3.1 Using Two-Term Ratios

GOAL

Compare two quantities using ratios.

1. Write a part-to-part ratio to compare the following items:
   • 8 peaches • 3 apples • 6 oranges • 4 pears

   a) peaches to pears

   b) apples to oranges

   c) oranges to peaches

   d) pears to apples

2. Calculate each missing term.

   a) $3 : 2 = 9 : \underline{\quad}$

   b) $36 : 27 = 4 : \underline{\quad}$

   c) $\dfrac{3}{18} = \dfrac{4}{\underline{\quad}}$

   d) $\dfrac{16}{12} = \dfrac{\underline{\quad}}{9}$

3. Write three equivalent ratios for each ratio.

   a) 6 to 36

   b) 11 : 33

   c) $\dfrac{5}{8}$

4. Allison spends 2 h each school day on homework and 30 min practising music.

   a) Write a ratio to compare Allison's time on homework with the total number of hours in a day.

   _____

   b) Write a ratio to compare Allison's time practising music with the total number of hours in a day.

   _____

   c) Calculate the number of hours Allison spends practising music in 30 school days.

   _____

5. Determine each ratio for the letters of the alphabet (A to Z).

   a) the number of consonants to the total number of letters _____

   b) the total number of vowels to the total number of consonants _____

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- Use ratios when you want to compare quantities with the same units, for example, the amount of time spent doing activities in a day or the areas of two rectangles.

- You can use equivalent fractions or set up a proportion to figure out an appropriate equivalent ratio.

For example, you spent $5 on CDs for every $2 you spent on clothes. You spent $16 on clothes. How much did you spend on CDs?

Multiply $2 by 8 to get the amount spent on CDs;. multiply $5 by 8 to get the amount spent on clothes.

$$\frac{\text{clothes}}{\text{CDs}} \qquad \frac{5}{2} \overset{\times\,8}{=} \frac{\boxed{40}}{16}$$
$$\times\,8$$

You spent $40 on clothes.

3.2 Using Ratio Tables

GOAL

Use ratio tables to solve problems.

1. Complete each ratio table.

a)

Girls	3	30	60		
Boys	4			20	60

b)

Number of 25-cent coins		4	9		21
Value of Coins (cents)	25	100		200	

c)

24	48		
23		92	161

2. Solve using a ratio table. Show your steps.

a) $4 : 6 = 20 :$ ___

b) $50 :$ ___ $= 75 : 30$
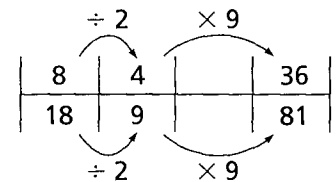

You can use a ratio table and a given ratio to create an equivalent ratio.

- Multiply or divide both terms in one column by the same amount.
- Add or subtract numbers in two or more columns to get one number in the equivalent ratio you need, and read the table to get the other number.

For example, solve:

$8 : 18 =$ ___ $: 81$

81 is not a multiple of 18, but it is a multiple of 9, which is also a factor of 18. Try to get a 9 as the second term.

$$\begin{array}{cc} \div 2 & \times 9 \\ \end{array}$$

8	4		36
18	9		81

$$\begin{array}{cc} \div 2 & \times 9 \\ \end{array}$$

So, the ratio is $8 : 18 = 36 : 81$.

3. In a survey, Grade 8 students were $3 : 1$ in favour of going on a class trip. In all, 56 students were surveyed. How many Grade 8 students were in favour? _____

4. A bag of mixed chocolate has 60 g of dark chocolate for every 40 g of white chocolate. In 400 g of this mixture, how many grams are dark chocolate? _____

5. Marisa made 6 L of fruit punch from concentrate. She used 2 parts of water for 1 part of concentrate. How much concentrate did she use? _____

3.3 Exploring Ratios with Three Terms

GOAL

Use ratios to solve problems involving three values.

1. Sonya has a bag of 54 different-coloured marbles. The marbles are blue, red, and green, and are in the ratio 4 : 3 : 2. How many marbles does Sonya have that are

    a) red? _____

    b) blue? _____

    c) green? _____

2. Sonya's friend Marco also has a bag of different-coloured marbles. Marco has 48 marbles in total that are also blue, red, and green. Marco's marbles are in the ratio 3 : 4 : 2. How many marbles does Marco have that are

    a) red? _____

    b) blue? _____

    c) green? _____

3. a) Who has more green marbles?

    _____

    b) Could you tell this from looking at the original three-term ratios? Explain your answer.

    _____

    _____

    _____

    _____

3.4 Using Rates

Use rates and equivalent rates to solve problems.

1. Write two equivalent rates for each case. One of the rates should be a unit rate.

   a) $24.99 for two CDs

   b) 148 heartbeats in 2 min

   c) 5 cm in 10 s

2. Desmond pays $86 for two concert tickets.

   a) What was his cost per ticket?

   b) How much would 5 tickets cost?

3. If 6 kg of apples cost $21, how many kilograms of apples can you buy for $35?

4. Determine the better buy in each case:

   a) 12 calculators for $144 or 27 calculators for $432

   b) 39 pens for $8.19 or 11 pens for $3.41

At-Home | Help

- You can set up a proportion to figure out an appropriate equivalent rate.

For example: You travel 650 km in 8 h. How far would you travel in 3 h?

$$\frac{650}{8} = \frac{}{3}$$

$$\frac{650 \times 3}{8 \times 3} = \frac{ \times 8}{3 \times 8}$$

$$650 \times 3 = \times 8$$

$$1950 = \times 8$$

$$1950 \div 8 = $$

$$243.75 = $$

You would travel 244 km in 3 h.

3.5 Communicate about Ratios and Rates

Explain your thinking when solving ratio and rate problems.

1. Lara earns $24 each day and saves $14 of the money. How much would you expect her to have saved when she has earned $120? Explain your thinking.

   _____

   _____

   _____

   _____

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Communication Checklist:
- ☑ Did you explain how you performed your calculations?
- ☑ Did you explain why you did each calculation?
- ☑ Did you use a model, a chart, or a diagram to make your thinking clear?
- ☑ Did you check that your answer makes sense?

2. Alison can plant 12 trees in 38 min. Can she plant 18 trees in 57 min at that rate? Explain.

   _____

   _____

   _____

3. Mohan makes sandwiches at a fast-food restaurant. He can make 7 sandwiches in 2 min. How long will Mohan take to make 42 sandwiches? Explain.

   _____

   _____

   _____

3.6 Using Equivalent Ratios to Solve Problems

1. To make orange paint, mix 3 parts of red paint and 1 part of yellow paint. How many litres of red paint are needed to make 16 L of orange paint?

2. Kashia's heart beats 72 times each minute. About how long would it take Kashia's heart to beat 10 000 times?

3. Three energy bars cost $3.97. Determine three strategies to figure out the cost of 10 bars.

At-Home | Help

- You can set up an equation with two equivalent fractions to solve a ratio problem.

For example, to solve
$5 : 6 = 12 : \blacksquare$.

$$\frac{5}{6} = \frac{12}{\blacksquare}$$

$$\frac{5 \times \blacksquare}{6 \times \blacksquare} = \frac{12 \times 6}{\blacksquare \times 6}$$

$5 \times \blacksquare = 12 \times 6$

$5 \times \blacksquare = 72$

$\blacksquare = 72 \div 5$

$\blacksquare = 14.4$

The ratio is $5 : 6 = 12 : 14.4$.

_____

_____

_____

_____

_____

_____

_____

_____

4. On a 3485 km trip, Tony's mother drove at an average of 90 km/h. On the trip back, there were road delays and her speed was 85 km/h. What was her average speed for the whole trip?

11. Your dad drives 480 km in 6 h. How far would he drive in 4 h?

    A. 605 km   **B.** 240 km   **C.** 320 km   **D.** 480 km

12. Your aunt drives 480 km in 5 h. About how long will it take her to drive 200 km?

    A. 2 h   **B.** 2.5 h   **C.** 3 h   **D.** 3.5 h

13. You pay $3.99 for 12 pens. Determine the unit cost.

    A. $0.35   **B.** $0.45   **C.** $0.33   **D.** $0.40

14. You pay $14.80 for 8 ice cream bars. Determine the unit cost.

    A. $1.85   **B.** $1.75   **C.** $1.95   **D.** $1.65

15. When making orange juice, you must add 1 part of juice to 3 parts of water. How much water must be added to 2 L of juice?

    A. 6 L   **B.** 0.5 L   **C.** 1.5 L   **D.** 8 L

16. A pancake recipe calls for 2 parts of oil to 8 parts of milk. How much milk do you need if you use 3 parts of oil?

    A. 9 parts   **B.** 10 parts   **C.** 12 parts   **D.** 16 parts

17. Four ride tickets for an amusement park cost $9.00. Determine the cost of 16 ride tickets.

    A. $28   **B.** $38   **C.** $36   **D.** $26

18. Three bus tickets cost $3.75. Determine the cost of 11 bus tickets.

    A. $15.50   **B.** $12.25   **C.** $14.25   **D.** $13.75

19. Sam and Fatima won $2000 in the lottery. They agreed to divide the winnings in the ratio (Sam) 2 : 3 (Fatima). How much money did Sam receive?

    A. $800   **B.** $600   **C.** $1000   **D.** $1200

20. Joanne and Alex earned $170 cleaning out a neighbour's garage. They shared the money according to the time they worked. Joanne worked 5 h and Alex worked 4 h. How much money did Joanne receive?

    A. $94.45   **B.** $75.55   **C.** $85.45   **D.** $99.55

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