



GOING FOR GOLD

Problem Solving

Silver Paper 3

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		4
8	Circle		7
9	Exchange rates and proportion		4
10	Volume and surface area		4
			46

Question 1 - Ratio

Colin, Dave and Emma share some money.

Colin gets $\frac{3}{10}$ of the money.

Emma and Dave share the rest of the money in the ratio 3 : 2.

What is Dave's share of the money?

a) What percentage of the money is left for Dave and Emma to share?

(1 mark)

b) Divide the percentage for Emma and Dave in the ratio of 3:2

(2 marks)

c) What is Dave's share as a percentage?

(1 mark)

Question 2 - Probability

Rhiana plays a game of bingo on the internet.

The probability that she will lose the game is 0.9.

The probability that she will win the game and share the prize is 0.05.

The probability that she will win the game and the total prize is 0.095.

Each game costs 50p.

If she wins a games she banks £3.00.

If she shares a prize she gets 2 free games.

Rhiana is going to play the game 200 times.

Work out an estimate for profit or loss that Rhiana will have made in 200 games.

- a) Estimate the number of times Rhiana will win the total prize in 200 games

(1 mark)

- b) Estimate how many free games Rhiana will win in 200 games

(1 mark)

- c) Use part b) to calculate an estimate for the extra wins she will achieve.

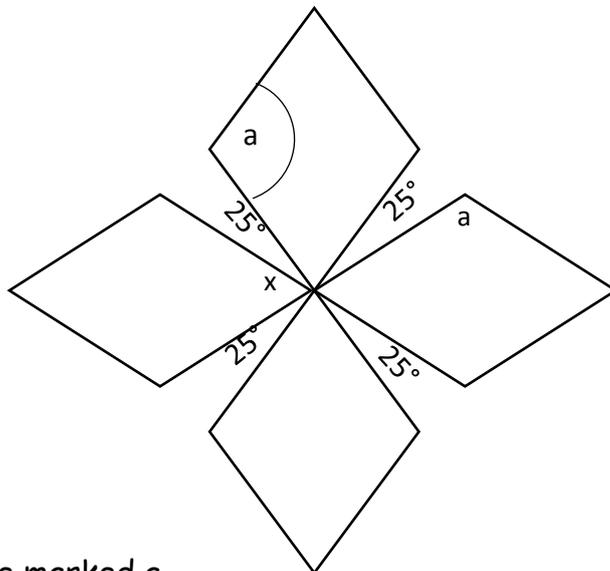
(1 mark)

- d) Work out an estimate for the profit or loss that Rhiana will have made in 200 games.

(2 marks)

Question 3 - Polygons

The diagram shows a pattern using four identical rhombuses.



Work out the size of angle marked a.

You must show your working

- a) Explain why $4x + 100 = 360$. Solve the equation for x

(2 mark)

- b) The opposite angles in a rhombus are equal. Explain why $2x + 2a = 360$

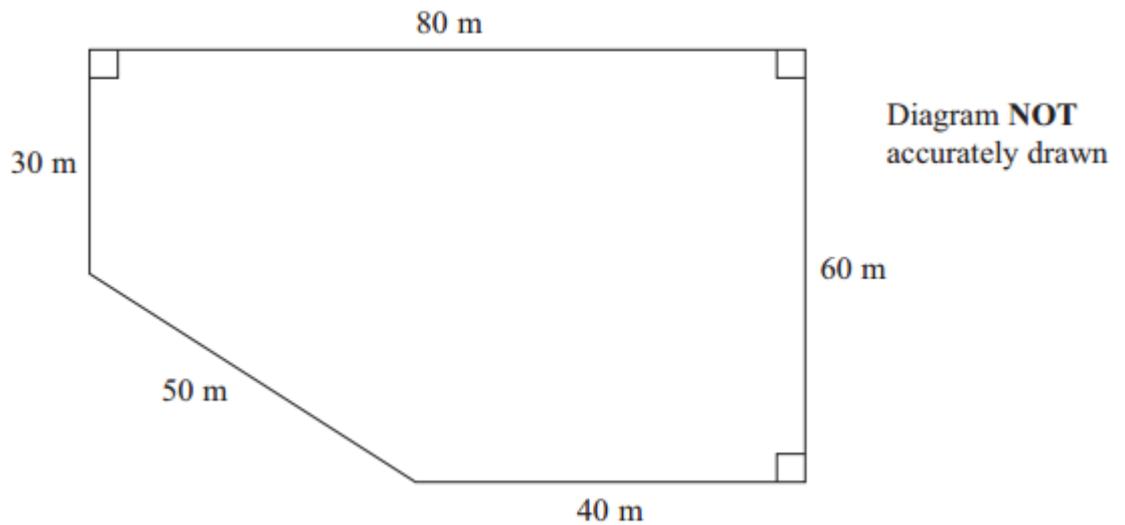
(1 mark)

- c) Use part b and c above to find the value of angle a.

(1 mark)

Question 4 - Area

The diagram shows the plan of a playground.



Bill is going to cover the playground with tarmac.

It costs £2.56 to cover each square metre with tarmac.

Work out the total cost of the tarmac Bill needs.

- a) Cut the playground into two rectangles and a triangle. Find the area of each shape, thus find the total area of the playground in m^2 .

(3 marks)

- b) Each m^2 costs £2.56 to cover with tarmac. Use part a) to find the total cost of covering the playground in tarmac.

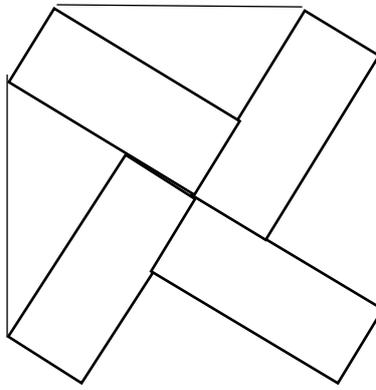
(1 mark)

Question 5 - Pythagoras

Here is a rectangle.



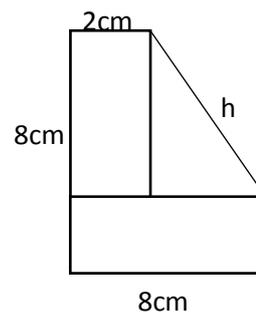
The 8 sided-shape below is made from 4 of these rectangles and 4 congruent right-angled triangles.



Work out the perimeter of the 8-sided shape.

You must show all your working.

a) Below is one quarter of the 8 sided shape



Work out the length of the hypotenuse of the triangle.

(2 marks)

b) The perimeter of the shape is made of 4 hypotenuse' and 4 short sides of the rectangle. What is the total perimeter of the 8-sided shape.

(3 marks)

Question 6 - Forming and solving equations

The diagram shows a trapezium.

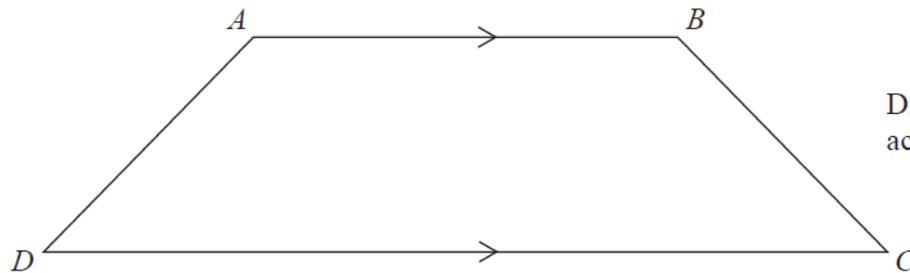


Diagram **NOT**
accurately drawn

$AD = x$ cm.

BC is the same length as AD .

AB is twice the length of AD .

DC is 4 cm longer than AB .

The perimeter of the trapezium is 38 cm.

Work out the length of AD .

a) AB is twice the length of AD . Explain why $AB = 2x$.

(1 mark)

b) DC is 4cm longer than AB . Express DC in terms of x (*use answer to part a*)

(1 mark)

c) Using the answers to part a) and part b) find an expression for the perimeter of the trapezium.

d) Give the expression in its simplest form.

(1 mark)

e) The perimeter of the trapezium is 38cm. Form an equation and solve it to find x .

(2 mark)

Question 7 - Percentages

Railtickets and Cheaptrains are two websites selling train tickets.

Each of the websites adds a credit card charge and a booking fee to the ticket price.

Railtickets

Credit card charge: 2.25% of ticket price

Booking fee: 80 pence

Cheaptrains

Credit card charge: 1.5% of ticket price

Booking fee: £1.90

Nadia wants to buy a train ticket.

The ticket price is £60 on each website.

Nadia will pay by credit card.

Will it be cheaper for Nadia to buy the train ticket from Railtickets or from Cheaptrains?

- a) Find the cost of the 'railticket' ticket including the credit card charge and the booking fee.

(1 mark)

- b) Find the cost of a 'Cheaptrains' ticket including the credit card charge and booking fee.

(2 marks)

- c) State which company which is the cheapest.

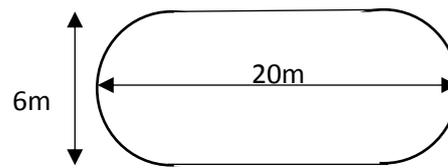
(1 mark)

Question 8 - Circle

Eliza makes this sketch of a pond.

The shortest distance across the pond is 6m.

The longest distance across the pond is 20m.



Eliza estimates that the surface area of the pond is 120m^2 .

a) Explain how Eliza arrived at her estimate

(2 marks)

b) Calculate an estimate for the surface area of the pond that would be more accurate than Eliza's estimate.

Explain how you decided to calculate your estimate.

You must justify your decision.

Show all your working.

Clue to finding a more accurate estimate:

Cut the shape into a circle of radius 3m and a rectangle and then find the area of each shape.

(5 marks)

Question 9 - Exchange rates and proportion

All tickets for a concert are the same price.

Amy and Dan pay £63 altogether for some tickets.

Amy pays £24.50 for 7 tickets.

How many tickets does Dan buy?

a) Find the cost of one ticket for Amy.

(1 mark)

b) How much does Dan pay for tickets?

(1 mark)

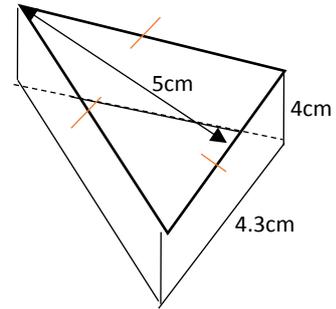
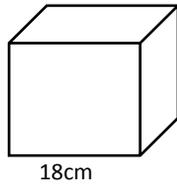
c) Find how many tickets Dan bought.

(2 marks)

Question 10 - Volume and surface area

Alex pours melted wax into moulds like this to make candles.

He melts this cube of wax.



How many candles can he make with this wax?

- a) Find the volume of the triangular prism in cm^3 .

(1 mark)

- b) Find the volume of the cube in cm^3 .

(1 mark)

- c) Use part a) and part b) to find how many candle moulds can be filled from the melted wax.

(2 marks)