



GOING FOR GOLD

Problem Solving

Silver 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

- a) How much is the cost of 5 litres of the mixture?

(2 marks)

- b) How much is the cost of 18 litres of the mixture?

(2 marks)

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.

(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.

Work out: Income - how much money is collected from people playing the game

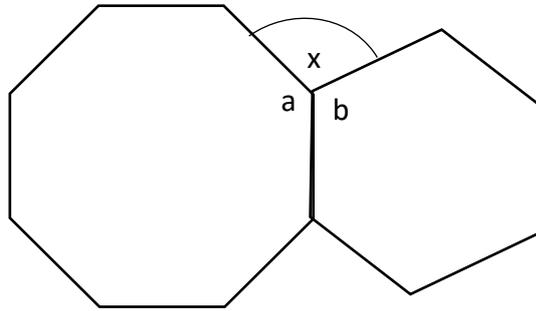
Outgoings - how much money is paid out in winnings

Profit: Income - outgoings

(3 marks)

Question 3 - Polygons

The diagram shows a regular hexagon and a regular octagon.



Find angle x .

- a) What is the size of the internal angle in a octagon? Label angle a

(1 mark)

- b) What is the size of an internal angle in a hexagon? Label angle b

(1 mark)

- c) Use part a) and b) to find x

(2 mark)

Question 4 - Area

Here is a diagram of Jim's garden.

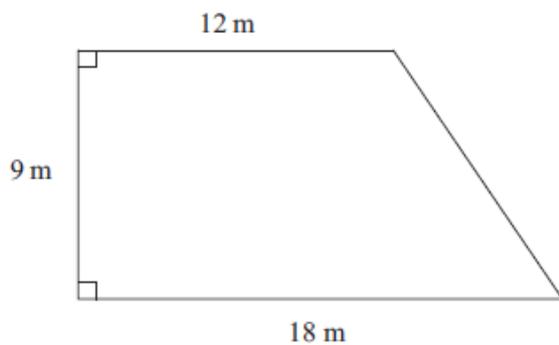


Diagram NOT
accurately drawn

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.

a) What is the area of the trapezium?

(2 marks)

b) How many bags of grass seed does Jim need?

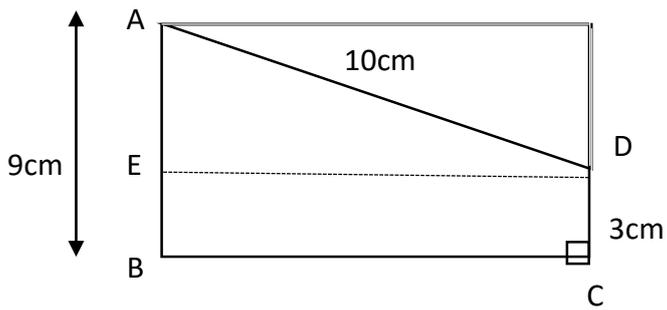
(1 mark)

c) What is the cost of the grass seed needed?

(1 mark)

Question 5 - Pythagoras

ABCD is a trapezium.



$AD = 10 \text{ cm}$

$AB = 9 \text{ cm}$

$DC = 3 \text{ cm}$

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

Calculate the length of AC .

Give your answer correct to 3 significant figures.

a) Find the length of DE from the triangle ADE

(2 marks)

b) Use the triangle BAC to find the length of AC

(3 marks)

Question 6 - Forming and solving equations

Silver A

ABC is a triangle.

Angle ABC = angle BCA

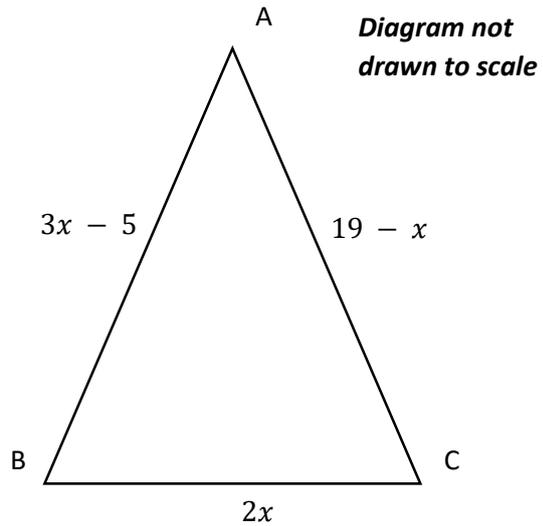
The length of AB = $(3x - 5)$ cm

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 = Angle BCA - what type of triangle is it?

(1 mark)

b) Write an equation connecting two of the sides and solve it.

(2 marks)

c) Use your answer to part b) to find the perimeter of the triangle.

(2 marks)

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) How many litres of oil is required to fill the tank?

(1 mark)

b) Find the total cost of the oil with the 5% reduction.

(4 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.

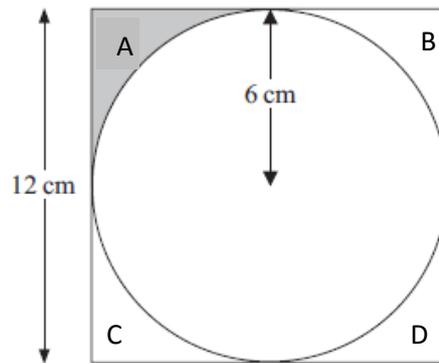


Diagram **NOT** accurately drawn

a) What is the area of the square?

(1 mark)

b) What is the area of the circle?

(1 mark)

c) Use a) and b) to find the area of the total of A, B, C and D

(1 mark)

d) Use part c) to 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) How many litres of petrol can you buy for 3.15 dollars 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) to exchange the cost per litre of petrol in the USA to cost in UK £'s.

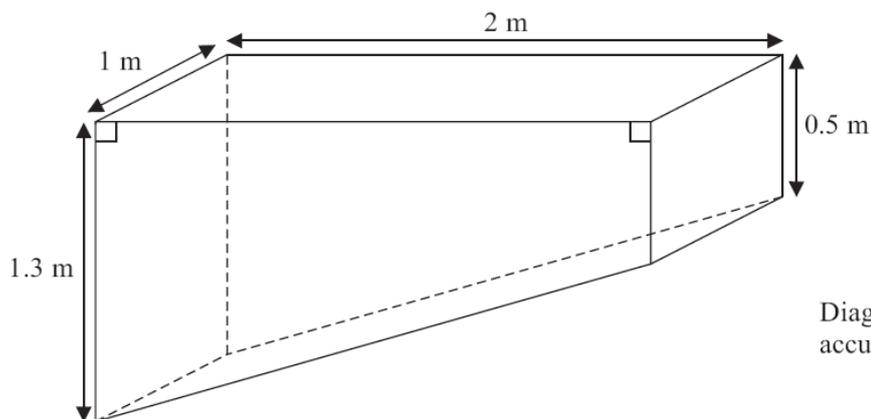
(1 mark)

d) 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) What is the volume of the prism?

(2 marks)

b) What is the volume of water that is pumped out of the pond in the first 30 minutes?

(2 marks)

c) Use part a) and part b) to work out how long it will take for the pond to completely empty.

(1 mark)

d) Use part c) to find the additional time to empty the pond after the first 30 minutes.

(1 mark)