



Aberdare Community School
Mathematics Department

WJEC GCSE
Higher – Calculator
Algebra

Writing expressions, formulae and equations

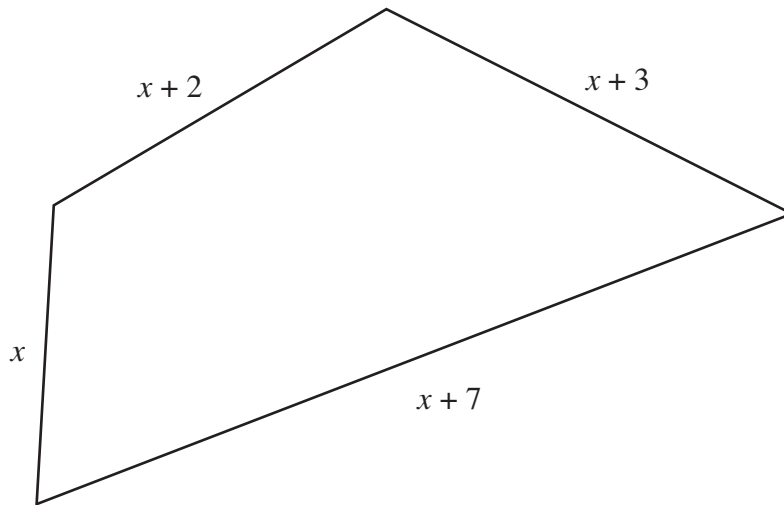
Name:

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2. The diagram shows a quadrilateral.
The lengths of the sides are all given in centimetres.



- (a) Write an expression for the perimeter of the quadrilateral in terms of x .

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[1]

- (b) (i) The perimeter of the quadrilateral is 40 cm.
Write down an equation in terms of x .

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(ii) Solve the equation.
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[2]

- (c) Write down the lengths of the four sides of the quadrilateral.

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[1]

4.



Diagram not drawn to scale

A ribbon is tied around **all** the sides of a box as shown in the diagram.
 The ribbon is placed across **each** face of the box and always meets the edges of the box at right angles.
 The bow is tied on top of the box, as shown.

- (a) Calculate the total length of ribbon required to decorate a box with length 8.5 cm, width 4.6 cm and height 2.2 cm. The bow is made using 18 cm of ribbon.

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[2]

- (b) A different box is to be decorated with ribbon in the same way.
 The bow is made using 18 cm of ribbon.
 The box has length l cm, width w cm and height h cm.
 Write down an expression for the total length of ribbon needed to decorate this box.

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[2]

1. Write down expressions for each of the following.

(a) The total cost of 10 pencils at g pence each and 5 pens at h pence each.

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(b) The mean height of the three boys listed below.

	Height in cm
Adam	x
Tommy	y
Joseph	z

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[2]

(c) The perimeter of a rectangle with length l cm and width w cm.

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[2]

(d) The smaller share when $\pounds q$ is shared in the ratio 1:3.

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[2]

12. The fee for advertising on an Internet website includes a charge for the number of words in an advertisement, as well as a standard charge.

There is a standard charge of R pounds for the placement of each advertisement.

The charge, in pounds, for the number of words in an advertisement is equal to one-tenth of the total number of words.

(a) Derive a formula for B , the total fee in pounds, for placing an advertisement which has h words.

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(b) A seller is charged a fee of £4.60 for placing an advertisement on this website. The standard charge is £2. Calculate how many words were placed in the advertisement.

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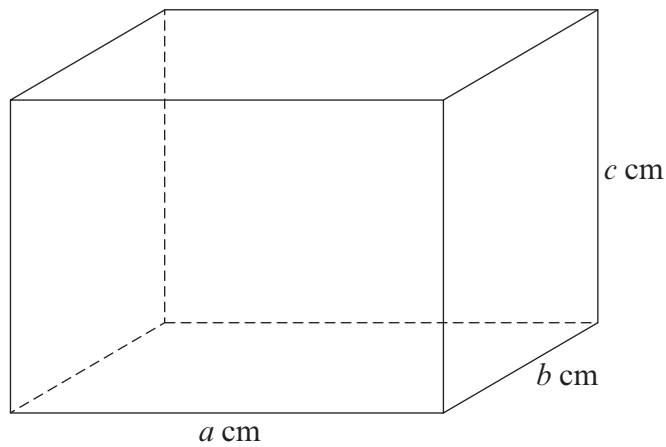
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- (b) Joseph works in a factory that makes boxes.
The boxes are all cuboids.
Each cuboid has dimensions a cm, b cm and c cm.



Joseph has been asked to write a simplified expression for the total length of all the edges of the cuboid.

Joseph writes down the expression $2a + 3b + 4c$.

Joseph's expression is incorrect.

What should the correct simplified expression be for the total length of all the edges?

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10. (a) It takes eight workers six days to lay paving slabs to make a 230 metre straight path.

- (ii) How long would it take 3 workers to make the path?
You may assume that all workers work at the same rate.

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[2]

- (b) It takes x workers d days to lay paving slabs to make a straight path.
Write an equation to give the time T , in days, that it would take w workers, working at the same rate, to make a path of the same length.

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[3]

1. (a) Write down expressions for each of the following.

- (i) The total cost, in pence, of 3 buttons at e pence each and 2 sewing needles at f pence each.

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- (ii) The total cost of these buttons and needles in pounds.

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[1]

(b) Write down an expression for the number of metres in t kilometres.

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(c) Write down an expression for the following.

The total amount of money donated to a charity by 5 people, given that the mean amount of money each gave was x pounds.

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(d) Write down an expression for the area of the right-angled triangle shown below written in its simplest form.

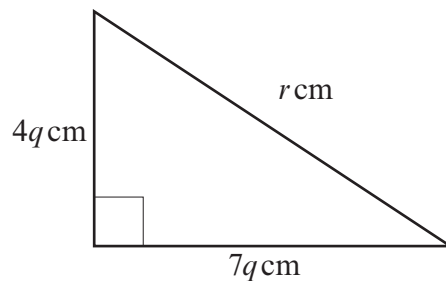


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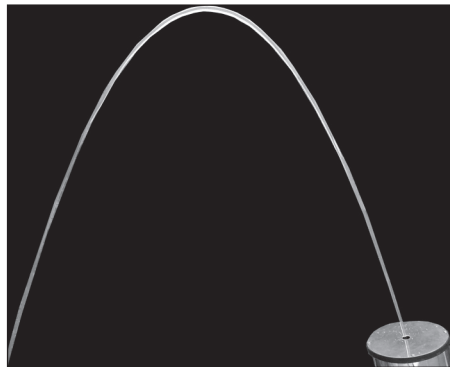
13. A fountain has jets of water that start from water level and reach different heights.



Rosie has taken a photograph of the fountain.
She has also recorded some information about one of the jets of water.

She finds

- the maximum height of the jet of water is 6.25 metres
- at its maximum height it is at a horizontal distance of 2.5 metres from the start of the jet of water
- the shape of the path of the water is a symmetrical curve



Rosie finds that the path of this jet of water is represented by $y = -x^2 + bx$, where y is the vertical height, x is the horizontal distance and b is a constant.

(a) Find the equation that represents the path of this jet of water.

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Equation is

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- (b) The path of a different jet of water is represented by $y = -x^2 + cx$, where y is the vertical height, x is the horizontal distance and c is a constant.
This jet of water hits the surface of the water in the fountain 6 metres away.
The path of the jet of water is symmetrical.

Draw a sketch of the path of this jet of water.

You must indicate on your sketch

- the horizontal distance measured as the jet of water reaches its maximum height
- the maximum height of the jet of water

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END OF PAPER

8. Evan is an assistant engineer.

(a) Evan has been asked to write down an equation to work out the total perimeter of any regular polygon.

The total length of the perimeter is P cm, the number of sides the regular polygon has is n , and each side measures s cm.

Write down an equation in terms of P , n and s .

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6. You will be assessed on the quality of your written communication in this question.

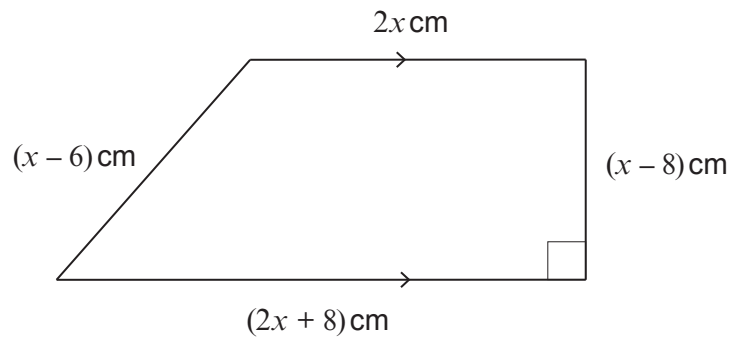


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The **perimeter** of the trapezium is 132 cm.

Calculate the height of the trapezium.
You must show all your working.

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7. (a) The number b is double the number c .
Use this information to write an equation in terms of b and c .

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- (b) When five times a whole number n is added to seven, the total is less than fifty-two.
Write down an inequality which is satisfied by n and rearrange it in the form $n < a$
where a is a whole number.

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17. The triangle below has an area of 10 cm^2 .
Calculate the value of x .

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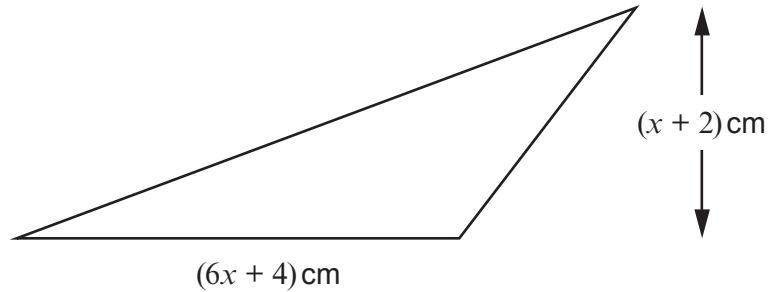


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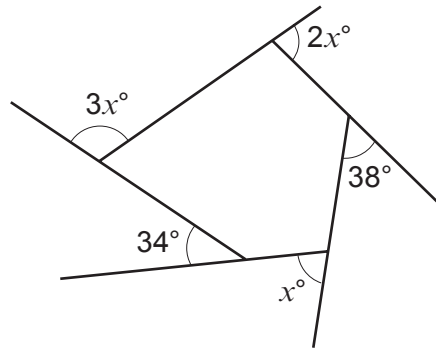


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Calculate the value of x .

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