

Lesson 13

► Division of Decimal Numbers

Problem Solving:
► The Line of Best Fit



► Division of Decimal Numbers

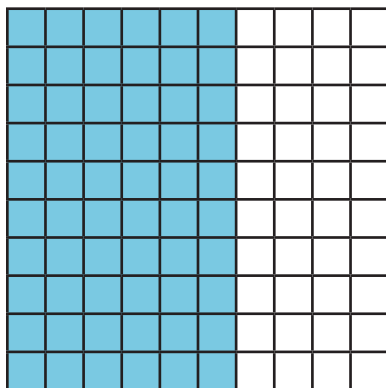
How do we divide decimal numbers?

When we talked about the division of fractions, we discussed that the quotient was often larger than the other two numbers in the problem. The same is true with the division of decimal numbers.

We use the same 100-square grid model that we used with multiplication to help understand the division of decimal numbers. Look at the problem:

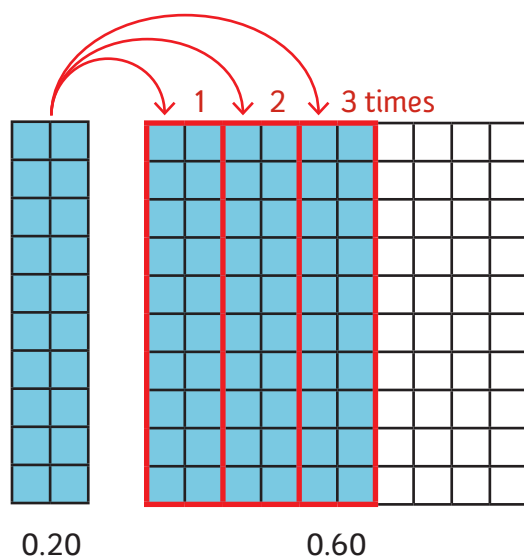
$$0.6 \div 0.2$$

Because we use a 100-square grid, we convert 0.6 and 0.2 to their hundredths equivalents, 0.60 and 0.20. First, we shade the portion of the grid equivalent to 0.60.



The decimal number 0.60 is shaded in color.

Then we show what 0.20 would look like. It divides, or breaks up, the number 0.60. The illustration shows that it breaks up 0.60 exactly three times.



The decimal number 0.20 divides, or breaks up, 0.60 three times.

$$0.60 \div 0.20 = 3$$

Let's look at another example.

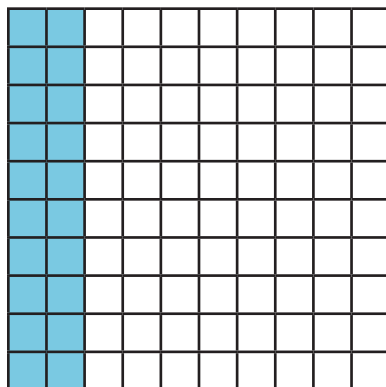


Example 1

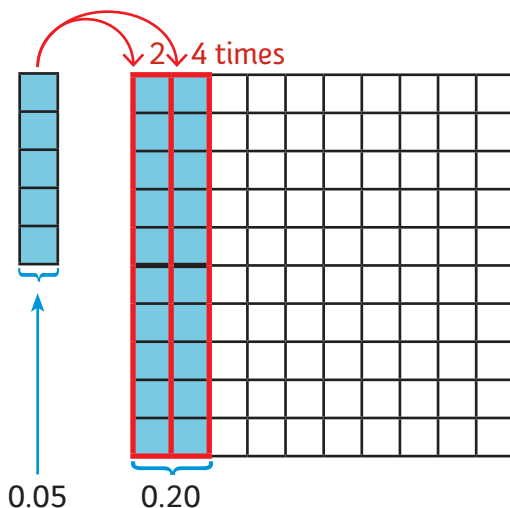
Divide 0.05 into 0.20 using a 100-square grid.

We think of 0.05 as 5 out of 100 and 0.20 as 20 out of 100.

This grid shows 0.20.



The decimal number 0.20 is shaded in color.



The decimal number 0.05 divides, or breaks up, 0.20 four times.

$$0.20 \div 0.05 = 4$$

When we look at division of decimal numbers using an area model, it is clearer why the answer is larger than the numbers we started with.



When we divide by a decimal number less than 1, the quotient is usually larger than the dividend.



Apply Skills

Turn to *Interactive Text*, page 35.



mBook Reinforce Understanding

Use the *mBook Study Guide* to review lesson concepts.

► Problem Solving: The Line of Best Fit

Vocabulary

line of best fit

What is the line of best fit?

When we look at a scatter plot, sometimes it is hard to tell the direction of the points. We make it easier by putting a line through the points to show the direction. This line is called the **line of best fit**.

How do we draw a line of best fit? The answer involves medians. Here is an example using a direct relationship. Let's go back to the relationship that used the variables of education and income. This is a direct relationship because the more you have of one, the more you tend to have of the other.

The data here show how much money 15 people make. The people have between 7 and 21 years of education. This means the first point on the scatter plot shows how much the person with a seventh-grade education made in a year. It's \$23,000. The last point is someone who went to college and graduate school and has 21 years of education. This person made \$67,000 in one year.

Years of Education	Income in One Year
7	\$23,000
8	\$19,000
9	\$34,000
10	\$26,000
11	\$36,000
12	\$28,000
13	\$37,000
14	\$42,000
15	\$41,000
16	\$50,000
17	\$63,000
18	\$60,000
19	\$54,000
20	\$75,000
21	\$67,000

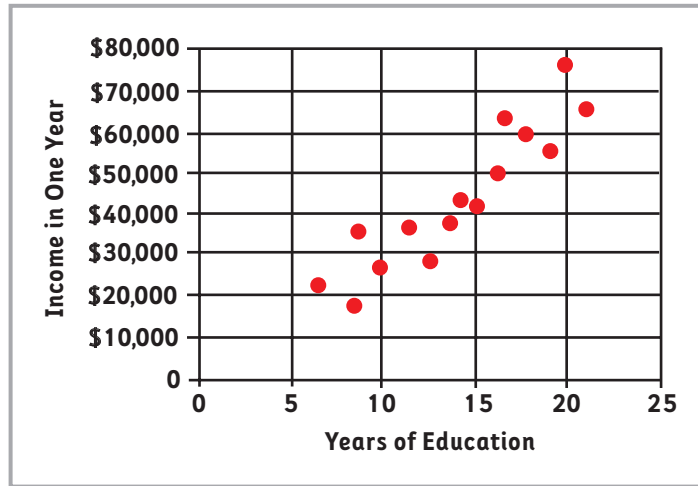
Next, we see how to make the line of best fit.



Steps for Finding the Line of Best Fit

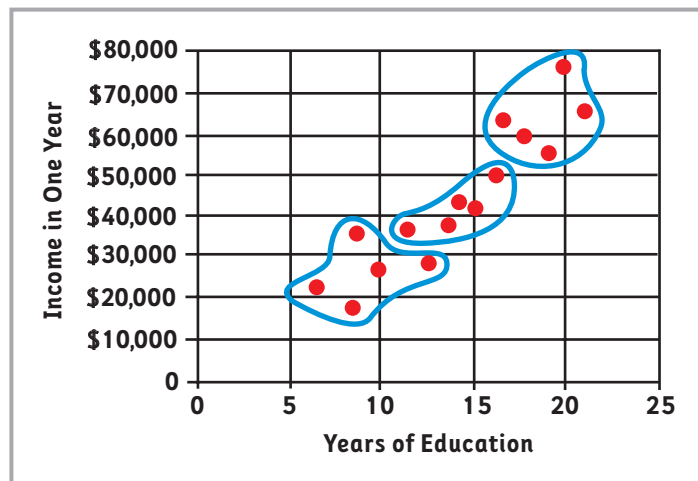
STEP 1

Create a scatter plot with the data.



STEP 2

Divide the points into three groups.



STEP 3

Find the medians for the low and the high groups of numbers.

We make a table of the data from these two groups and sort them from low to high so that we can find the medians.

Median for the Low Group	
8	\$19,000
7	\$23,000
10	\$26,000
9	\$34,000
11	\$36,000

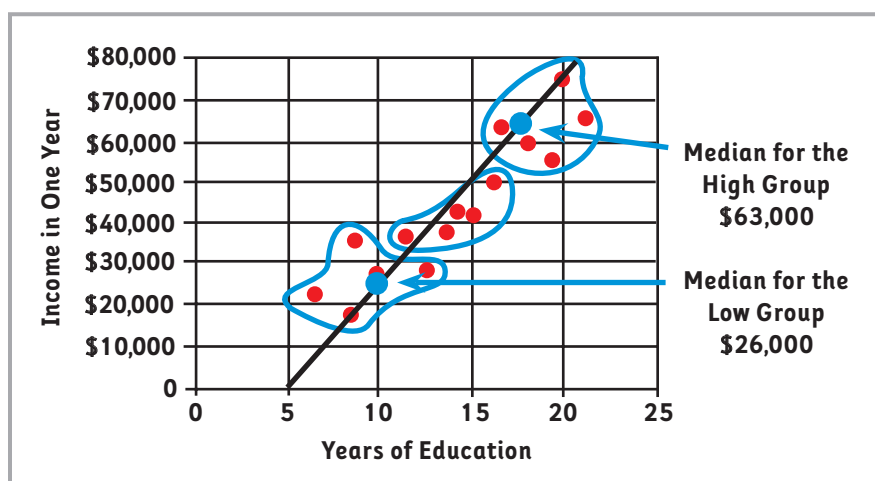
← median

Median for the High Group	
19	\$54,000
18	\$60,000
17	\$63,000
21	\$67,000
20	\$75,000

← median

STEP 4

Place the two medians on the scatter plot and connect them to make the line of best fit.



The line of best fit now shows us a clear direction in the data. It does not have to go through all or any of the points plotted on the graph. The line can help us predict other data that might appear on the graph.



Problem-Solving Activity

Turn to *Interactive Text*, page 36.

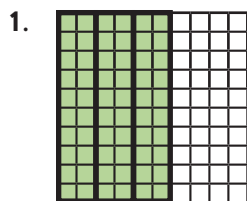


mBook Reinforce Understanding

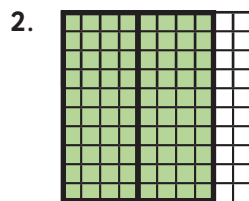
Use the *mBook Study Guide* to review lesson concepts.

Activity 1

Select the problem that is represented by the 100-square grid.



- (a) $0.6 \div 0.3 = 2$
- (b) $0.6 \div 0.2 = 3$
- (c) $0.6 \div 0.2 = 0.3$

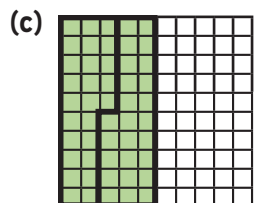
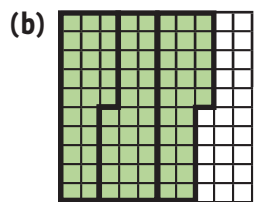
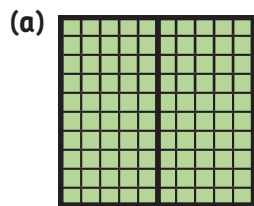


- (a) $0.8 \div 0.2 = 4$
- (b) $0.8 \div 0.4 = 0.2$
- (c) $0.8 \div 0.4 = 2$

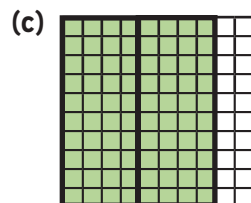
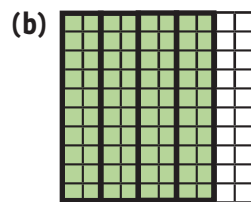
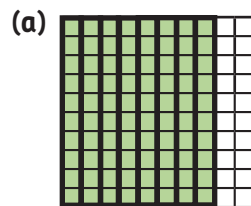
Activity 2

Select the correct 100-square grid for each of the problems. Then write the answer.

1. $0.75 \div 0.25$



2. $0.8 \div 0.1$



Homework

Activity 3

Answer the questions about the data sets.

- | | |
|--|---|
| 1. Data Set: 23, 27, 28, 32, 45, 75, 100
What is the median?
(a) 23
(b) 100
(c) 32 | 2. Data Set: 1, 2, 3, 4, 5, 5, 6, 6, 6
What is the mode?
(a) 4
(b) 5
(c) 6 |
| 3. Data Set: 20, 40, 60, 80, 100
What is the range?
(a) 80
(b) 60
(c) 40 | 4. Data Set: 1, 2, 3, 3, 5, 7, 7, 9, 25
Which number is called an outlier?
(a) 1
(b) 9
(c) 25 |

Activity 4 • Distributed Practice

Solve.

- | | |
|------------------------------------|-----------------------------------|
| 1. $\frac{1}{3} \cdot \frac{1}{5}$ | 2. $\frac{1}{2} + \frac{2}{3}$ |
| 3. $\frac{4}{6} \cdot \frac{3}{2}$ | 4. $\frac{7}{8} \div \frac{1}{4}$ |
| 5. $\frac{3}{4} - \frac{1}{2}$ | 6. $\frac{3}{9} \div \frac{1}{3}$ |
| 7. $104.01 - 79.67$ | 8. $14.78 + 22.3 + 28.09$ |
| 9. $0.67 \cdot 0.8$ | 10. $0.12 \cdot 9$ |