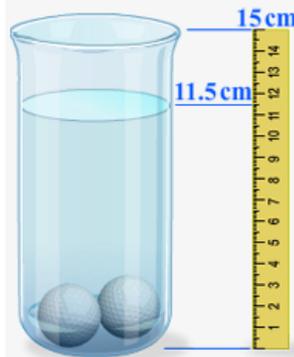
Part 2:
PARCC Type III Task Prototype

High School - Golf Balls in Water [Type III Task with 3 parts - Modeling and Application]

- F-BF.1 Write a function that describes a relationship between two quantities.
- F-LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of the relationship, or two input-output pairs (include reading these from a table).
- F-LE.5 Interpret the parameters in a linear or exponential function in terms of a context.

PART A

Tom is doing an experiment adding golf balls to a glass jar containing water. The picture and the table show what happens to the height of the water as Tom adds golf balls.



Number of golf balls, x	Height of water in centimeters, y
0	9.0
1	10.2
2	11.5
3	12.7
4	13.8

Drag tiles to complete the sentences and the equation below based on the results of Tom's experiment.

golf balls	change	glass jars	water height	1.16
1.2	1.3	9.0	12.0	13.8

The height of the water changes at an average rate of about centimeters per golf ball. If these data were graphed with the number of golf balls as the independent variable, the y -intercept for the graph would be about centimeters. This means that for zero , the is 9 centimeters. Tom's table and graph can be represented by the trend line with the equation $y =$ $x +$.

PART B

There are several ways that Tom could modify the conditions of his experiment.

What modifications would increase the rate of change in the height of the water level with respect to the number of golf balls? Select all that apply.

- Use larger golf balls
- Add 5 cm of water to the glass jar
- Decrease the diameter of the glass jar
- Drop the golf balls into the glass jar two at a time
- Drop the golf balls into the glass jar at a faster rate

Submit Answer

PART C

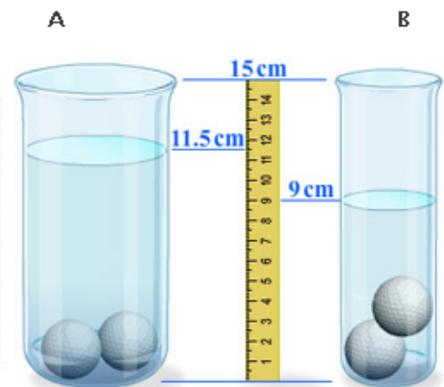


Write your answers to the following problem in your answer booklet.

Tom repeats his experiment with a different glass jar. The new glass jar, B, has a smaller radius than the original glass jar, A.

Data from Experiment with Glass Jar A

Number of golf balls, x	Height of water in centimeters, y
0	9.0
1	10.2
2	11.5
3	12.7
4	13.8



Tom forgot to write down the initial height of the water in glass jar B, but he measured the water height at 9 centimeters after adding two golf balls.

Question a: When Tom creates graphs of the data from both experiments, how will the y -intercepts of the graphs be different for glass jar A versus glass jar B? Explain how you know.

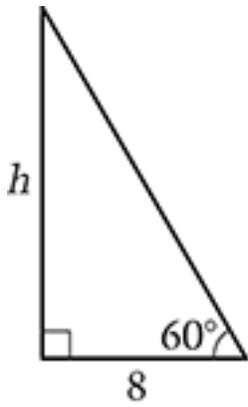
Question b: How will the rate of change in the experiment using glass jar B be different than the rate of change in the experiment using glass jar A? Explain how you know.

Question c: Suppose glass jar B has a water height of 5 centimeters with no golf balls, and the water height increases at a rate of 2 centimeters per golf ball added. Tom continues to add golf balls to each glass jar. He discovers that there is a number of golf balls at which the height of the water in each glass jar is the same. How many golf balls will be in each jar when the water in each reaches the same height?

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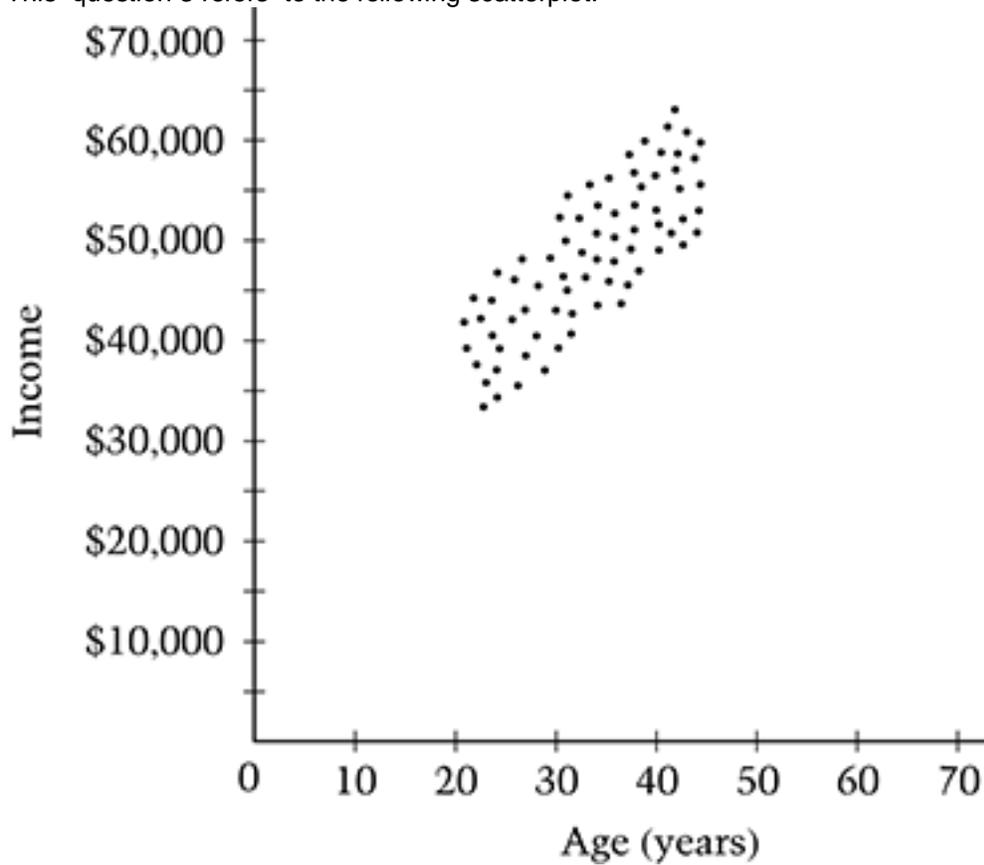
Part 3: NAEP Sample Questions



1. What is the value of h in the figure above?

- A. $4\sqrt{3}$
- B. $8\sqrt{2}$
- C. $8\sqrt{3}$
- D. $12\sqrt{2}$
- E. $12\sqrt{3}$

This question 3 refers to the following scatterplot.

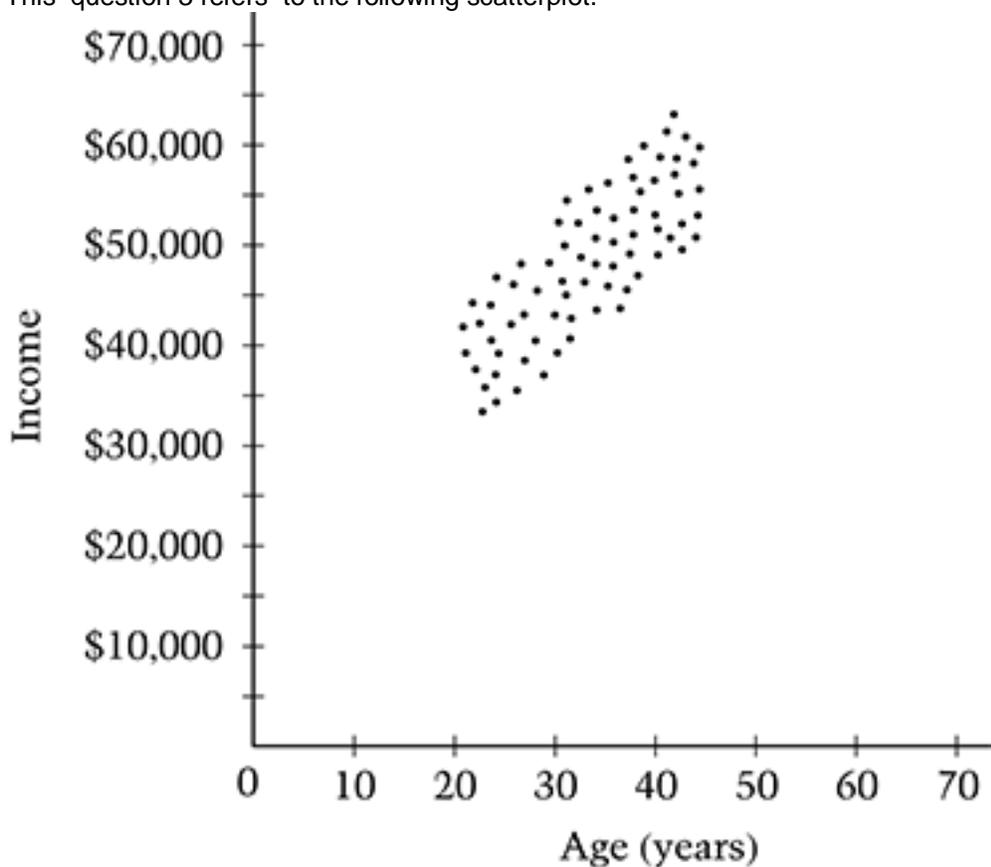


A random sample of graduates from a particular college program reported their ages and incomes in response to a survey. Each point on the scatterplot above represents the age and income of a different graduate.

2. Of the following equations, which best fits the data above?

- A. $y = -1,000x + 15,000$
- B. $y = 1,000x$
- C. $y = 1,000x + 15,000$
- D. $y = 10,000x$
- E. $y = 10,000x + 15,000$

This question 3 refers to the following scatterplot.



A random sample of graduates from a particular college program reported their ages and incomes in response to a survey. Each point on the scatterplot above represents the age and income of a different graduate.

3. Based on the data in the scatterplot, predictions can be made about the income of a 35 year old and the income of a 55 year old. For which age is the prediction more likely to be accurate?

35 year old

55 year old

Justify your answer.

x	y
-2	3
-1	0
0	-1
1	0
2	3
3	8

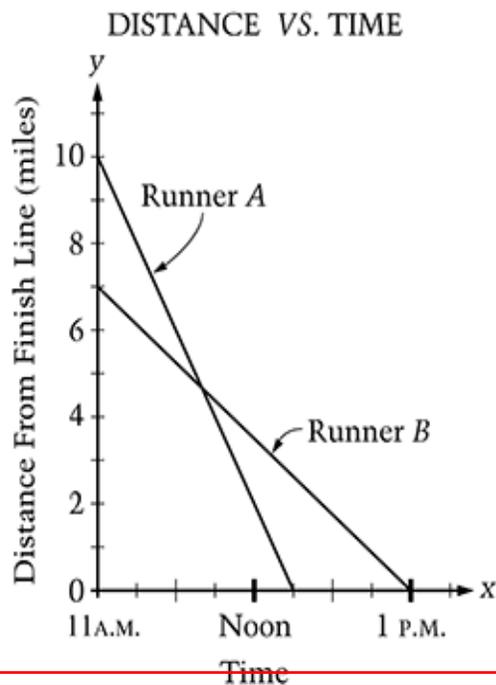
4. The table above shows all the ordered pairs (x, y) that define a relation between the variables x and y . Is y a function of x ?

Yes

No

Give a reason for your answer.

5. The principal of a high school would like to determine why there has been a large decline during the year in the number of students who buy food in the school's cafeteria. To do this, 25 students from the school will be surveyed. Which method would be the most appropriate for selecting the 25 students to participate in the survey?
- Randomly select 25 students from the senior class.
 - Randomly select 25 students from those taking physics.
 - Randomly select 25 students from a list of all students at the school.
 - Randomly select 25 students from a list of students who eat in the cafeteria.
 - Give the survey to the first 25 students to arrive at school in the morning.



6. The graph above shows distance versus time for a race between runners A and B. The race is already in progress, and the graph shows only the portion of the race that occurred after 11 A.M. The table on the next page lists several characteristics of the graph. Interpret these characteristics in terms of what happened during this portion of the race. Include times and distances to support your interpretation. (A sample interpretation of the y-intercepts is given in the table.)

Characteristic of Graph	Interpretation in Terms of the Race
y-intercepts	At 11 A.M. Runner A is 10 miles from the finish line and Runner B is 7 miles from the finish line.
Slopes	
Point of intersection	
x-intercepts	

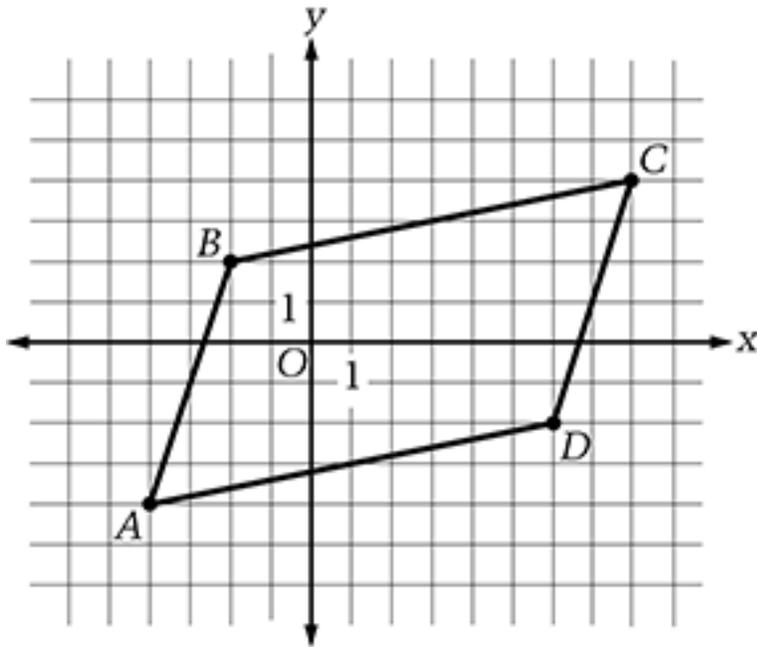
7. Carlene told Kyle that a rectangular room measured 16 feet by 12 feet, to the nearest foot. This means that the length could measure between 15.5 feet and 16.5 feet and the width could measure between 11.5 feet and 12.5 feet. Kyle performed the following calculations.

Dimensions (feet)	Area (square feet)
15 by 11	165
15.5 by 11.5	178.25
16 by 12	192
16.5 by 12.5	206.25
17 by 13	221

Of the following intervals, which is the smallest interval that contains all possible values of the area of the room?

- A. Between 191.5 and 192.5 square feet
- B. Between 191 and 193 square feet
- C. Between 179 and 206 square feet
- D. Between 178 and 207 square feet
- E. Between 165 and 221 square feet

8. Which of the following expressions is equal to $\frac{1}{x+2} - \frac{2}{x+1}$?
- A. $\frac{-1}{2x+3-x-3}$
 - B. $\frac{x^2+2}{-1}$
 - C. $\frac{x^2+3x+2}{-x-3}$
 - D. $\frac{x^2+3x+2}{-x+5}$
 - E. x^2+3x+2



9. In the figure above, the vertices of ABCD are $A(-4, -4)$, $B(-2, 2)$, $C(8, 4)$, and $D(6, -2)$.
Give a mathematical justification that ABCD is a parallelogram.

Amplitude: 2

$$\frac{2\pi}{3}$$

Period: 3

10. Which of the following trigonometric functions has the properties given above?

- A. $y = \frac{2}{3} \cos(2x)$
- B. $y = \frac{2}{3} \cos(3x)$
- C. $y = \frac{3}{2} \cos(2x)$
- D. $y = 2 \cos\left(\frac{2}{3}x\right)$
- E. $y = 2 \cos(3x)$

11. What is the solution to the system of equations $\begin{cases} 3x - 2y = -7 \\ x + y = 11 \end{cases}$?

Answer: $x =$ _____ $y =$ _____