



Connect and Reflect

Key Ideas

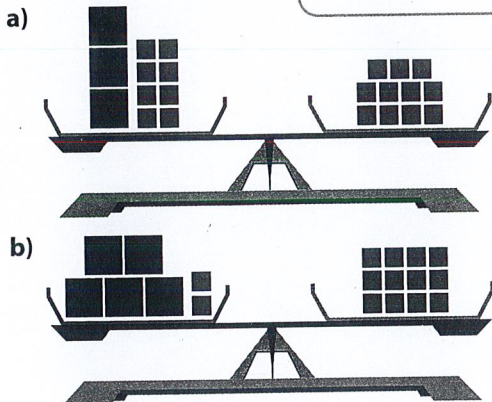
- When solving an equation, it is important to keep the equation balanced at all times.
- To solve an equation, isolate the variable on one side of the equal sign by undoing the operations performed on the variable.
- To undo the operations performed on the variable, follow the reverse order of operations:
 - subtract and/or add
 - multiply and/or divide
- To check your solution
 - Substitute your answer into the equation. Both sides should have the same value. If both sides are not the same value then check your solution to see if you made a mistake.
 - Draw a diagram to model the equation.

Practise

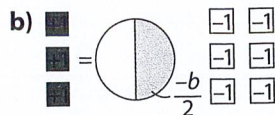
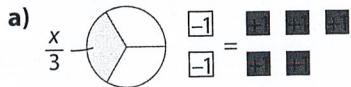
For help with #1 to #3, refer to Example 1 on pages 200–201.

1. Solve the equation modelled by each scale. Check your solution.

Each represents 1 unit.
Each represents 1 variable.



2. Solve the equation modelled by each diagram. Check your solution.



3. Draw a model for each equation. Then solve. Verify your answer.

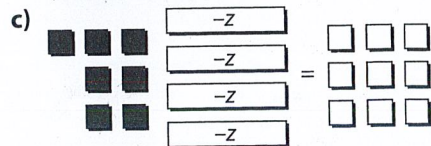
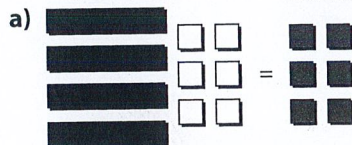
a) $-5 + -2g = 3$

b) $-3 = -7 - \frac{n}{5}$

For help with #4, refer to Example 2 on page 202.

4. Solve each equation modelled by the algebra tiles. Check your solution.

= 1 unit.
 = -1 unit.
 = 1 variable.
 = -1 variable.



For help with #5 to #7, refer to Example 3 on page 203.

5. Solve each equation. Check your answer.

a) $6r + 6 = 18$

b) $4m + 8 = 12$

c) $39 + 9g = 75$

d) $37 = 6f + 139$

6. Solve. Verify your answer.

a) $-17 = 3k + 4$

b) $29 = -14n + 1$

c) $8x - 7 = -31$

d) $-10 = -6n + 2$

7. Solve each equation. Check your answer

a) $\frac{t}{-5} + 12 = 9$

b) $\frac{p}{13} - 2 = -3$

c) $6 - \frac{k}{12} = 15$

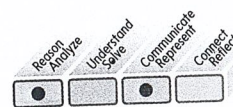
d) $14 = 11 - \frac{x}{3}$

Apply

8. Draw diagrams to show how you would solve the equation $24 = 14 - 5x$ using algebra tiles. Explain each step in words.

9. a) Describe the order of operations you would use to isolate the variable in the equation $5x + 10 = 40$.

b) If the equation is changed to $5x - 10 = 40$, would you use the same order of operations to isolate the variable? Explain.



10. Show whether $x = -3$ is the solution to each equation.

a) $-8x - 1 = 25$

b) $30 = 6x + 12$

11. Show whether $n = -72$ is the solution to each equation.

a) $6 + \frac{n}{9} = 14$

b) $\frac{n}{-3} + 6 = -18$

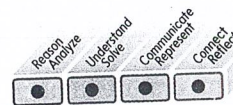
12. ✓ Competency Check

Brennan is saving \$750 to buy a tablet. If he triples the amount he has saved so far, he will have \$30 more than he needs. The equation $3s - 30 = 750$ models the situation, where s represents the amount he has saved so far.

a) Explain how $3s - 30 = 750$ models the situation.

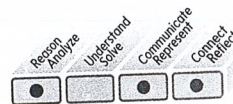
b) How much money has Brennan saved so far?

c) What other strategy could you use to determine Brennan's savings?



13. ✓ Competency Check

Describe a situation that the equation $\frac{x}{4} - 2 = 3$ can model. Compare your situation with a classmate's. How are they similar? How are they different?



14. You are buying lunch at Sandwich Express. A sandwich costs \$4. Your choice of extras cost \$2 each. You have \$10.

MENU

Your choice of extras, only \$2 each:

salad	milk	jumbo cookie
fries	juice	frozen yogurt

- a) How many extras can you buy if you spend all of your money?
- b) Suppose you have \$30 to buy lunch for you and your friends. If you buy 6 sandwiches, how many extras can you buy? Show how you know.
15. If Jennifer doubles the money that she has in her account now and then takes out \$50, she will have enough left in her account to buy a new bike that costs \$299. What is the minimum amount of money Jennifer has in her account now? How did you determine your answer?

16. An eagle is hunting a bird in flight. The eagle begins its descent from a height of 75 m. The eagle reaches its prey at a height of 3 m. The formula $75 - 6t = 3$ models this situation, where t represents the time, in seconds.

Reason Analyze	Understand Solve	Communicate Represent	Connect Reflect
●	●	□	●

- a) What do you think the value of 6 represents in the equation?
- b) After how many seconds does the eagle reach its prey?



17. In the formula $T = t - \frac{h}{150}$, T is the air temperature in degrees Celsius at an altitude of h metres, and t is the ground temperature in degrees Celsius.



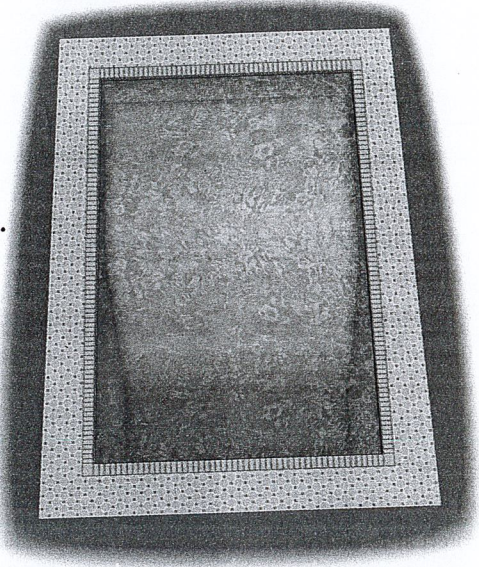
- a) If the ground temperature is 25 °C, what is the temperature outside an aircraft at an altitude of 7500 m?
- b) What is the altitude of the same plane if the outside air temperature is -35 °C?

Reason Analyze	Understand Solve	Communicate Represent	Connect Reflect
□	●	□	□

18. How is solving an equation of the form $\frac{x}{a} + b = c$ similar to solving one of the form $ax + b = c$? How is it different?

Extend

19. The deck around a swimming pool has the same width all the way around. The perimeter of the pool is 30 m. The outside perimeter of the deck is 76 m. What is the width of the deck? Explain your thinking.



20. The variable m is a positive integer. The variable n is an integer from 0 to 9. Identify all of the values for m that would satisfy the equation $3m + n = 2008$.
21. Mallika walks at 2 km/h for 2 h and then cycles at x km/h for 3 h. If the average speed for the whole journey is 3 km/h, how fast did she cycle? Give your answer to the nearest tenth of a kilometre per hour.
22. Haruka is at an outdoor concert in Vancouver. He is sitting 120 m from the band. The formula that gives the length of time for the band's sound to reach him is $t = \frac{d}{330}$, where t is the time, in seconds, and d is Haruka's distance from the band, in metres. Mara is listening to the same concert on a radio in Moncton which is approximately 4267 km from Vancouver. The formula that gives the length of time for the band's sound to reach her is $t = \frac{m}{298\,000\,000}$, where t is the time, in seconds, and m is the distance from Moncton to Vancouver, in metres.
- Who hears each sound first, Haruka or Mara?
 - How close to the band would Haruka need to sit in order to hear the music at the same time as Mara?

