The Light Bulb Lesson
The Explore Phase of the Lesson
New York City Schools
Video Transcript

GROUP 1

S: Want to find the work and to multiply to get that number.

T: All right.

S: So to find it divided 96 by 24,000 and I got 250

T: Okay, 250, so what does that 250 tell me?

S: That out of 6,000 light bulbs 250 are defective light bulbs.

T: Right but, now we want to look at Pedro's because Pedro didn't do it that way, right? He's trying to figure out – here's a box of 96, okay? For this box of 96 is how many are defective?

S: Four.

T: Four. Okay what if I have another box, how many would be in the next box?

S: Eight

T: How many?

S: Eight

T: How'd you know that? So eight what. Eight defective! How'd you know that? So eight, what – what's the eight need? 8 defective. Let me write that down. Come on everyone write. 8 defective. I'm gonna come back. Can you keep this going? 8 defective but how many light bulbs?

S: 96?

T: Well, there's 96 in this one but now she's saying there's 8 defective balls. That's why I want you to – yeah, how'd you know that? Tell each other how you know that and I'll be back.

GROUP 2

T: Okay so what are you doing?

S: We all have the same answer and then we just saying how we got it. We figured out, we all did it the same way.

T: You did! Oh! Can you tell me how you did it? So if you did your work together, I can call on any one in this group, right?

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S: Yeah.

S: All right, hum Christopher, how did you go about thinking about this?

S: I divided 6,000 divided by 96 would give me 62.5.

S: Why did he divide by 6,000 by 96? What are you finding out if you take the 6,000, all those bulbs and pulling out 96's?

S: Because then you find out how many are in the box.

T: Okay so every time I pull out 96, what's the 62 and 5/10 tell me?

S: How many are defective.

S: The percentage of how many were defective.

T: Okay you look like you disagree.

S: Yeah

T: Okay I'll be back because I'm curious, too. I'm not quite sure, okay? So figure out what that 62 and 5/10 tells me.

GROUP 3

T: Actually I see some interesting work here, so I'm gonna challenge you to ask Kate some more about her thinking. What you did here is incredible. She took the 6,000 and why don't you tell them and I'm gonna come back. Why did you divide 6,000 by 96? What are you finding out when you're doing that, all right? And I'll come back and see if you understand Kate's thinking.

GROUP 4

T: What's your thinking? Okay let's put it in the middle, what's your thinking?

S: Well, I used the example, so I divided 4 outta 96 and it gave me 24 and I used the answer to divide it outta 6,000 and it gave me ____.

T: Wooo—ooo! That is so cool! Do you understand what she's finding out? Did you explain it to them?!

S: Yeah, he kinda disagrees with me.

T: He disagrees, all right, well, I can only understand it if I talk light bulbs, too, all right? So here's the 96th light bulb and here's my box and she divided that 96 by 4. What's that tell me, what's that 24 tell me?

S: That's how much there is.

S: That's

S: That's how much there is. That are not defective.

S: That are defective.

T: All right, wait, I'm confused.

S: It is four that are defective.

T: Right, so what's the 24 tell me? So I break 96 bulbs in the 24s.

S: Oh, outta 24 there's only 1.

T: I mean if I break 96 and I'm breaking into 4 groups, right?

S: Yeah, each group has 24 and 1 of them is defective in this group.

T: Is that right? Draw a picture to show us that. Okay, so if I reach in at 24, how would I write that as a fraction?

GROUP 1

T: Then tell me about this, Jennifer.

S: So there's two boxes now, that's 96 and 96 is 192, so the number of defective light bulbs goes up so I think it's eight.

T: Ohhh! Sherry, tell me this one! You might get that sticker yet, five of them. What's happening here, then with these boxes? I'll be back and I'm gonna ask you about this one and Pedro got this one, but you're on your way.

GROUP 3

T: Well if I pull these out, is that the defective, the 60?

S: No, it's the ones that are actually worked.

T: Okay, so I'm pulling out all the ones that work, groups of 96, right? And here they are. They're all laying at – 96 and another group of 96. How many of these would I need, like?

S: Need to get to 6000.

T: Well this is a group of 96. How many groups of 96 am I going to make?

S: 62.

T: 62 of them! 62 of these groups and --?

S: A half.

T: And a half a box. Ooo, they knew that was a half a box.

GROUP 5

T: Okay I told you I would be back, okay, so are you done?

S: Yeah, this one.

T: All right, okay.

S: I did um…

S: We did cross…we multiplied.4/96 bulbs by 4 and got ____

S: Times 5

S: and then 20/480. We divided 6000 by 96 and I think it's the [crosstalk] – and so [crosstalk] –

T: Okay so it kind of works doesn't it. But why does it work? So what mathematicians want to figure out is what allows you to make this equal to this (Points to 4/96 = 250/6000.) What allows you to put that equals sign in there to say, "4/96 is equal to," what's this question mark going to be (points to ?/6000) that I'm going to be?

S: 250, It's going to be [crosstalk] –

T: 250, so 4/96 is 250/6,000, all right? [Crosstalk] Why do I want you to put those equal to each other?

S: Well, which one [crosstalk] 4 times 8 is 32, so I have 32 different things…

S: 2 times 8 is [crosstalk] –

T: Okay so but what's making those proportions? That's what I don't get. They're equal! What does it mean to be proportioned?

GROUP 2

T: That's right, I remember, wait a minute, you were figuring out. [Crosstalk]

S: I knew what it was but I knew you were gonna say that you have to divide 6,000 by 96, which equals 62.5 to figure out how many 96 there are [crosstalk] –

T: Oh, okay, so it's pulling out how many – go ahead.

S: I was thinking that we divide 6,000 by 96 light bulbs because 96 light bulbs is like a box and any boxes with 96 light bulbs in total and all of those light bulbs is 4 bulbs that don't work right.

T: Yes.

S: So then you multiply 62.5, which is all the light bulbs and then you times it by 4, which is a defective light bulbs, the ones that don't work and then you get 250 light bulbs from the 6,000 that don't work.

T: So I'm still not understanding what the 62 and 5/10 is.

S: They are among all the 96 – like 97 light bulbs in the number of boxes.

T: Yeah, the number of boxes you pulled out! So what's this .5 you keep saying or what's another way of saying, ".5?"

S: Half.

T: Half, yeah!

S: So half-a-box.

T: Half-a-box, right! How many in that half-a-box?

S: Half of 96.

S: 96 in each one?

T: Yes, there is in each one.

S: So 96 divided by 4.

S: 48.

T: Yeah, I think that's a, did you – why don't you ask her? What's that mean?

S: How did you get that so quickly?

S: What's half of 96? Uh-huh. [Crosstalk] what's that do to the defective box?

S: The defective [crosstalk] –

T: The defective, I'm sorry, the defective.

S: Well, they go back ____.

T: Yes, well they can't do that, so what's the number of defective then?

S: It’s gonna be half of 62.5.

T: She says she made a claim, ask her about it.

S: What is it, 48, right?

T: And see if you can write that and tell me as a number fraction, okay?

S: If you multiply by 4, it would already be 250.

S: What are you thinking, Michael?

S: If you just multiply it by 2.

S: So just multiply it by 2.

S: It is 250, though.

S: But she says that the .5 is going to be half and half of 96 is 48.

S: Yeah but didn’t we already add the half?

S: No, we divide the half.

S: The half?

S: What are you talking about? We already – I didn’t – the .5. [Crosstalk] –

S: Remember, we said half the box, she said, “Oh, right.”

S: Yeah, but we’ve already added half the box [crosstalk]

S: No we didn’t.

S: Yeah but then she said, “Divide by 96” and then we divided it by 2 and we have 48.

S: We didn’t add half the box.

S: Yes we did by putting it in front.

S: You didn’t divide half the box.

S: …125. Don’t you add the 48?

S: If you add the 48 back and 96 it still ends up 250.

S: Yes, we did! [Crosstalk] –

S: Okay, we’re good.

GROUP 1

T: So what could I do to get down there?

S: Multiply 4 times 8, which equals 32.

T: Oh, wait a minute! He said the 4 times 8 equals 32, and, Sherry, did ya see that? He did these 4 defective bulbs times 8. Can he do that?

S: 46 times 8 equals 760 of light bulbs. 46 and 7, and 96 times 8 equals [crosstalk]

T: Oh, then you went over here and you said, “I have to do the same thing over here.” My question for you – yes, times 8 – why do you have to do the same thing over here?

S: Because I keep going – because the number of – I think the total number of light bulbs goes up.

T: The total number of light bulbs goes up? Yes, it does it does but my question was why the defective, too? All right. [Crosstalk] But why? That’s my question, so here’s what I want you to do. Get this – this table’s great! That’s a sticker. Wow! I want you to get this table on this chart. I want ya to come back, okay? Told you I’d come back. It’s .5, ah-ha! And what’s that mean? And you get the light bulbs. What’s that telling me with the light bulbs?

S: That you’ve got [crosstalk] –

T: Oh, those are the defective, no? [Crosstalk] – So you’re absolutely right, it is 62 but if I take out 96, I keep taking them out and I get to 62 and 5/10, what does that mean with the light bulbs? Yep, they’re pulling out groups of 96, so what does the 62 mean? Keep pulling them out. What does the 62 mean?

S: There will only be 62 light bulbs that actually work?

T: I dunno, what do you think? You look like you disagree? Go ahead.

S: You said you can take it out?

T: Yep, 6,000 and you keep taking groups of 96 out and you get 62 and 5/10. What’s that mean, with the light bulbs? That’s 62. All right, so if I pull these out, is that the defective, the 60?

S: You’re pulling out the ones that actually work?

T: Okay so I’m pulling out all the ones that were groups of 96, right, and here they are, they’re all laying the group of 96 and another group of 96. How many of these would I need to make?

S: You need to make ‘em 6,000.

T: Well, this is a group of 96. How many groups of 96 am I going to make?

S: 62.

T: 62 of them! 62 of these groups and --?

S: Half.

T: And half-a-box, ooo, they knew that was the half-a-box, so, now, how many are defective there?

S: Uhm, uhm.

T: That's what I want you to tell me. You don't know that, yet. How many are defective?

GROUP 5

T: Okay, all right, so did you make a table? You started to make a table. Where's is it at? Oh, look at this! Oh my goodness, he started a table – 4 is to 96. Go ahead, finish this table – 8 all the way down? Did you keep going? No, what would it take for me to go – I wanted to get far down. What could I do to get way down here with the amount, what would you do? Hmm? Look he wants to – that's 96 and 4 of them are defective but I have to give the whole way to 6,000, so what could I do to get there much faster?

S: Keep adding 96.

T: Keep adding 96, that would take me forever and my friend is saying, "Hurry up, time to go, almost," so what could I do to get down there faster?

S: Multiply?

T: Multiply! What do you want to multiply by? By what?

S: – 96?

T: 96 you wanna --?

S: 96 multiplied by 2.

T: Two, twice? Okay, times 2. What's 96 times 2?

S: 192.

T: 192! So that got me down here, so what do you think I have to do to get closer? 96 is almost 100. 96 times what?

S: Times 2.

T: Times 2? I did that, it gave me 192. What would I have to do? Could you try 10? What if I did 96 times 10, what would happen? Okay, oops. Okay, see how close you're getting because that's almost 100. 96 times 10?

S: 960

T: Ohh! 960! Then how many defective?

S: 900.

T: Uh-oh, how would you do the defective ones?