17. A person's accurate typing speed can be estimated using the formula 
\[ S = \frac{w - 5e}{10} \] 
where \( S \) is the person's accurate typing speed in words per minute, \( w \) is the number of words typed in 10 minutes, and \( e \) is the number of errors made in 10 minutes. Cameron took a typing test and recorded an accurate typing speed of 37.5 wpm. He was told he had typed a total of 450 words in 10 minutes. How many errors did he make?

18. The perimter of a rectangle is 37 cm. The width of the rectangle is 4 cm shorter than the length. The perimeter of a rectangle can be calculated using the formula \( P = 2(l + w) \) or \( P = 2l + 2w \). Show that both versions of the formula give the same values for the length and width of the given rectangle. Explain how the two equations relate differently to the rectangle.

19. Competency Check Bridges are built with gaps because the steel expands or contracts as the temperature changes. The change, \( C \), in centimetres, of the length of a 100-m-long steel girder at an air temperature of 10°C can be calculated using the formula \( C = \frac{2}{25} (T - 10) \), where \( T \) is the air temperature in degrees Celsius.
   a) At what air temperature does the steel girder expand by 5 cm?
   b) At what air temperature does the steel girder contract by 5 cm?
   c) What would be a reasonable gap size for this bridge? Justify your reasoning with calculations.

20. A principle of science states that when a lever is balanced, \( F_1x = F_2y \), where \( F_1 \) and \( F_2 \) are the forces, or weights, in Newtons, applied at the ends of the lever, and \( x \) and \( y \) are their respective distances from the fulcrum.

For the lever system shown to be in balance,
   a) How far from the fulcrum should each weight be?
   b) How long must the lever be?

21. The distance, in metres, an object will fall after \( t \) seconds can be approximated by the equation \( d = (4.9t + v) \), where \( v \) is the initial velocity. What was the initial velocity of an object that has fallen 53.4 m after 4 s?

22. Rewrite each equation, solving for the indicated variable.
   a) \( 2(x - 5) = y; x = \)
   b) \( \frac{3m - 4}{2} = 5n; m = \)
6. **Competency Check** To play the online game Dragons of Yore, there are two price plans available.
   - Plan A: Pay $4.95 for unlimited usage for a month.
   - Plan B: Pay $5.50 plus $0.25 per 4-hour visit.

Write an expression representing the cost of each plan. Determine how many visits you could make with Plan B before Plan A becomes more economical.

7. **Competency Check** A bucket of water is half full. Barb added 5.4 L of water to provide a total volume of 17.4 L. How much water will the bucket hold? Check your answer.

8. A shelving unit is to be made from 16 m of wood. It will have 2 vertical sides of height 2.5 m and an unknown number of 2-m-long shelves.
   a) Use a diagram to show this situation.
   b) Write an equation modelling this situation. What does your unknown represent?
   c) How many shelves can be made? How much scrap wood will remain?

9. Chang has developed a strategy for setting up a linear equation. In the question part of the word description, he identifies the verb and replaces it with an equal sign. On each side of the equal sign, he builds an expression representing the words on that side of the verb. How would that strategy work for question 8?

10. A taxi charges a flat fee of $3.50 plus $0.75 per kilometre. How far could a passenger travel for $10?

11. To convert temperature between Celsius and Fahrenheit degrees, you can use the formula $F = \frac{9}{5}C + 32$. Convert each of the following.
   a) 10 °C to Fahrenheit
   b) 32 °F to Celsius
   c) –30 °C to Fahrenheit
   d) 22 °F to Celsius

12. In #11, which is easier to solve for, degrees Celsius or degrees Fahrenheit? Explain why.

13. Sarah earns a base salary of $2500 per month plus 5% commission on all sales at a computer store. How much does she need to sell in order to earn $4000 in a month?

14. A pipe is 12 m long. Simran wants to cut it into two sections so that one section is half as long as the other. Calculate the length of each section of pipe. Describe the method you used.

15. **Competency Check** The world population increased in a linear manner from 1975 to 2015. The population was about 4.061 billion in 1975 and increased by an average of 86.3 million people per year until 2015.
   a) Set up an equation to calculate the population $t$ years after 1975.
   b) What was the approximate population in 2000?
   c) Estimate the year in which the world population reached 7.5 billion.
   d) Graph this equation and describe the relation.

16. **Competency Check** A 22-m-long chain is to be cut into 3 sections. The length of the shortest piece is to be $\frac{1}{3}$ of the longest piece. The length of the middle piece is to be $\frac{1}{2}$ of the longest piece. How long is each piece?
   a) Write an equation to represent this situation.
   b) Solve the equation to determine the length of each piece.
   c) Josh used the following incorrect equation. Describe his thinking.

   Let $x$ be the length of the shortest piece.
   $3x + 2x + x = 22$

   d) Solve Josh’s equation and show that it has a different solution from yours.

17. A marketing company has two machines that stuff envelopes. One machine can stuff a batch of 10 000 envelopes in 3 hours. The second machine can stuff the same-sized batch in 5 hours. Working together, how long would it take for the machines to stuff the 10 000 envelopes?

18. The perimeter of a rectangle is 80 cm. What could the area be?

19. Solve the following equations.
   a) $\frac{1}{4} = \frac{5}{x - 4}$
   b) $\frac{2}{x - 2} = \frac{1}{3}$
   c) $\frac{3}{x - 5} - \frac{1}{x} = 0$