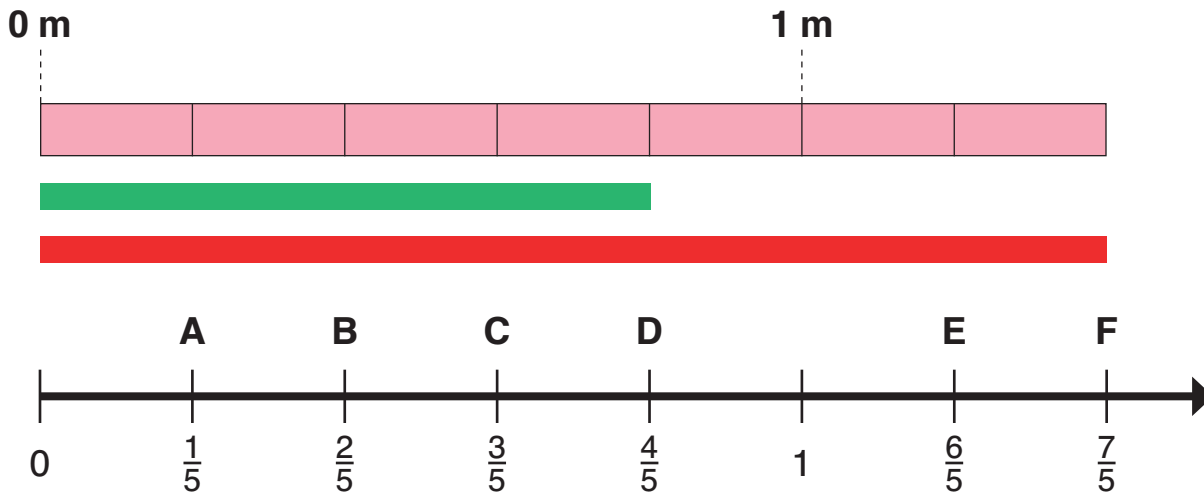## Think

A paper tape is marked so that there are 5 equal parts between each meter. The tape is used to measure the length of two ribbons.
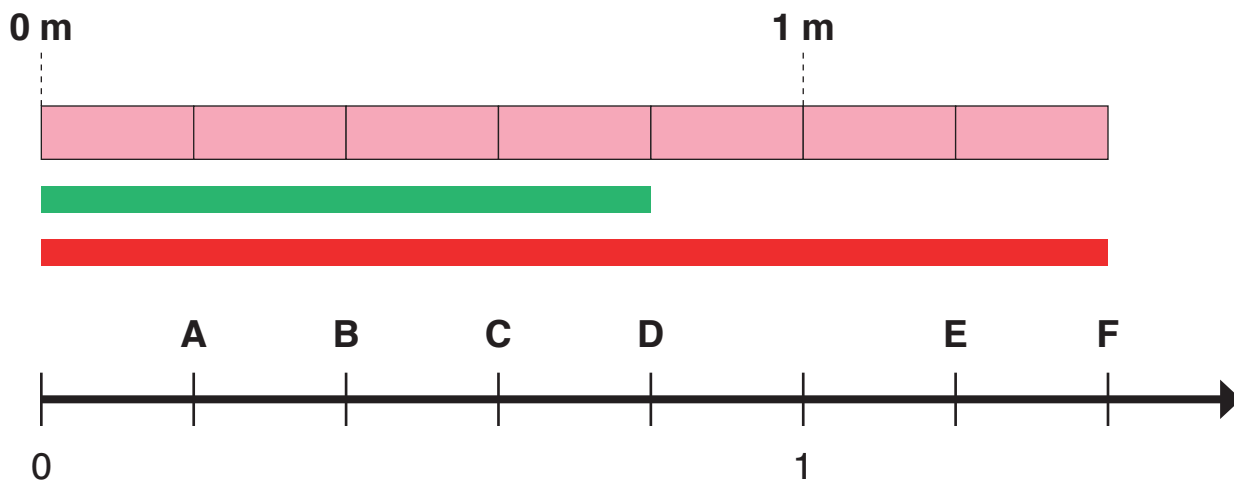
(a) What numbers are indicated by each letter, A, B, C, and D, on the number line?

(b) How long is the green ribbon?

(c) How many $\frac{1}{5}$ m are in 1 m?

(d) How many fifths make 1?

(e) How many fifths make the numbers indicated by E and F?

(f) What numbers are indicated by the letters E and F?
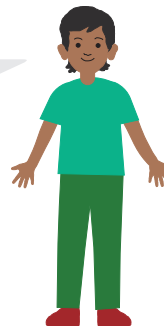
(g) How long is the red ribbon?

Learn

0 m   **1 m**

A   B   C   D   E   F

$0 \quad \frac{1}{5} \quad \frac{2}{5} \quad \frac{3}{5} \quad \frac{4}{5} \quad 1 \quad \frac{6}{5} \quad \frac{7}{5}$

(a) $A = \dfrac{\square}{5}$, $B = \dfrac{\square}{5}$, $C = \dfrac{\square}{5}$, and $D = \dfrac{\square}{5}$.

(b) The green ribbon is $\dfrac{\square}{5}$ m long.

(c) There are five $\dfrac{1}{5}$ m in 1 m.

> We can think of a number line as if it were a ruler and divide the distance between 0 and 1 into equal-length parts.
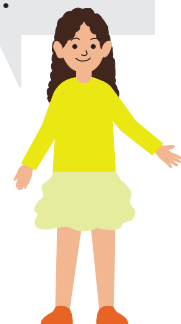
(d) $\square$ fifths make 1.

(e) E is $\square$ fifths and F is $\square$ fifths.

(f) E is $\dfrac{\square}{5}$ and F is $\dfrac{\square}{5}$.

(g) The red ribbon is $\dfrac{\square}{5}$ m long.
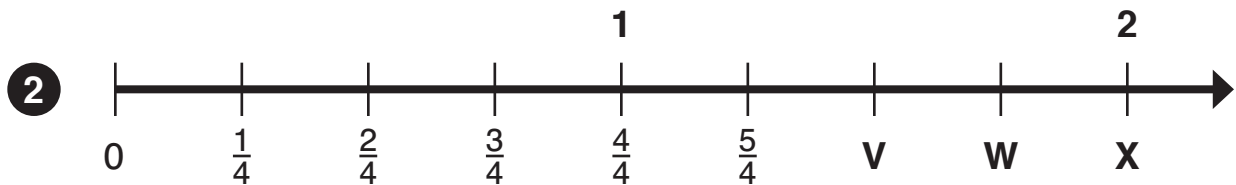
> Fractions are numbers. They can be represented on a number line.

Do

1

0 P Q R 1

(a) What numbers are indicated by each letter, P, Q, and R, on this number line?

(b) Write 1 using sevenths.

(c) R is greater than Q by how much?

(d) P is less than 1 by how much?

(e) What fraction do we add to $\frac{3}{7}$ to get 1?

2

1   2

0 $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ $\frac{4}{4}$ $\frac{5}{4}$ V W X

> $\frac{4}{4} = 1$
> 4 one-fourths make 1.

(a) How many fourths make $\frac{5}{4}$?

(b) Write fractions in fourths for V, W, and X.

(c) Which of the fractions marked on the number line are greater than 1 but less than 2?

(d) How many fourths make 2?

Think

Compare the bars and the numerators and denominators of the fractions in these two sets of equivalent fractions.
What do you notice?

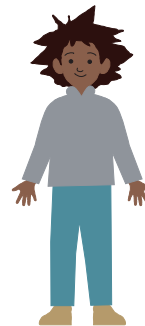$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$$

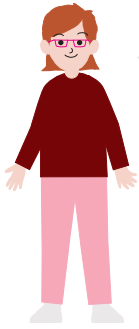$$\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12}$$

Learn

When the number of shaded parts doubled, so did the total number of parts.

The number of blue and orange parts are the same in each row, but the number of total parts are not the same.
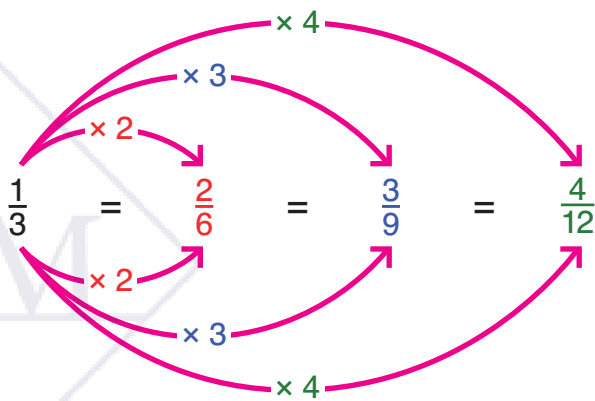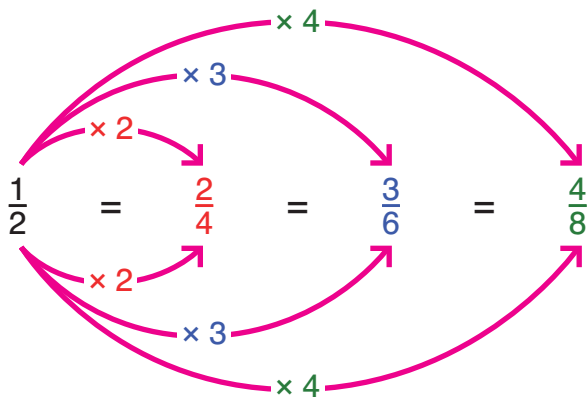
Both the number of shaded parts and the number of total parts are 2, 3, and 4 times as many, but the size of the shaded part does not change...

I noticed that

$$\overset{\times 4}{\underset{\times 4}{\frac{1}{2} = \frac{4}{8}}} \text{ and } \overset{\times 4}{\underset{\times 4}{\frac{1}{3} = \frac{4}{12}}}.$$
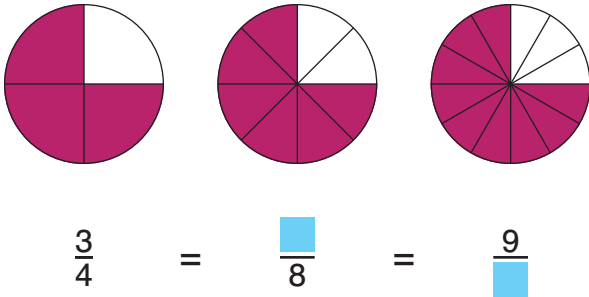
To find equivalent fractions, we can multiply both the numerator and denominator by the same number.

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$$

(×2, ×3, ×4)

$$\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12}$$

(×2, ×3, ×4)
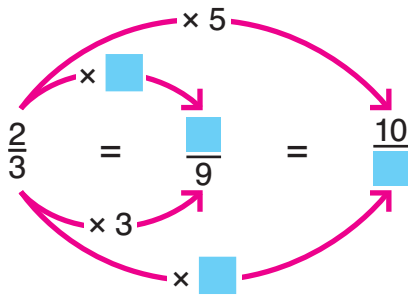
Find other equivalent fractions for $\frac{1}{2}$ and $\frac{1}{3}$.

Do

1 What is the missing numerator and denominator?

$$\frac{3}{4} \quad = \quad \frac{\blacksquare}{8} \quad = \quad \frac{9}{\blacksquare}$$

2 What are the missing numbers?

3 What are the missing numerators or denominators?

(a) $\frac{1}{4} = \frac{\blacksquare}{12}$

(b) $\frac{2}{5} = \frac{\blacksquare}{15}$

(c) $\frac{3}{7} = \frac{\blacksquare}{14}$

(d) $\frac{2}{6} = \frac{6}{\blacksquare}$

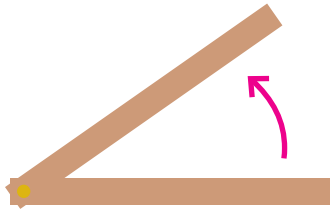(e) $\frac{1}{8} = \frac{3}{\blacksquare}$

(f) $\frac{2}{4} = \frac{4}{\blacksquare}$

4 List some equivalent fractions.

(a) $\frac{1}{5} \longrightarrow \frac{2}{10}, \frac{\blacksquare}{\blacksquare}, \frac{\blacksquare}{\blacksquare}, \frac{\blacksquare}{\blacksquare}$

(b) $\frac{2}{7} \longrightarrow \frac{\blacksquare}{\blacksquare}, \frac{\blacksquare}{\blacksquare}, \frac{\blacksquare}{\blacksquare}, \frac{\blacksquare}{\blacksquare}$
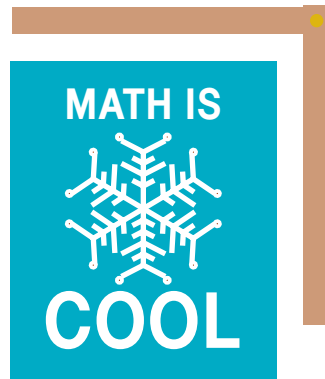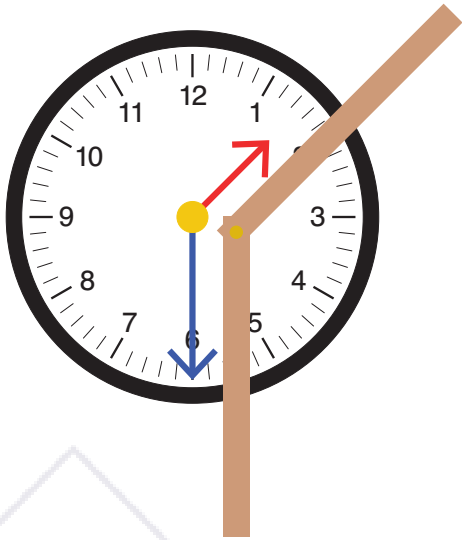
Exercise 2 • page 55

Think

Fasten two cardboard strips at one end with a brad.
Open it to make an **angle**.

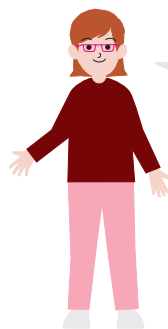You can make different angles by opening the sides by different amounts.

What shapes do you see around you that have angles?
Use the cardboard strips to show these angles.

MATH IS

COOL

The hands of this clock form an angle.
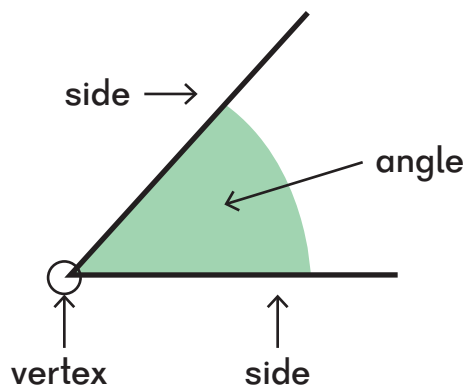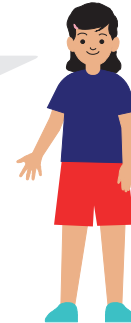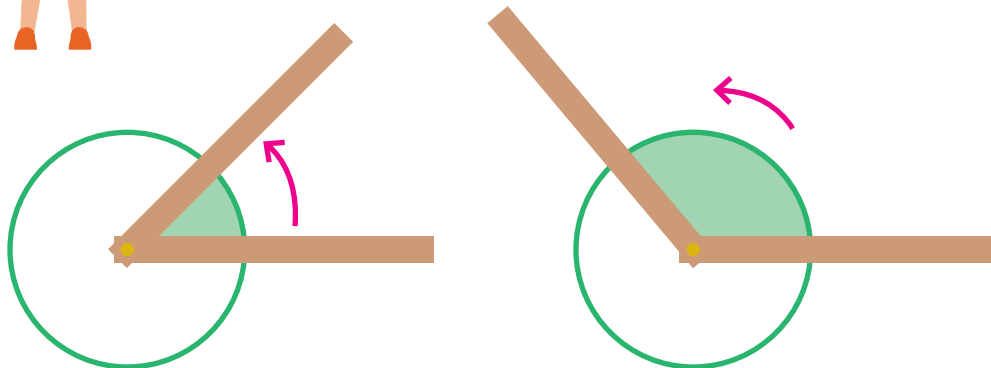
The sides of this poster form an angle at the corner.

Learn

Two lines (sides) that meet at a point form an **angle**.

side →

angle

vertex

side

The angle is the space between the sides.

The point where the lines meet is called the **vertex**.

An angle is formed when one side opens away from the other side around a circle. The larger the opening, the larger the angle.

Think

Use 12 toothpicks to make rectangles.
What is the area of each rectangle?

Learn

Length = 5 units | Width = 1 unit

Area = [ ] square units

Each of these rectangles has a perimeter of 12 units.

Length = 4 units | Width = 2 units

Area = [ ] square units

Which rectangle has the smallest area?

Length = 3 units | Width = 3 units

Area = [ ] square units

Which rectangle has the largest area?
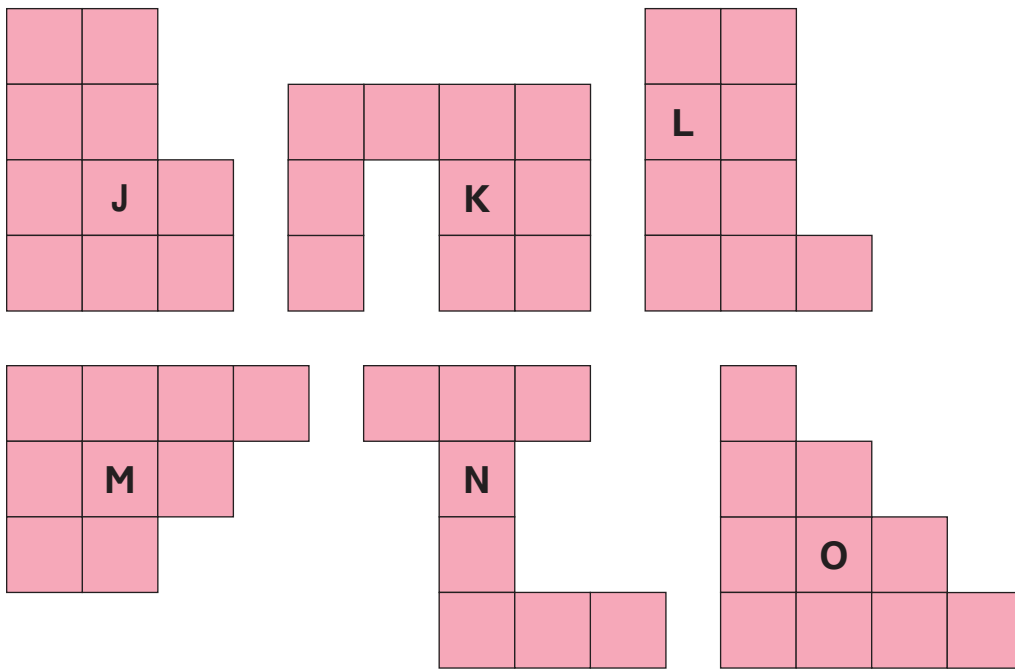
Do

1 Use centimeter graph paper to draw all the possible rectangles with side lengths equal to a whole number and an area equal to 12 cm².

(a) What is the longest possible perimeter?

(b) What is the shortest possible perimeter?

2 These figures are made up of one-centimeter squares.

(a) Which figures have the same area but different perimeters?

(b) Which figures have the same perimeters but different areas?

(c) Which figures have the same area and perimeter?

Think

Saturday
2 h 20 min

Sunday
55 min

On Saturday, Emma played with Dion for 2 hours and 20 minutes.
On Sunday, she played with Dion for 55 minutes.
How much longer did she play with Dion on Saturday than on Sunday?

Learn

2 h 20 min − 55 min
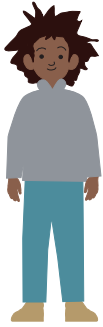
Method 1

2 h 20 min − 55 min

1 h 20 min   60 min

− 55 min   + 1 h 20 min
60 min ⟶ 5 min ⟶ ☐ h ☐ min

55 min is 5 min less than 1 h.

2 h 20 min $\xrightarrow{-1\text{ h}}$ 1 h 20 min $\xrightarrow{+5\text{ min}}$ ⬜ h ⬜ min

Method 3

2 h 20 min − 55 min
╱ ╲
20 min   35 min
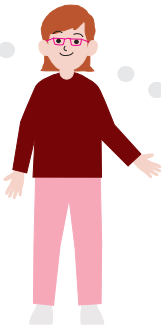
1 h − 35 min = ?
2 h − 35 min = ?

2 h 20 min $\xrightarrow{-20\text{ min}}$ 2 h $\xrightarrow{-35\text{ min}}$ ⬜ h ⬜ min

Emma played with Dion for ⬜ hour and ⬜ minutes longer on Saturday than on Sunday.