

6. Use algebra tiles to solve each equation.

Record the steps.

- a) $4g = 7 - 3g$
- b) $4k + 4 = -2k - 8$
- c) $-4a - 3 = 3 - a$
- d) $3h - 5 = 7 - 3h$

Apply

7. a) Solve each equation.

- i) $\frac{6}{h} = 2, h \neq 0$
- ii) $\frac{-6}{h} = 2, h \neq 0$
- iii) $-2 = \frac{6}{h}, h \neq 0$
- iv) $\frac{6}{-h} = 2, h \neq 0$
- v) $-2 = \frac{-6}{h}, h \neq 0$
- vi) $\frac{6}{-h} = -2, h \neq 0$

- b) Explain why there are only 2 solutions to all the equations in part a.

8. Solve each equation.

What strategy did you use?

Verify the solution.

- a) $2.4 = \frac{4.8}{s}, s \neq 0$
- b) $\frac{-5.4}{t} = 1.8, t \neq 0$
- c) $-6.5 = \frac{-1.3}{w}, w \neq 0$

9. Ten divided by a number is -3 . Write, then solve an equation to determine the number. Verify the solution.

10. Solve each equation.

What strategy did you use?

Verify the solution.

- a) $-12a = 15 - 15a$
- b) $10.6y = 2.1y - 27.2$
- c) $-10.8 + 7z = 5z$
- d) $6u - 11.34 = 4.2u$
- e) $-20.5 - 2.2b = -7.2b$
- f) $-5.3p = -9 - 8.9p$

11. Solve each equation. Verify the solution.

- a) $2 - 3n = 2n + 7$
- b) $13 - 3q = 4 - 2q$
- c) $-2.4a + 3.7 = -16.1 + 3.1a$
- d) $8.8v + 2.1 = 2.3v - 16.1$
- e) $-2.5x - 2 = -5.7x + 6$
- f) $6.4 - 9.3b = 25.3 - 3.9b$

12. Two rental halls are considered for a wedding.

Hall A costs \$50 per person.

Hall B costs \$2000, plus \$40 per person.

Determine the number of people for which the halls will cost the same to rent.

- a) Model this problem with an equation.
- b) Solve the problem.
- c) Verify the solution.



13. Five subtract 3 times a number is equal to 3.5 times the same number, subtract 8. Write, then solve an equation to determine the number. Verify the solution.

14. A part-time sales clerk at a store is offered two methods of payment.

Plan A: \$1500 per month with a commission of 4% on his sales

Plan B: \$1700 per month with a commission of 2% on his sales

Let s represent the sales in dollars.

- a) Write an expression to represent the total earnings under Plan A.
- b) Write an expression to represent the total earnings under Plan B.
- c) Write an equation to determine the sales that result in the same total earnings from both plans.
- d) Solve the equation. Explain what the answer represents.

15. Verify each student's work.

If the solution is incorrect, write a correct and complete solution.

a) Student A:

$$\begin{aligned} 2.2x &= 7.6x + 27 \\ 2.2x - 7.6x &= 7.6x + 27 - 7.6x \\ -5.4x &= 27 \\ \frac{-5.4x}{-5.4} &= \frac{27}{-5.4} \\ x &= 5 \end{aligned}$$

b) Student B:

$$\begin{aligned} -2.3x - 2.7 &= 2.2x + 11.7 \\ -2.3x - 2.7 + 2.2x &= 2.2x + 11.7 + 2.2x \\ -0.1x - 2.7 &= 11.7 \\ -0.1x - 2.7 + 2.7 &= 11.7 + 2.7 \\ -0.1x &= 14.4 \\ \frac{-0.1x}{-0.1} &= \frac{14.4}{-0.1} \\ x &= -144 \end{aligned}$$

16. a) Solve each pair of equations.

i) $\frac{x}{27} = 3$; $\frac{27}{x} = 3, x \neq 0$

ii) $\frac{a}{36} = 12$; $\frac{36}{a} = 12, a \neq 0$

b) How are the steps to solve for a variable in the denominator of a fraction similar to the steps used to solve for a variable in the numerator? How are they different? Explain.

17. Solve each equation. Verify the solution.

a) $4(g + 5) = 5(g - 3)$

b) $3(4j + 5) = 2(-10 + 5j)$

c) $2.2(h - 5.3) = 0.2(-32.9 + h)$

d) $0.04(5 - s) = 0.05(6 - s)$

18. **Assessment Focus** Hendrik has a choice of 2 companies to rent a car.

Company A charges \$199 per week, plus \$0.20 per kilometre driven.

Company B charges \$149 per week, plus \$0.25 per kilometre driven.

Determine the distance that Hendrik must drive for the two rental costs to be the same.

a) Model this problem with an equation.

b) Solve the problem.

c) Verify the solution.

Show your work.



19. Solve each equation.

a) $\frac{7}{2}(m + 12) = \frac{5}{2}(20 + m)$

b) $\frac{1}{3}(5 - 3t) = \frac{5}{6}(t - 2)$

c) $\frac{3}{2}(1 + 3r) = \frac{2}{3}(2 - 3r)$

d) $\frac{2}{3}(6x + 5) = \frac{4}{5}(20x - 7)$

20. Both Dembe and Bianca solve the equation:

$$\frac{x}{3} + \frac{x}{4} = x - \frac{1}{6}$$

Dembe clears the fractions by multiplying each side by 12. Bianca clears the fractions by multiplying each side by 24.

a) Solve the equation using each student's method. Compare the solutions.

b) When you solve an equation involving fractions, why is it a good idea to multiply each side by the least common denominator?

21. Solve each equation. Verify the solution.

a) $\frac{x}{4} + \frac{7}{4} = \frac{5}{6}$

b) $\frac{5x}{16} - \frac{5}{4} = \frac{x}{4}$

c) $2 - \frac{x}{24} = \frac{5x}{24} + 1$

d) $\frac{25}{9} + \frac{x}{9} = \frac{7x}{6} - \frac{5}{2}$

Take It Further

22. In volleyball, statistics are kept about players.

The equation $B = M + \frac{1}{2}A$ can be used to calculate the total blocks made by a player.

In the equation, B is the total blocks, M is the number of solo blocks, and A is the number of assisted blocks. Marlene has 9 total blocks and 4 solo blocks. How many assisted blocks did Marlene make? How do you know that your answer is correct?

23. A cell phone company offers two different plans.

Plan A

Monthly fee of \$28

30 free minutes

\$0.45 per additional minute

Plan B

Monthly fee of \$40

No free minutes

\$0.25 per minute

- Write an equation to determine the time in minutes that results in the same monthly cost for both plans.
- Solve the equation.
- Verify the solution.

Reflect

List some strategies for solving an equation. For each strategy, provide an example of an equation and its solution.

Math Link

Science

Ohm's Law relates the resistance, R ohms, in an electrical circuit to the voltage, V volts, across the circuit and the current, I amperes, through the circuit: $R = \frac{V}{I}$

For a light bulb, when the voltage is 120 V and the resistance is 192 Ω , the current in amperes can be determined by solving this equation: $192 = \frac{120}{I}$



**Start
Where You
Are**

**How Can I Use My
Problem-Solving Skills?**

Suppose I have to solve this problem:
 The sale price of a jacket is \$41.49.
 The original price has been
 reduced by 17%.
 What was the original price?



- What do I know?
 - The sale price is \$41.49.
 - This is 17% less than the original price.
- What strategy could I use to solve the problem?
 - I could write, then solve an equation.

Let d dollars represent the original price.
 17% of d is $0.17d$.

A word equation is:

(original price) $-$ (17% of original price) is \$41.49

An algebraic equation is:

$$1d - 0.17d = 41.49$$

Combine the terms in d .

$$0.83d = 41.49$$

Divide each side by 0.83.

$$\frac{0.83d}{0.83} = \frac{41.49}{0.83}$$

$$d \doteq 49.99$$

- I could write, then solve a proportion.

Let d dollars represent the original price, which is 100%.

Since the price has been reduced by 17%,

the sale price is 100% $-$ 17%, or 83% of the original price.

So, the ratio of sale price to original price is equal

to the ratio of 83% to 100%.

As a proportion: $\frac{41.49}{d} = \frac{83}{100}$

$$\frac{41.49}{d} = \frac{83}{100}$$

Multiply each side by 100.

$$100 \times \frac{41.49}{d} = 100 \times \frac{83}{100}$$

$$\frac{4149}{d} = 83$$

Multiply each side by d .

$$d \times \frac{4149}{d} = 83 \times d$$

$$4149 = 83d$$

Divide each side by 83.

$$\frac{4149}{83} = \frac{83d}{83}$$

$$49.99 \doteq d$$