**Algebra and Shape**

**1.**

Diagram **NOT** accurately drawn

The diagram shows the length, in centimetres, of each side of the rectangle.  
The perimeter of the rectangle is *P* cm.

Work out the value of *P*.

*P* = ............................

(Total 4 marks)

**2.** *ABC* is an isosceles triangle.



*AB* = *AC*  
*AB* = 3*p* + *q*  
*BC* = *p* + *q*

(a) Find an expression, in terms of *p* and *q*, for the perimeter of the triangle.  
Give your answer in its simplest form.

...................................

(2)

Angle *A* = *x*°

(b) Find an expression, in terms of *x*, for the size of angle *B*.

...................................

(2)

(c) Solve the simultaneous equations

3*p* + *q* = 11

*p* + *q* = 3

*p* = ...................................

*q* = ...................................

(3)

(Total 7 marks)

**3.**



The diagram shows a trapezium.  
The lengths of three of the sides of the trapezium are *x* – 5, *x* + 2 and *x* + 6.  
All measurements are given in centimetres.

The area of the trapezium is 36 cm2.

(a) Show that *x*2 – *x* – 56 = 0

(4)

(b) (i) Solve the equation *x*2 – *x* – 56 = 0

…………………………

(ii) Hence find the length of the shortest side of the trapezium.

…………………… cm

(4)

(Total 8 marks)

**4.**



The diagram shows a trapezium.   
The measurements on the diagram are in centimetres.  
The lengths of the parallel sides are *x* cm and 20 cm.  
The height of the trapezium is 2*x* cm.

The area of the trapezium is 400 cm2.

(a) Show that

*x*2 + 20*x* = 400

(2)

(b) Find the value of *x*.  
Give your answer correct to 3 decimal places.

.....................................

(3)

(Total 5 marks)

**5.** The length of a rectangle is twice the width of the rectangle.  
The length of a diagonal of the rectangle is 25 cm.



Work out the area of the rectangle.  
Give your answer as an integer.

................................... cm2

(Total 3 marks)

**6.**



A cuboid has a square base of side *x* cm.  
The height of the cuboid is 1 cm more than the length *x* cm.  
The volume of the cuboid is 230 cm3.

(a) Show that *x*3 + *x*2 = 230

(2)

The equation *x*3 + *x*2 = 230

has a solution between *x* = 5 and *x* = 6.

(b) Use a trial and improvement method to find this solution.  
Give your answer correct to 1 decimal place.  
You must show **all** your working.

*x* = ...........................

(4)

(Total 6 marks)

**7.**



Diagram **NOT**  accurately drawn

The diagram shows a rectangle.  
The width of the rectangle is *x* cm and its length is *y* cm.

The perimeter of the rectangle is 10 cm.

(a) Show that *x* + *y* = 5

(1)

The length of a diagonal of the rectangle is 4 cm.

(b) Show that 2*x*2 – 10*x* + 9 = 0

(3)

(c) Solve the equation 2*x*2 – 10*x* + 9 = 0 to find the possible values of *x*.  
Give your answers correct to 3 significant figures.

......................................

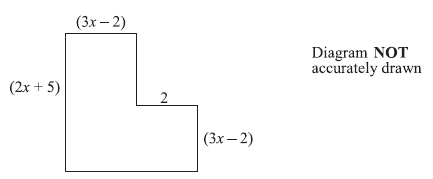
(3)

(Total 7 marks)

**8.** The diagram below shows a 6-sided shape.

All the corners are right angles.

All measurements are given in centimetres.



The area of the shape is 25 cm2.

(a) Show that 6*x*2 + 17*x* – 39 = 0

(3)

(b) (i) Solve the equation

6*x*2 + 17*x* – 39 = 0

*x* = …………… or *x* = ……………

(ii) Hence work out the length of the longest side of the shape.

………………..cm

(4)

(Total 7 marks)

**9.** The diagram shows a 6-sided shape.  
All the corners are right angles.  
All the measurements are given in centimetres.



Diagram **NOT**  
accurately drawn

The area of the shape is 85 cm2.

(a) Show that 9*x*2 – 17*x* – 85 = 0

(3)

(b) (i) Solve 9*x*2 – 17*x* – 85 = 0

Give your solutions correct to 3 significant figures.

*x =* .................................. or *x =* ..................................

(ii) Hence, work out the length of the shortest side of the 6-sided shape.

.................................. cm

(4)

(Total 7 marks)

**10.** The diagram below shows a 6-sided shape.  
All the corners are right angles.  
All the measurements are given in centimetres.



Diagram **NOT** accurately drawn

The area of the shape is 95 cm2.

(a) Show that 2*x*2 + 6*x* – 95 = 0

(3)

(b) Solve the equation

2*x*2 + 6*x* – 95 = 0

Give your solutions correct to 3 significant figures.

*x* = ...................................... or *x* = ......................................

(3)

(Total 6 marks)