

**Problem Solving with Algebra**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Class: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |
| --- |
| **Time**: 1 hour 20 mins |
| **Total marks available**: 70 | **Total marks achieved**: \_\_\_\_\_ |

**Q1.**

The diagram shows three sides of a regular polygon.



The size of each exterior angle of the regular polygon is *x*°.
The size of each interior angle of the regular polygon is 8*x*°.

Work out the number of sides the regular polygon has.

**(Total for question = 3 marks)**

**Q2.**The diagram shows **shape A**.
All the measurements are in centimetres.



(a) Find an expression, in terms of *x*, for the perimeter of **shape A**.

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

**(3)**

A square has the same perimeter as **shape A**.

(b) Find an expression, in terms of *x*, for the length of one side of this square.

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

**(1)**

**(Total for Question is 4 marks)**

**Q3.**

*ABC* is a triangle.



Angle *ABC* = angle *BCA*.

The length of side *AB* is (3*x* − 5) cm.

The length of side *AC* is (19 − *x*) cm.

The length of side *BC* is 2*x* cm.

Work out the perimeter of the triangle.

Give your answer as a number of centimetres.

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

**(Total for Question is 5 marks)**

**Q4.**(a)  Expand 5(2*c* + 3*d*)

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

**(1)**

(b)  Here are two straight lines, *ABCDE* and *PQ*.



In the diagrams all the lengths are in cm.

*AE* = 2*PQ*.

Find an expression, in terms of *x*, for the length of *DE*.

Give your answer in its simplest form.

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

**(4)**

**(Total for Question is 5 marks)**

**Q5.**

The diagram shows the plan of a floor.



The area of the floor is 138 m2.

Work out the value of *x*.

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

**(Total for Question is 4 marks)**

**Q6.**

Here is a rectangle.



All measurements on the diagram are in centimetres.

(a)  Find the value of *x*.

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

**(2)**

Here is a triangle.



(b)  Find the size of the angle marked *y*.

...........................................................°

**(2)**

**(Total for question = 4 marks)**

**Q7.**

The diagram shows a right-angled triangle.



All the angles are in degrees.

Work out the size of the smallest angle of the triangle.

...........................................................°

**(Total for question is 3 marks)**

**Q8.**

You can use this rule to work out the total hire charge, in pounds (£), for hiring a satellite phone.



Ismail wants to hire a satellite phone for 4 weeks.

(a)  Work out the total hire charge.

£...........................................................

**(2)**

Dominik hires a satellite phone.
His total hire charge is £ 860

(b)  For how many weeks did he hire the phone?

........................................................... weeks

**(3)**

**(Total for question = 5 marks)**

**Q9.**

The diagram shows a garden in the shape of a rectangle.



All measurements are in metres.
The perimeter of the garden is 32 metres.

Work out the value of *x*

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

**(Total for Question is 4 marks)**

**Q10.**



The diagram shows a parallelogram.
The sizes of the angles, in degrees, are

2*x*
3*x* – 15
2*x*
2*x* + 24

Work out the value of *x*.

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

**(Total for Question is 3 marks)**

**Q11.**

Here is a parallelogram.



Work out the value of *x* and the value of *y*.

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

*y* = ...........................................................

**(Total for question = 5 marks)**

**Q12.**



There are 300 m*l* of medicine in a bottle.
Mary has to take two 5 m*l* spoons full of medicine twice a day.

Mary has to take the medicine until the bottle is empty.

(a) How many days does Mary have to take the medicine for?

 . . . . . . . . . . . . . . . . . . . . . . days

**(3)**

You can work out the amount of medicine, *c* m*l*, to give to a child by using the formula

*c* = *ma*⁄150

*m* is the age of the child, in months.
*a* is an adult dose, in m*l.*

A child is 30 months old.
An adult's dose is 40 m*l*.

(b) Work out the amount of medicine you can give to the child.

 . . . . . . . . . . . . . . . . . . . . . . m*l*

**(2)**

**(Total for Question is 5 marks)**

**Q13.**

\*  This formula is used to work out the body mass index, *B*, for a person of mass *M* kg and height *H* metres.



A person with a body mass index between 25 and 30 is overweight.

Arthur has a mass of 96 kg.
He has a height of 2 metres.

Is Arthur overweight?
You must show all your working.

**(Total for Question is 3 marks)**

**Q14.**

Here is information about the cost of sending a parcel to Europe by Parcel Link.



Kate is going to send a parcel to Europe by Parcel Link.
The parcel weighs 12 kg.

Kate can send the parcel using next day delivery or using 3 day delivery.

(a)  Work out the difference in the two costs.

£...........................................................

**(3)**

Adam sends a parcel to Europe by Parcel Link.
He uses 3 day delivery.

The cost is £25

(b)  Work out how many kilograms Adam's parcel weighs.

........................................................... kg

**(3)**

**(Total for question = 6 marks)**

**Q15.**

Penelope is going to cook a chicken.

She uses this rule to find the cooking time.



The chicken has a weight of 2 kg.

Penelope wants to finish cooking the chicken at 12 30 pm.

What time should Penelope start cooking the chicken?

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

**(Total for question = 4 marks)**

**Q16.**

You can use these rules to change temperatures from °C to °F.

**approximate rule**  

**exact rule**               

Amy uses the **approximate rule** to change 20°C to °F.
Dan uses the **exact rule** to change 20°C to °F.

(a) Work out the difference between Amy's result and Dan's result.

...........................................................°F

**(4)**

Jade uses the **approximate rule** to change a temperature from °C to °F.
The result is 110°F.

(b) What °C temperature did Jade change to °F?

...........................................................°C

**(3)**

**(Total for Question is 7 marks)**