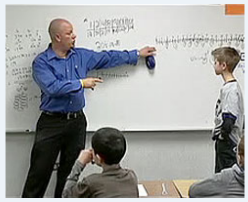
DOINGWHATWORKS

VIDEO
6:41 min

Full Details and Transcript



Solving a Real-World Fraction Division Problem

Eliza Hart Spalding School of Math and Technology, Idaho
January 2011

Topic DEVELOPING EFFECTIVE FRACTIONS INSTRUCTION FOR K-8

Practice OPERATIONS WITH FRACTIONS

Highlights

» Fifth-grade teacher Brett Mosely provides his students with the problem of dividing 20 1/2 by 1 3/4 and sets it in a Spiderman context that invests them in finding the solution.

» He provides them with a variety of tools to use, including measuring tapes, yardsticks, Cuisenaire rods, and other manipulatives.

» He emphasizes careful choice of numbers in the problem to make the challenge doable but difficult.

» Three students show on the board how they solved the problem. Solutions involve repeated addition on a double-scaled number line, repeated multiplication, and using partial quotients.

» Mr. Mosely discusses the importance of solving problems in different ways and having students talk through their approaches with peers.

About the Site

Eliza Hart Spalding School of Math and Technology
Boise, Idaho

Demographics

- 85% White
- 8% Native American
- 6% Black
- 5% Hispanic
- 3% Asian
- 2% Other
- 18% Free or Reduced-Price Lunch
- 1% English Language Learners
- 6% Special Education

At Eliza Hart Spalding School of Math and Technology, a math and technology magnet, the focus is on developing students' mathematical thinking. Features of the program include the following:

- A learning environment that supports using a variety of strategies in mathematical problem solving, reasoning and proof, and connections;
- Use of models, manipulatives, and visual representations to support fractions instruction; and
- Emphasis on mathematical discourse and communication to explain reasoning.

Full Transcript

00:05 My name is Brett Mosely. I am a fifth-grade teacher at Eliza Hart Spalding School of Math and Technology in Boise, Idaho, in Meridian School District.

The lesson today started off with a contextual problem of asking the kids to divide 20 1/2 by 1 3/4 of an inch. The importance of a context problem to me is huge. Numbers are numbers to kids, but when you put them in the meaning they see them a little bit different. And being able to understand what you are asking is huge for kids. Putting them in context for kids makes them vested in what they are looking at.

Student 00:46 Shane and I were playing in the garage, and he wanted to be just like Spiderman, big shot. He asked if we can make him a web shooter out of the rope that he found. To make each web shot, it takes one and three-quarters of an inch of rope and if he found 20 and a half inches of rope, how many web shots can we make for my Spiderman? What is the mathematical sentence? Then solve.

Mosely B says once you figure your answer for A, how much rope is left over? C says how much more rope is needed to make another web shot? And D, which I think might be the most challenging, is what would your mathematical model look like for the way you solve the problem.

Mosely 01:33 We had measuring tapes, yards sticks, or meter sticks. We had yarn that was precut at 20 and a half inches. They also had Cuisenaire rods, and whatever manipulatives they wanted to use. I would recommend that you work out your problem before you give it to the students because the numbers are huge. I wanted to make numbers that were easy to work with but were also problematic, so they had to find the equivalent fractions of halves and fourths to be able to solve this problem. So making it problematic, but doable, as well as working out the problem to see what kind of answers you could get from students, so you are prepared as an educator to be able to answer the questions and know where to go.

Student 02:14 I drew up big long number line from zero to 20 and a half. First, I went up to the first one and three-fourths and that would be one. Then second, two. I just kept doing that continually until I got to 20. Right there I could do another one, so that leaves me with a half. So my answer was 11 remainder one, remainder one-half, but since a half wouldn't count as a shot, it was 11 shots.

Mosely — **02:53** So that top row here represents the total length of string. What does the bottom represent in his case? What does your bottom numbers represent, the one, the two, the three, the four, the five, all the way to 11? What does it represent?

Student — The shots.

Mosely — The number of shots.

Student — **03:15** I got one and three-fourths equals one of the...and if you times that by two, it will equal three and a half. And I did the same thing with my three. I did 3 x 2 = 6 and then 1/2 x 2 = 1, 6 + 1 = 7. And then I did 7 x 2 = 14, and I couldn't times 14 again, because that would equal 16, and then that would equal 28, so I couldn't do 16, so I did 19. So I did, so I added 1 3/4 to 14 to equal 15 3/4, and I added 1 3/4 to 15 to get 17 1/4, and then did the same thing with that and got 19.

Mosely — **04:17** Mosley: What does that represent?

Student — Rope shots.

Mosely — Okay, web shots. So one web shot gives you that. So what does this represent?

Student — How much, the length of the rope.

Mosely — Thank you.

Student — **04:27** I multiplied 1 3/4 x 6 and that got me 10 1/2, so 10 1/2 – 20 1/2 would equal 10. So I was thinking that I could do six one more time, but I couldn't because it's a half over, so I went down to five, and I multiplied 1 3/4 x 5 and that got me 8 3/4. And then 10 – 8 3/4 would be 1 1/4. So 6 + 5 = 11, and 1 1/4 is the remainder.

Mosely **05:17** I want you to show me—your six on your partial quotients is ten and a half. Where is that represented in Kyle's?

Student Yeah, two-fourths is the same as one-half, two-fourths.

Mosely So what are they?

Student Fourths.

Mosely Okay. So they are dealing with fourths.

Student Yeah, but I just put a half because it's the same thing.

Mosely **05:44** We go up to the board often with usually several different strategies up there, so the kids gets comfortable with seeing different strategies and solving it different ways. A lot of times I will ask for multiple ways of solving it, so it gets them different ways of thinking. So they can check their answer. They are always asked a couple of questions like "Will it work all the time?" because some tricks work every once in a while, but they won't work all the time. And that's where multiple strategies come in because a kid could get a wrong answer one place and get another answer, but the ability to see different strategies and talk through those strategies with their peers is huge because I think kids, when they talk about their strategies with other classmates, [it] defines their own understanding as well as helps others. So those multiple strategies are huge in math.