6.1 Multiplying Fractions
by a whole number

Pg 202   Q# 6 - 12, 15 - 17

6.

6.3 Multiplying Fractions

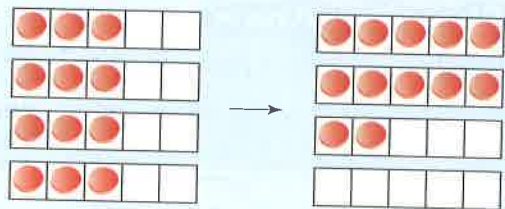Pg 214   Q# 5 - 9, 14 - 16

1. The diagram models $3 \times \frac{6}{5}$.

a) What equation does the diagram represent?

b) If a hexagon represents one whole, could you use pattern blocks to model the same multiplication? Explain.

2. Makoto found his own way to model $4 \times \frac{3}{5}$ by using counters on grids.

a) Why did he use 5-by-1 grids?

b) Why did he use four grids?

c) How does Makoto's model show the product?

3. Nadine said that she had her own method for determining $4 \times \frac{3}{5}$. She first multiplied 4 and 3 to get 12. She then wrote the product as $\frac{12}{5}$. Do you agree with Nadine's method for multiplying a whole number and a fraction? Explain using other examples.
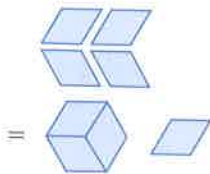
Check Your Understanding

Practise

For help with #4 to #7, refer to Examples 1 and 2 on pages 199–200.

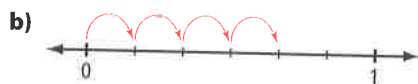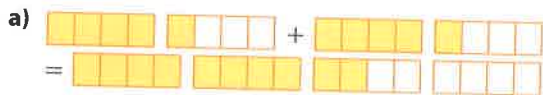**4.** What equation does each model represent? For pattern blocks, assume that a hexagon represents one whole.

a)

b)

$$\frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5}$$
$$+ \frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5}$$
$$+ \frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5}$$
$$= \frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5} \frac{1}{5}$$

5. What equation does each diagram represent?

a)

b)

6. Determine each product using manipulatives or diagrams.

a) $4 \times \frac{1}{2}$

b) $3 \times \frac{7}{10}$

c) $5 \times \frac{2}{3}$

d) $3 \times \frac{3}{8}$

7. Determine each product.

a) $3 \times \dfrac{1}{8}$ b) $6 \times \dfrac{1}{4}$

c) $2 \times \dfrac{6}{5}$ d) $2 \times \dfrac{4}{3}$

Apply

For help with #8 to #9, refer to Example 3 on page 200.

8. The width of a Canadian flag is $\dfrac{1}{2}$ of its length. What is the width of a Canadian flag that is 4 m long?

9. A minibus that seats 12 people is $\dfrac{3}{4}$ full. How many people are seated in the minibus?

10. a) What fraction of the surface area of a cube is the area of one face?

b) What is the area of each face of a cube of surface area 6 cm²?

11. Ron's car uses 12 L of gasoline per 100 km of highway driving. Asma's car uses only $\dfrac{5}{6}$ as much fuel. How much fuel does Asma's car use per 100 km of highway driving?

12. Nunavut covers about $\dfrac{1}{5}$ of the area of Canada. The area of Canada is about ten million square kilometres. What is the approximate area of Nunavut?

13. Suppose a friend knows how to multiply whole numbers, but not fractions.

a) How could you use the following pattern to show your friend how to calculate $\dfrac{1}{2} \times 10$?

$4 \times 10 = 40$
$2 \times 10 = 20$
$1 \times 10 = 10$
$\dfrac{1}{2} \times 10 = \blacksquare$

b) Make up a pattern to show your friend how to calculate $\dfrac{1}{3} \times 9$.

14. Write a word problem that you can solve using the expression $\dfrac{1}{4} \times 8$.

Extend

15. There are 30 students in a class. Four fifths of them have brown eyes. How many students have brown eyes?

16. The perimeter of an isosceles triangle is 15 cm. The shortest side equals $\dfrac{1}{5}$ of the perimeter. What are the side lengths of the triangle?

17. A ball dropped to the ground bounces back to $\dfrac{2}{3}$ of its previous height. If the ball is dropped straight down from a height of 81 cm, how far does it travel altogether by the time it hits the ground for the fifth time?

MATH LINK

A quarter of Canada's 20 ecozones are marine ecozones, which include parts of oceans. The rest of Canada's ecozones are terrestrial ecozones. They include parts of the land, and may contain rivers, lakes, and wetlands.

a) How many marine ecozones does Canada have?

b) How many terrestrial ecozones does Canada have?

1. a) Model $\frac{2}{3} \times \frac{1}{3}$ using manipulatives or diagrams.

   b) Which method did you choose? Explain why you chose it.

2. Brendan calculated $\frac{3}{5} \times \frac{2}{5}$ as follows:
   $$\frac{3}{5} \times \frac{2}{5} = \frac{6}{5}$$

   a) What mistake did he make?

   b) How could you use estimation to show Brendan that he made a mistake?

   c) What is the correct product?

Check Your Understanding

Practise

For help with #3 and #4, refer to Examples 1 and 2 on pages 211–212.

3. Determine each product using paper folding or diagrams.

   a) $\frac{5}{6} \times \frac{1}{2}$ b) $\frac{3}{4} \times \frac{5}{6}$

4. Use paper folding or diagrams to determine each product.

   a) $\frac{1}{4} \times \frac{2}{3}$ b) $\frac{7}{10} \times \frac{1}{2}$

For help with #5 and #6, refer to Example 3 on page 213.

5. Estimate and calculate each product. Express your answer in lowest terms.

   a) $\frac{3}{8} \times \frac{2}{3}$ b) $\frac{3}{7} \times \frac{1}{6}$ c) $\frac{3}{4} \times \frac{3}{4}$

6. Estimate and calculate each product. Express your answer in lowest terms.

   a) $\frac{2}{5} \times \frac{4}{5}$ b) $\frac{7}{8} \times \frac{4}{5}$ c) $\frac{3}{4} \times \frac{4}{9}$

Apply

7. Tamar had $\frac{1}{2}$ of an apple pie in her refrigerator. She ate $\frac{1}{4}$ of this piece of pie. What fraction of a whole pie did she eat?

8. Marius spends $\frac{1}{3}$ of his time sleeping. While he is asleep, he dreams for $\frac{1}{4}$ of the time.

   a) For what fraction of his time is Marius dreaming?

   b) For how many hours a day is Marius dreaming?

9. About $\frac{1}{20}$ of the people in the world live in Canada or the United States. Of the people who live in Canada or the United States, about $\frac{1}{10}$ live in Canada. What fraction of the people in the world live in Canada?

10. At the age of four, the average person is about $\frac{3}{5}$ as tall as they will be as an adult. At birth, the average person is about $\frac{1}{2}$ as tall as they will be at the age of four. For the average person, what fraction is their height at birth of their height as an adult?

11. When the Summer Olympic and Paralympic Games were held in Athens, Greece, paralympic athletes won $\frac{6}{7}$ of Canada's total medals. Of the medals that Canadian paralympic athletes won, $\frac{7}{18}$ were gold medals.

   a) What fraction of Canada's total medals were gold medals won by paralympic athletes?

   b) Canada won a total of 84 medals. How many gold medals did Canadian paralympic athletes win?

12. Write a word problem that you can solve using the expression $\frac{3}{4} \times \frac{1}{2}$.

13. For a standard deck of 52 playing cards, the probability of randomly drawing a red card is $\frac{1}{2}$. The probability of randomly drawing a face card (jack, queen, or king) is $\frac{12}{52}$. What is the probability of randomly drawing a face card that is red?

14. Calculate. Express the product in lowest terms.

   a) $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$ **b)** $\frac{2}{3} \times \frac{1}{4} \times \frac{2}{5}$

   c) $\frac{3}{4} \times \frac{3}{4} \times \frac{2}{9}$ **d)** $\frac{5}{6} \times \frac{3}{8} \times \frac{7}{10}$

15. Copy each equation. Complete it using a fraction in lowest terms.

   a) $\frac{\blacksquare}{\blacksquare} \times \frac{1}{2} = \frac{5}{16}$ **b)** $\frac{\blacksquare}{\blacksquare} \times \frac{3}{7} = \frac{1}{3}$

   c) $\frac{2}{3} \times \frac{\blacksquare}{\blacksquare} = \frac{1}{2}$ **d)** $\frac{3}{4} \times \frac{\blacksquare}{\blacksquare} = \frac{5}{8}$

16. Use the sum and the product of two fractions to identify the fractions.

   a) sum $\frac{1}{2}$; product $\frac{1}{16}$

   b) sum $\frac{5}{6}$; product $\frac{1}{6}$

   c) sum $\frac{2}{3}$; product $\frac{1}{12}$

MATH LINK

The area of British Columbia is about $\frac{1}{10}$ of the area of Canada. The Pacific Maritime ecozone covers about $\frac{1}{5}$ of the area of British Columbia. What fraction of the area of Canada does the Pacific Maritime ecozone cover?