## Core Focus

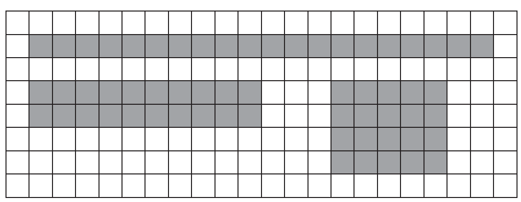
- Working with factors and multiples, and identifying prime and composite numbers
- Using the associative property to multiply and introducing the double-and-halve strategy for multiplication
- Reviewing fraction concepts and comparing fractions using a number line model

### Multiplication and Division: Factors and Multiples

- Numbers can be taken apart by using multiplication or division:
  - 30 is a **multiple** that can be broken into 5 × 6, or 5 × 2 × 3
  - 5, 6, 2, and 3 are **factors** of 30.
- By listing pairs of factors in order, **all** the **factors** of a **multiple** can be listed systematically. E.g. for 30: 1 × 30, 2 × 15, 3 × 10, and 5 × 6. All the **factors** of 30 are 1, 2, 3, 5, 6, 10, 15, and 30.

**3.2 Finding Pairs of Factors**

What do you notice about the shaded arrays?

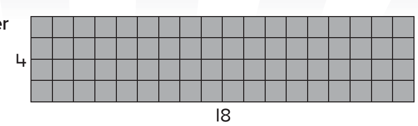


To find the number of factors for a multiple, students build rectangles using a number of small squares. In the example above, three different rectangles (or arrays) have each been built from 20 small squares.

- If the number has many factors, it is called **composite**. If the only factors of a number are itself and 1, it is **prime**.
- When one factor is doubled and the other is halved, the quantity of the product is the same. An array model illustrates why this works.

**3.3 Introducing the Double-and-Halve Strategy for Multiplication**

How could you figure out the number of squares in this array?



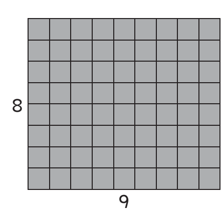

Imagine the array is cut in half and the new array below is made with the two pieces.

What is different about the arrays?

Has the number of squares changed?

Is it easier to calculate the total number of squares for the new array? Why?

Write a number sentence to describe each array.



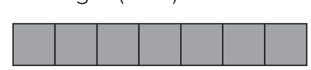

Students use a rectangular array to show how one factor can be doubled and the other can be halved to figure out the total.

### Ideas for Home

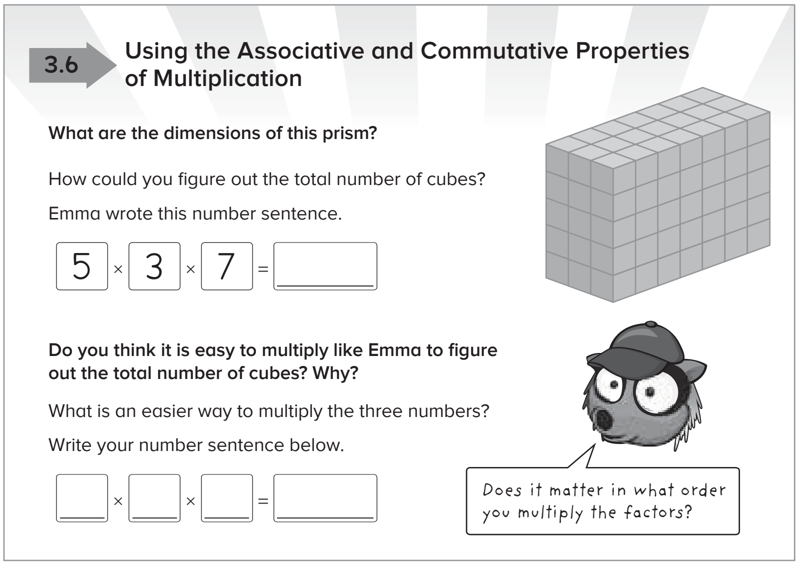
- Ask your child to multiply three one-digit numbers, e.g. 4 × 5 × 8, and then describe the mental strategy used (was it 20 × 8 or 4 × 40 or 32 × 5?). Ask which was the easiest.
- Practice the **doubling and halving** strategy with larger factors such as 18 × 5. Half of 18 is 9 and double 5 is 10, so 18 × 5= 9 × 10, which is easier to multiply mentally (90). Note: one of the factors must be even.

### Glossary

- **Associative property of multiplication** allows three numbers to be multiplied in any order: e.g. 2 × 3 × 4 can be (2 × 3) × 4 = 6 × 4 = 24 or 2 × (3 × 4) = 2 × 12 = 24 or (2 × 4 ) × 3 = 8 × 3.
- A **prime** has only one set of factors, so only one rectangular array can be built. 7 is prime because there is only one way to configure 7 tiles into a rectangle (7 × 1).



- Numbers can be broken down to make mental multiplication easier. E.g. order and grouping do not matter when we are multiplying more than two numbers together.


3.6 Using the Associative and Commutative Properties of Multiplication

**What are the dimensions of this prism?**

How could you figure out the total number of cubes?

Emma wrote this number sentence.

5 × 3 × 7 = ____

**Do you think it is easy to multiply like Emma to figure out the total number of cubes? Why?**

What is an easier way to multiply the three numbers?

Write your number sentence below.

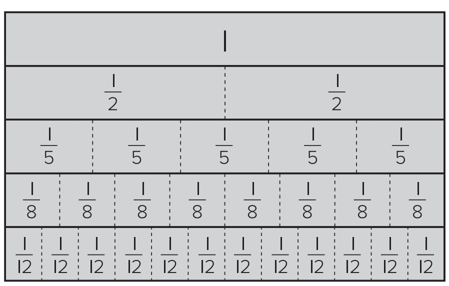
___ × ___ × ___ = ____



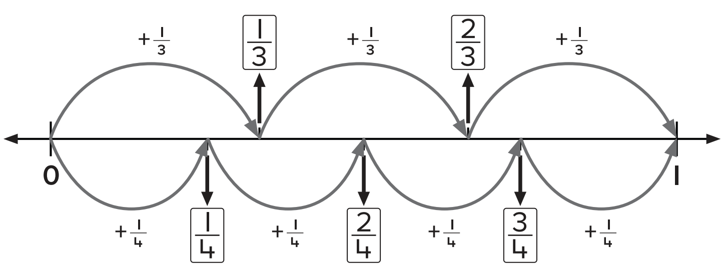
In this lesson, students consider the best order to multiply three one-digit numbers.

### Fractions

- In Grade 3, students used area and length models to learn about equivalent fractions.
- In this module, length and number line models are used to compare fractions.
- Length models are used to compare common fractions by first considering the size of the unit fractions and how many unit fractions it takes to make one whole.

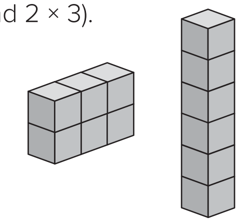



- **Number lines** are used to compare and then order common fractions.




### Glossary

- A **composite** has more than one set of factors and more than one array can be built. E.g. 6 is composite because there are 2 possibilities (6 × 1 and 2 × 3).



- A **unit fraction** is a proper fraction that has 1 as the numerator. E.g. $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, etc. All fractions are composed of unit fractions: e.g. $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} = \frac{3}{5}$.
- While $\frac{10}{3}$ is called an **improper fraction**, this type of fraction is acceptable to write and use in mathematics.

### Ideas for Home

- When cooking, use measuring cups and spoons to review equivalency. E.g. a $\frac{1}{2}$ cup is equivalent to $\frac{2}{4}$ cup, etc.
- Use a tape measure to compare lengths. E.g. "Is $\frac{1}{3}$ of a yard longer or shorter than $\frac{1}{4}$ of a yard?"