

Setting up linear equations

Starter

1. (Review of last lesson)

Solve: (a) $\frac{3x + 1}{7} = \frac{2}{3}x$ (b) $\frac{x + 7}{x + 5} = 3$ (c) $\frac{9}{5x} - 7 = 1$

2. Find the value of x , given that the angles in the triangle are $5x$, $7x$ and 20° .

Notes

Write down the key information from the question.

Form an equation.

Solve the equation.

E.g. 1 The perimeter of a rectangle is 146 cm. Given that the sides are $4x$ and $x + 8$, find:

- (a) the value of x and
- (b) the area of the rectangle.

Working:

(a) Perimeter of a rectangle = $2 \times \text{length} + 2 \times \text{width}$

$$2 \times 4x + 2(x + 8) = 146$$

Expand the brackets:

$$8x + 2x + 16 = 146$$

Collect like terms:

$$10x + 16 = 146$$

Subtract 16 from both sides:

$$10x = 130$$

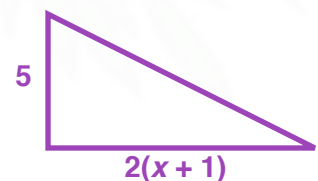
Divide both sides by 10:

$$x = 13 \text{ cm}$$

(b) Length of rectangle = $4x = 4 \times 13 = 52$
Width of rectangle = $x + 8 = 13 + 8 = 21$
Area of rectangle = $52 \times 21 = 1092 \text{ cm}^2$.

E.g. 2 The area of the right-angled triangle is 30 cm^2 . Find:

- (a) the value of x and
- (b) the length of the hypotenuse.



E.g. 3 A woman is 32 years older than her son. Ten years ago she was 3 times as old as her son was then. Find the present age of each.

Algebraic representations of number patterns

Consecutive numbers: $n, n + 1, n + 2, \dots$

Two times an integer is an even number.

Even numbers: $2n, 2n + 2, 2n + 4, \dots$

Odd numbers are one more than the even numbers

Odd numbers: $2n + 1, 2n + 3, 2n + 5, \dots$

E.g. 4 The sum of four consecutive numbers is 90. Find the numbers.

Working: Let the four consecutive numbers be $n, n + 1, n + 2, n + 3$
The sum is 90: $n + n + 1 + n + 2 + n + 3 = 90$
Collect like terms: $4n + 6 = 90$
Subtract 6 from each side: $4n = 84$
Divide both sides by 4: $n = 21$
The four consecutive **even** numbers are 21, 22, 23 and 24.

E.g. 5 The sum of four consecutive **even** numbers is 524. Find the four numbers.

Video: [Forming and solving equations/
Solutions to Starter and E.g.s](#)

Exercise

9-1 class textbook: p162 M6.4 Qu 1-18
A*-G class textbook: p152 M6.4 Qu 1-16
9-1 homework book: p57 M6.4 Qu 1-10
A*-G homework book: p42 M6.4 Qu 1-8

Summary

Write down the key information from the question.
Form an equation.
Solve the equation.

Consecutive numbers: $n, n + 1, n + 2, \dots$
Even numbers: $2n, 2n + 2, 2n + 4, \dots$
Odd numbers: $2n + 1, 2n + 3, 2n + 5, \dots$