Using equations

- Using an equation to represent a problem
- Using the solution of the equation to solve the problem

Keywords

You should know

explanation 1a explanation 1b online

1 Solve these equations.

a $n + 11 = 16$ **b** $t - 10 = 45$ **c** $4p = 24$

d $7z = 35$ **e** $2h + 1 = 17$ **f** $2m - 1 = 11$

2 Solve these equations.

a $3x + 5 = 38$ **b** $10x - 14 = 56$ **c** $12 + 7x = 54$

d $48 - 5x = 13$ **e** $22 = 7x - 41$ **f** $87 = 3x + 12$

3 Solve these equations. Give your answers as fractions in their lowest terms.

a $8p + 11 = 15$ **b** $16 + 9t = 22$ **c** $24 - 10n = 18$

d $35 = 12a + 27$ **e** $41 = 17y + 29$ **f** $46 + 24g = 61$

4 Solve these equations. Give your answers as mixed numbers.

a $14 + 5r = 30$ **b** $50 - 8h = 39$ **c** $35 = 7d + 15$

d $29 = 11x - 24$ **e** $9s - 23 = -4$ **f** $-9 = 4k - 18$

5 Solve these equations. Give your answers as decimals.

a $9 + 2g = 16$ **b** $25 = 16 + 4w$ **c** $5x + 11 = 14$

d $-8 + 10b = 81$ **e** $14m + 9 = 30$ **f** $31 - 6y = 4$

6 Simplify and solve these equations.

a $2x + 7 + 3x - 4 = 33$ **b** $x + (x + 1) + (x + 2) + (x + 3) = 34$

explanation 2

7 You can use algebra to help you solve the puzzle shown on this scroll.

Age-old puzzle

Scott is 3 years older than his sister Lucy.

Their parents are the same age, which is three times Lucy's age.

The sum of all four ages is 99 years. How old is Scott?

Use x to represent Lucy's age in years.

a Write an expression for Scott's age using x.

b How old is each of their parents in terms of x?

c Write an expression for the sum of all four ages and simplify it.

d Use the final piece of information from the scroll to write an equation.

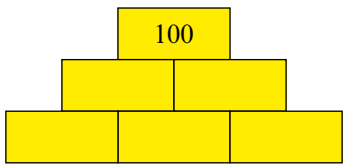
e Solve the equation.

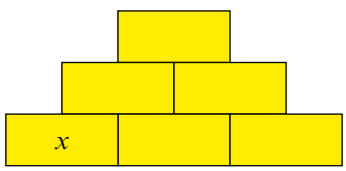
f How old is Scott?

8 This diagram shows an addition pyramid.

The bottom three numbers are consecutive integers, increasing from left to right.

What are the missing numbers?





Follow the steps below to solve the puzzle.

a Copy the second diagram and write expressions for the missing numbers in the bottom row.

b Use the rules for an addition pyramid to find expressions for the other missing numbers.

Simplify them and write them in the spaces.

c Write an equation using what you know about the top number in the pyramid.

d Solve the equation.

e Copy the top diagram and fill in the missing numbers.

9 Karam added 5 consecutive integers to make a total of 2010.

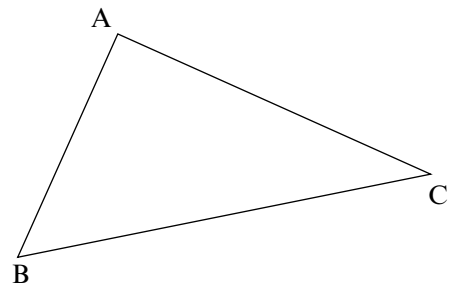
What were the integers that Karam used?

Use x to represent the first number.

10 In this triangle

$\angle ACB = 2 \times \angle ABC$

$\angle BAC = \angle ABC + \angle ACB$



a Use x to represent $\angle ABC$ and write

i $\angle ACB$ in terms of x

ii $\angle BAC$ in terms of x

iii an equation based on the sum of the angles

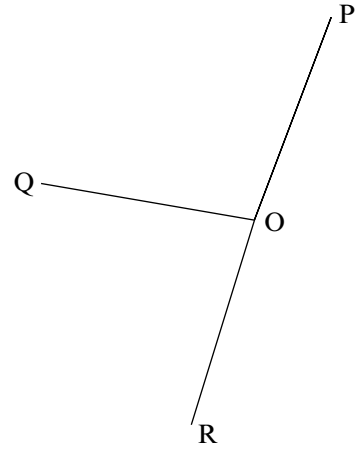
b Solve the equation.

c Find the size of each angle.

11 This diagram shows angles.

$\angle POR$ is 80° larger than $\angle POQ$

$\angle QOR$ is 23° smaller than $\angle POQ$



a Use x to represent $\angle POQ$ and write an equation based on the sum of the angles.

b Solve the equation.

c Find the size of each angle.

explanation 3 online

12 Solve these equations.

a $3(x + 11) = 48$ **b** $4(x - 9) = 24$ **c** $6(12 - x) = 18$

d $8(3 + x) = 72$ **e** $6(x + 8) = 30$ **f** $5(3 - x) = 35$

13 Solve these equations by expanding the brackets first.

a $4(h + 2.5) = 30$ **b** $5(r + 2) + 11 = 56$ **c** $42 = 4(d - 1) + 6$

d $34 = g + 4(2g - 5)$ **e** $p + 3(p - 7) = 23$ **f** $9(v + 1) - 2v - 44 = 0$

14 Solve these equations.

a $\frac{x + 11}{4} = 7$ **b** $\frac{u}{5} - 9 = 2$ **c** $14 = \frac{t + 23}{3}$

d $\frac{y}{10} + 19 = 23$ **e** $\frac{a - 7}{6} = 5$ **f** $-7 = \frac{e}{5} - 11$

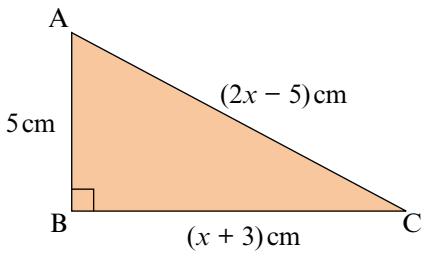
15 **a** Write an expression for the area of triangle ABC.

b The area of the triangle is $30\,\text{cm}^2$.

Write this information as an equation.

c Solve the equation.

d Write down the length of AC.



16 **a** I think of a number, add 17 and then divide by 5. My answer is 5.4.

Write this information as an equation. Solve the equation to find my number.

b I think of a number, divide it by 6, then subtract the result from 20. My answer is 11.5.

Write this information as an equation. Solve the equation to find my number.

17 The nth term of a sequence is $4(n + 9)$.

a Which term has value 96?

b How many terms have a value less than 50?

c Show that there isn't a term with value 45.

18 Find the coordinates of the point where the graph of $y = \frac{x + 7}{3}$ crosses the graph of $y = 4$.