

Core Focus

- Division: Partial-quotients strategy (two-, three-, and four-digit dividends)
- Common fractions: Multiplicative nature (area and number line models)
- Common fractions: Multiplying mixed numbers

Division

- The **array** model helps students review the concept of division. Students are given the total in the array, but can only see the number of rows, or the number in one row. This demonstrates the idea of a missing factor, and shows that most arrays have two related multiplication equations, and two related division equations.

8.1 Division: Reviewing the relationship between multiplication and division

Step In What do you know about this rectangle? 5 ft Area is 45 ft²

How can you calculate the length of the rectangle?
Write two equations you could use to help you.

× = ÷ =

What do you know about this square?
What thinking would you use to calculate the length of the unknown side?
? Area is 36 m²

6 m

What equations could you write?

In this lesson, students calculate the length of the unknown side.

- Students extend their skill with division by building on what they know about the relationship between multiplication and division. Just like multiplication, division can be represented using a rectangular area model.
- In the problem below, students use what they know about the area model formula ($L \times W = A$) to split the total area (63) into parts that can easily be divided ($60 + 3$) by the known W dimension (3) to find the missing L dimension (21).

Step 1	Step 2	Step 3
She draws a rectangle to show the problem. The length of one side becomes the unknown value.	She partitions the rectangle into two parts so that it is easier to divide by 3.	She thinks: $3 \times 20 = 60$ $3 \times 1 = 3$ then $20 + 1 = 21$
Why did she split the rectangle into two parts? Why did she choose the numbers 60 and 3? Why did she add 20 and 1?		
I will call the amount that each person pays A . To find the amount, William thinks $63 \div 3 = A$, and Daniela thinks $3 \times A = 63$.		

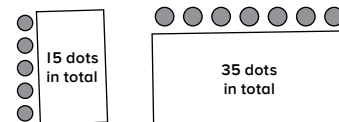
In this lesson, area models are used to split two-digit dividends into parts that are easily divisible by one-digit divisors.

Ideas for Home

- Take turns practicing mental division problems while traveling or walking. Use multiples of the divisor to come up with problems like $336 \div 3$. This problem can be mentally decomposed to become $300 \div 3$ and $36 \div 3$, which equals $100 + 12$, which equals 112. Try $245 \div 5$, $648 \div 6$, $819 \div 9$, $444 \div 4$, $396 \div 3$, etc...

Glossary

- ▶ A partially covered **array** show the total and either the number of groups or the number in each group to represent division.




- ▶ The **dividend** is the number that is split into smaller equal parts when division is performed.
- ▶ The **divisor** is the number that indicates how many parts the dividend is to be split into, or the number in each part.
- ▶ The **quotient** is the missing information in a division problem (the answer).

- All the lessons build on this idea of partitioning to make division easier, even when the numbers in a division problem are three or four digits. The key is to choose convenient ways to do the partitioning, so the division becomes easy to perform.

8.4 Division: Using the partial-quotients strategy (three-digit dividends)

Step In David paid for this laptop in three monthly payments. He paid the same amount each month.

What amount did he pay each month? How do you know?




I would break 639 into parts that are easier to divide.

Describe how this rectangle has been partitioned.

What is special about the numbers 600, 30, and 9?

What amount does David pay each month?



In this lesson, area models are used to break three-digit dividends into parts that are easily divisible by one-digit divisors.


Common fractions

- Students explore how to multiply when the number of groups is a whole amount and the number in each group is a fractional amount. They consider what happens to the numerators and denominators of **fractions** when multiplying. An area model is used to represent the situations.

8.9 Common fractions: Exploring the multiplicative nature (area model)


Step In Three friends share one pizza that is cut into eighths. If they each eat one slice of pizza, how much pizza will be eaten?

How could you figure it out?



There are three people and they have $\frac{1}{8}$ of the pizza each. That is equivalent to $\frac{1}{8} + \frac{1}{8} + \frac{1}{8}$.

Another way to show this repeated addition is to use multiplication.

$$3 \times \frac{1}{8}$$


In this lesson, students multiply fractions.

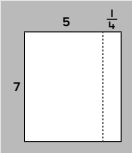
- Students also use area models to reinforce multiplying whole numbers by **mixed numbers** in parts.

8.12 Common fractions: Multiplying mixed numbers (with composing)

Step In Victoria is painting a wall that is 7 feet high and $5\frac{1}{4}$ feet long.

What is the area of the wall? How could you figure it out?

Jayden drew this picture to help him figure it out. What numbers should you write below to match his picture?



(×) + (×)

What is the value of each partial product?
What do you need to do to the product of 7 and $\frac{1}{4}$ so the final answer makes sense?
What is the area of the wall?

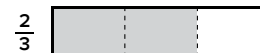
In this lesson, students multiply fractions with mixed numbers.

Ideas for Home

- Find recipes that have fractions in the ingredients list. Discuss how you could figure out the amount needed if you need to make multiple batches.

Glossary

- Fractions** describe equal parts of a whole. In this example of a common fraction, 2 is the **numerator** and 3 is the **denominator**.



- A **mixed number** is a whole number and a common fraction added together and written as a single number without the addition symbol.