

4.3 Solve Equations Involving Fractions

Principles of Mathematics 9, pages 204–210

Part 1

7

A

1. Solve using pencil and paper.

a) $\frac{1}{4}(x-3) = -2$

b) $6 = -\frac{3}{5}(a-7)$

c) $\frac{m+7}{5} = 3$

2. Solve using pencil and paper.

a) $9 = \frac{3(k+4)}{2}$

b) $\frac{3k+5}{2} = 10$

c) $1 = \frac{2p-3}{5}$

3. Solve using a Computer Algebra System (CAS). Use at least two steps.

a) $\frac{y-5}{3} = -4$

b) $\frac{1}{3}(p+2) = -5$

c) $3 = \frac{4}{5}(h+2)$

4. Solve using a CAS. Use at least two steps.

a) $5 = \frac{4(n+3)}{2}$

b) $6 = \frac{7-c}{2}$

c) $\frac{3+w}{-2} = 4$

B

5. Find the root of each equation. Check your answers.

a) $\frac{h-4}{5} = \frac{h-3}{6}$

b) $\frac{d-2}{4} = \frac{d+1}{3}$

c) $\frac{1}{3}(x+4) = \frac{1}{5}(x+2)$

6. Find the root of each equation. Check your answers.

a) $\frac{1}{4}(p-7) = \frac{1}{6}(p-3)$

b) $\frac{2(k-5)}{3} = \frac{4(k+2)}{5}$

c) $\frac{3(s-4)}{4} = \frac{2(s-3)}{3}$

7. Find the root of each equation. Use a CAS to check your answers.

a) $\frac{2}{5}(3m+2) = \frac{3}{4}(m+5)$

b) $\frac{2}{3}(k+2) = \frac{3}{4}(2k-1)$

c) $\frac{4c+5}{3} = \frac{2c+4}{5}$

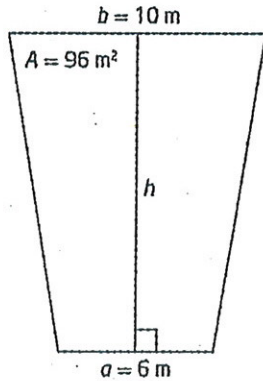
d) $\frac{5-3n}{4} = \frac{2-n}{3}$

e) $\frac{2(3w+4)}{5} = \frac{2(2w-1)}{3}$

Solve Equations Involving Fractions Part 2

7

8. A trapezoidal deck has an area of 96 m^2 . The front and back widths are 6 m and 10 m, as shown. What is the length of the deck from front to back?



9. Each solution contains an error. Identify the error and describe how to correct it.

a)
$$\frac{x+5}{4} = \frac{x-2}{3}$$

$$4(x+5) = 3(x-2)$$

$$4x+20 = 3x-6$$

$$4x+20-3x-20 = 3x-6-3x-20$$

$$x = -26$$

b)
$$\frac{1}{5}(2y+4) = \frac{1}{2}(y-3)$$

$$10 \times \frac{1}{5}(2y+4) = 10 \times \frac{1}{2}(y-3)$$

$$2y+4 = y-3$$

$$2y+4-y-4 = y-3-y-4$$

$$y = -7$$

10. Find the base of a triangle with height 8 cm and area 72 cm^2 .

C

11. The equation $F = \frac{9}{5}C + 32$ allows you

to convert between Fahrenheit and Celsius temperatures. C is the temperature in degrees Celsius ($^{\circ}\text{C}$) and F is the temperature in degrees Fahrenheit ($^{\circ}\text{F}$).

- a) The temperature at a resort is 30°C . What is this equivalent to in degrees Fahrenheit?
- b) The temperature in the living room of a house is 77°F . What is this equivalent to in degrees Celsius?

12. Solve.

a)
$$\frac{2a}{3} + \frac{a-4}{5} = \frac{1}{2}$$

b)
$$\frac{u+1}{2} + \frac{2u+3}{3} = \frac{u}{4}$$

c)
$$\frac{w+3}{4} = \frac{w}{3} + \frac{2w-1}{5}$$

13. The balcony of an apartment is in the shape of a right triangle in which the height is twice the base. The hypotenuse of the triangular area is 4.5 m.

- a) Determine the height and base of the triangular area. Round your answers to one decimal place.
- b) Approximately how much indoor-outdoor carpet is needed to cover the floor of the balcony?

4.4 Modelling With Formulas

Principles of Mathematics 9, pages 211–219

A

1. Rearrange each formula to isolate the variable indicated using pencil and paper.

a) $C = \pi d$ for d (circumference of a circle)

b) $d = vt$ for t (distance)

c) $A = P + I$ for I (investments)

2. Rearrange each formula to isolate the variable indicated using pencil and paper.

a) $y = mx + b$ for m (linear relations)

b) $Ax + By + C = 0$ for y (linear relations)

c) $F = ma$ for a (motion)

d) $V = IR$ for R (voltage)

3. Rearrange each formula to isolate the variable indicated.

a) $V = s^3$ for s (volume of a cube)

b) $P = I^2R$ for R (electrical power)

c) $V = \pi r^2 h$ for h (volume of a cylinder)

4. Rearrange each formula to isolate the variable indicated.

a) $P = 2l + 2w$ for l (perimeter of a rectangle)

b) $A = s^2$ for s (area of a square)

c) $A = \frac{1}{2}bh$ for h (area of a triangle)

d) $c^2 = a^2 + b^2$ for a (Pythagorean theorem)

B

5. You can use the formula $w = 2.2m$ to obtain an approximate value for converting a mass, m , in kilograms, to a weight, w , in pounds.

a) Use the formula to find the number of pounds in

- 3 kg
- 500 g (1 kg = 1000 g)

b) Rearrange the formula to express m in terms of w .

c) How many kilograms are in 8 pounds? Round your answer to the nearest tenth of a kilogram.

6. a) Plot a graph of $w = 2.2m$ either by hand or by using technology such as a graphing calculator or graphing software.

b) Is the graph linear or non-linear? Explain.

c) Use the graph to find

- the number of kilograms in 3 pounds
- the number of pounds in 5 kg

Round your answers to the nearest tenth, if necessary.

7. The surface area, A , of a cube is related to the length of a side of the cube, s , by the formula $A = 6s^2$.

a) Rearrange this formula to express s in terms of A .

b) Find the length of the side of a cube with surface area 800 cm^2 . Round your answer to the nearest tenth of a centimetre.

4.5 Modelling With Algebra

Principles of Mathematics 9, pages 220–229

Part 1

A

1. Write an algebraic expression to represent each description.
 - a) quadruple a number
 - b) three more than a number
 - c) one third a number
 - d) four less than triple a number
2. Write an algebraic expression to represent each description.
 - a) five times a number
 - b) six more than twice a number
 - c) two less than a number
 - d) three fifths of a number
3. Write an equation to represent each sentence.
 - a) five times a number is 85
 - b) an area increased by 8 is 177
 - c) three more than double a number is 33
 - d) the sum of three consecutive integers is 168
4. Solve each equation in question 3 and explain what the answer means.
5. Two friends are collecting pop-can tabs. Natasha has 250 more pop-can tabs than Krysten. Together they have collected 880 pop-can tabs. How many pop-can tabs has each friend collected?

B

6. Justin and Kieran both participated in a walk-a-thon to raise money for a charity. Justin raised \$20 more than Kieran. Together they raised \$95. How much money did they each raise?
7. Jacinth is 4 years older than her sister Naomi. The sum of their ages is 30. How old are the sisters?
8. Jack is selling used computers. He is paid \$15/h plus a 5% commission on sales. What dollar amount of computer sales must Jack make to earn \$1000 in a 40-h work week?
9. The sum of three consecutive integers is 120. Find the numbers.
10. Alicia and Wayne are both collecting coins. Alicia has three times as many coins as Wayne. Together they have 712 coins. How many coins does Alicia have and how many coins does Wayne have?
11. Sally, Letitia, and Jessica play together on a basketball team. At the end of the season, Sally had scored 8 more points than Letitia, while Letitia had scored twice as many points as Jessica. The three girls scored a total of 108 points. How many points did each girl score?

Modelling With Algebra Part 2

8

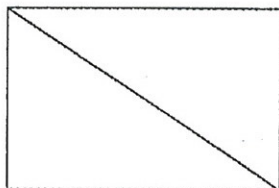
12. Ashley works part time, 2 h per day, selling memberships to a video club. She is paid \$8.50/h, plus a \$2 commission for each video club membership that she sells.

- Write an algebraic expression that describes Ashley's total earnings.
- Find the amount that Ashley makes in 10 h when she sells 30 memberships.
- How many memberships does Ashley have to sell to make \$475 in a 10-h workweek?
- How many hours does Ashley have to work to make \$250 if she sells 40 memberships?

13. Anoja, Amani, and Azra are three friends who each have part-time jobs. Last week, Anoja earned twice as much money as Azra, while Amani earned \$25 more than Anoja. The total earnings of the three friends last week was \$450. How much money did each of them earn last week?

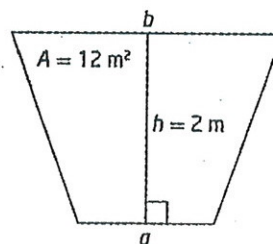
14. The length of the banquet hall where Naomi works is double its width. The area of the banquet hall is 200 m^2 .

- Find the length and width of the banquet hall.
- If Naomi walks around the perimeter of the banquet hall, how far does she walk?
- If Naomi walks diagonally across the banquet hall, how far does she walk? Round your answer to the nearest tenth of a metre.

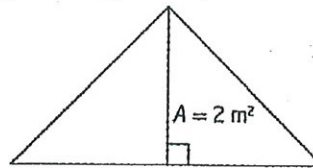


C

15. A reflecting pool is in the shape of a trapezoid. The front width is triple the back width. The pool has an area of 12 m^2 . The distance from the front to the back of the pool is 2 m. Find the front width and the back width of the pool.



16. An isosceles triangle has been constructed so that its height is one half of its base. Without changing the base length, how should the height of the triangle change to triple the area?



17. Raza works at a flea market selling sunglasses. He is paid \$7.50/h plus a 75¢ commission for every pair of sunglasses he sells.

- Write an equation to model Raza's earnings.
- Find Raza's earnings if he sells 25 pairs of sunglasses during a 6-h shift.
- How many pairs of sunglasses must he sell to earn \$90 in 8 h?