



GOING FOR GOLD

Problem Solving

Bronze Paper 1

Q	Topic	My Mark	Maximum Marks
1	Ratio		4
2	Probability		5
3	Polygons		4
4	Area		4
5	Pythagoras		5
6	Forming and solving equations		5
7	Percentages		5
8	Circle		4
9	Exchange rates and proportion		4
10	Volume and surface area		6
			46

Question 1 - Ratio

White paint cost £2.80 a litre.

Blue paint cost £3.50 a litre.

White and blue paint are mixed in the ratio 3:2

Work out the cost of 18 litres of the mixture.

- a) To make 5 litres of paint I would put 3 litres of white and 2 litres of blue paint. How much would 5 litres of the mixture cost?

(2 marks)

- b) How much would 1 litre of the mixture cost?

(1 mark)

- c) Work out the cost of 18 litres of the mixture.

(1 mark)

Question 2 - Probability

Karl wants to raise money for charity. He designs a game for people to play.

Karl uses a ten sided dice for the game. The dice is numbered 1 to 10.

Each person will roll the dice once. A person wins the game if the dice lands on a multiple of 4.

Ali plays the game once.

- a) Work out the probability that Ali will win the game.
 - i. How many multiples of 4 are in the numbers 1 to 10?

 - ii. What is the probability of getting a multiple of 4 if you choose one number from 1 to 10?

(2 marks)

Each person pays 30p to play the game once. The prize for a win is £1.

Karl thinks the game will be played 100 times.

- b) Work out an estimate for how much money Karl will raise for charity.
 - i. If the game is played 100 times and each person pays 30p to play. How much money will the charity collect from games (income)?

 - ii. If the game is played 100 times how many times will there be a winner (use part a to find the answer)

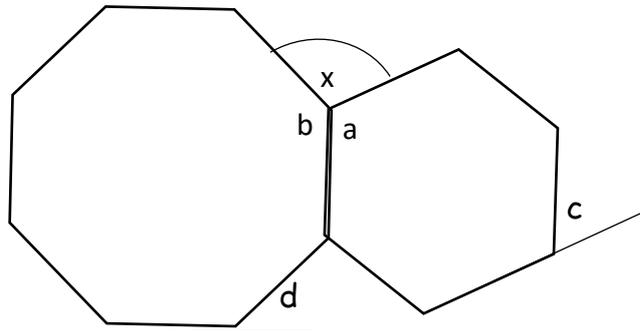
 - iii. How much money will be paid in winnings (outgoings)?

 - iv. How much profit will be made (Income - outgoings)?

(3 marks)

Question 3 - Polygons

The diagram shows a regular hexagon and a regular octagon.



Find angle x .

Information you need:

For all polygons the external angles total 360

To find the external angle of any polygon calculate

$$360 \div n \quad (\text{where } n \text{ is number of sides})$$

a) Calculate the external angle for the hexagon (c) and the octagon (d).

(1 mark)

Information you need:

The internal angle for any polygon is: $180 - \text{external angle}$

b) Calculate the internal angle for the hexagon (a) and the octagon (b).

(1 mark)

c) On the diagram label angle a and angle b. Use this information to find angle x .

(2marks)

Question 4 - Area

Here is a diagram of Jim's garden.

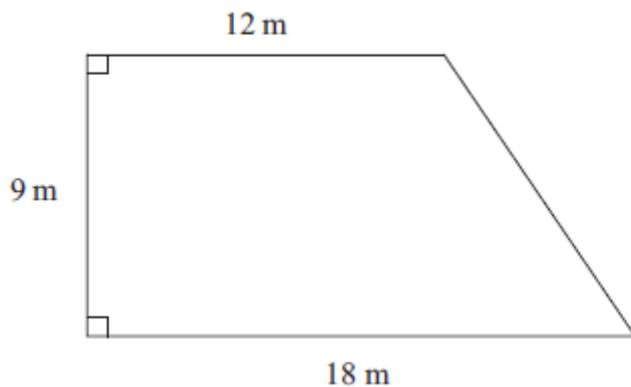


Diagram NOT
accurately drawn

Jim wants to cover his garden with grass seed to make a lawn.

Grass seed is sold in bags.

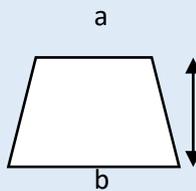
There is enough grass seed in each bag to cover 20 m^2 of garden.

Each bag of grass seed costs £4.99

Work out the least cost of putting grass seed on Jim's garden.

Information you need to know:

Area of a trapezium = $\frac{1}{2} (a + b) \times h$



a) Calculate the area of the trapezium

(2 marks)

b) Find the number of bags of grass seed required to cover the area of the garden (each bag covers 20 m^2)?

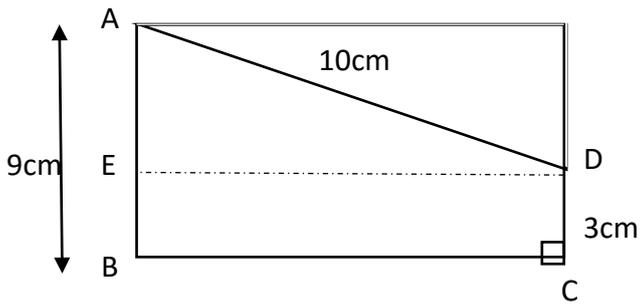
(1 mark)

c) Each bag of grass seed costs £4.99. Find the cost of the grass seed.

(1 mark)

Question 5 - Pythagoras

ABCD is a trapezium.



$$AD = 10 \text{ cm}$$

$$AB = 9 \text{ cm}$$

$$DC = 3 \text{ cm}$$

$$\text{Angle } ABC = \text{angle } BCD = 90^\circ$$

Calculate the length of AC .

Give your answer correct to 3 significant figures.

- a) Use the triangle ADE to find the length of DE (note $AE = AB - CD$)

(2 marks)

- b) Use the answer to part a) and the triangle ABC to find the length of AC

(3 marks)

Question 6 - Forming and solving equations

ABC is a triangle.

Angle $ABC = \text{angle } BCA$

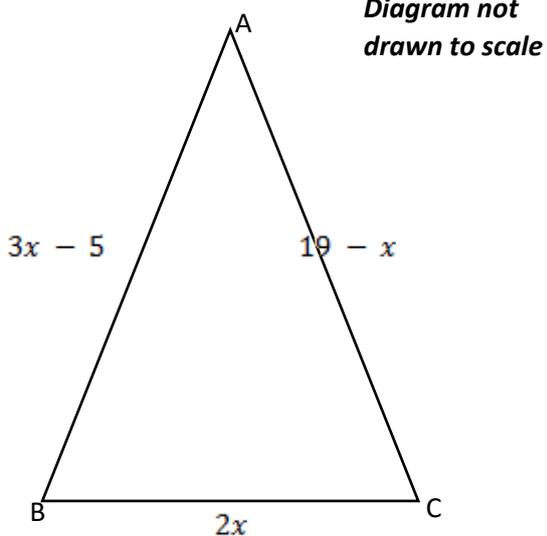
The length of $AB = (3x - 5)$ cm

The length of $AC = (19 - x)$ cm

The length of $BC = 2x$ cm

Work out the perimeter of the triangle.

Give your answer as number of centimetres.



- a) Angle $ABC = \text{Angle } BCA$ what type of triangle is it?

(1 mark)

- b) This means that $AB = AC$. Write an equation and solve it.

(2 marks)

- c) Use your answer to part b) to give the lengths of the sides of the triangle.

(1 mark)

- d) Use part c) to give the perimeter of the triangle.

(1 mark)

Question 7 - Percentages

Mr Watkins needs to buy some oil for his central heating.

Mr Watkins can put up to 1500 litres of oil in his oil tank.

There are already 850 litres of oil in the tank.

Mr Watkins is going to fill the tank with oil.

The price of oil is 67.2p per litre.

Mr Watkins gets 5% off the price of the oil.

How much does Mr Watkins pay for the oil he needs to buy?

- a) Find how many litres of oil is required to fill the oil tank.

(1 mark)

- b) Oil costs 67.2p per litre. What is the cost of the oil?

(2 marks)

- c) Mr Watkins gets 5% off the price of the oil. Calculate the price he will pay for the oil.

(2 marks)

Question 8 - Circle

The diagram shows a circle drawn inside a square.

The circle has a radius of 6 cm.

The square has a side of length 12 cm.

Work out the shaded area.

Give your answer in terms of π .

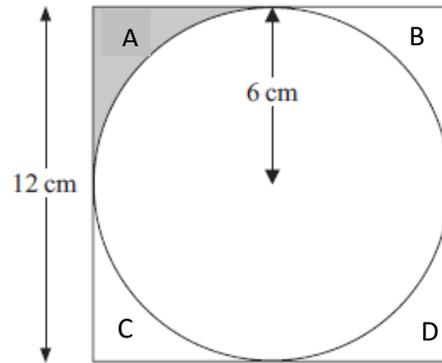


Diagram **NOT** accurately drawn

a) What is the area of the square?

(1 mark)

b) What is the area of the circle?

(1 mark)

c) By subtracting area in b) from the area a), find the area of the total of A, B, C and D

(1 mark)

d) The shaded area is $\frac{1}{4}$ of the answer in part c). Find the shaded area.

(1 mark)

Question 9 - Exchange rates and proportion

In the UK, petrol costs £1.24 per litre.

In the USA, petrol costs 3.15 dollars per US gallon.

1 US gallon = 3.79 litres

£1 = 1.47 dollars

Is petrol cheaper in the UK or in the USA?

- a) 1 US gallon = \$3.15
 3.79 litres = 1 US gallon
 How many litres of petrol can you buy for \$3.15 in the USA?

(1 mark)

- b) Use your answer to part a) to find out how much it costs for 1 litre of petrol in USA dollars.

(1 mark)

- c) Use your answer to part b) and the exchange rate £1 = 1.47 dollars to find the cost per litre of petrol in the USA to cost in UK £'s.

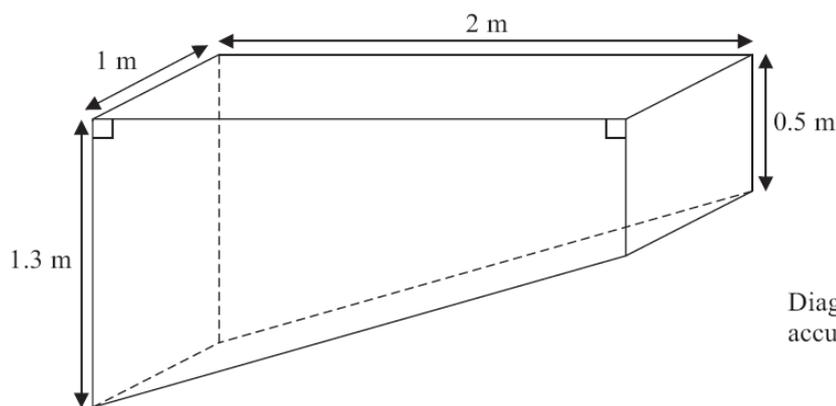
(1 mark)

- d) Compare your answer to c) with the cost of petrol in the UK to state which country is cheaper per litre of petrol.

(1 mark)

Question 10 - Volume and surface area

Sumeet has a pond in the shape of a prism.



The pond is completely full of water.

Sumeet wants to empty the pond so he can clean it.

Sumeet uses a pump to empty the pond.

The volume of water in the pond decreases at a constant rate.

The level of the water in the pond goes down by 20 cm in the first 30 minutes.

Work out how much more time Sumeet has to wait for the pump to empty the pond completely.

- a) The cross-sectional area of the pond is a trapezium. What is the area of the trapezium?

(1 mark)

- b) What is the volume of the prism?

(1 mark)

- c) What is the volume of water that is pumped out of the pond in the first 30 minutes? (Note: it is a cuboid measuring 0.2m by 2m by 1m)

(2 mark)

- d) Use part c) to find the volume of water pumped per hour.

- e) Use your answer to part b) and part d) to find the time taken to empty the pond.

(1 mark)

- f) Use the answer to part e) to state the additional time to empty the pond after the first 30 minutes.

(1 mark)