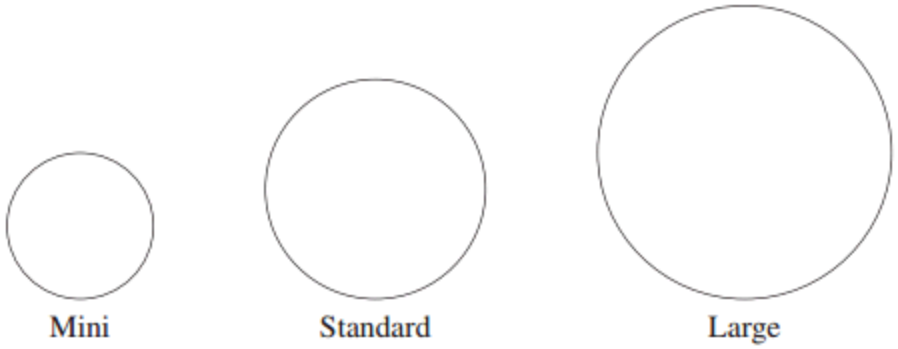
Question **(50 marks)**

(a) Joe's pizzas are made in three different sizes.



Joe puts olives on all his pizzas. The number of olives depends on the size of the pizza, as shown in the table.

Size	*Diameter, d,* (cm)	*Number of olives, n*
Mini	20	8
Standard	30	18
Large	40	32

The relationship between the diameter of the pizza and the number of olives can be expressed by the formula:

$$n = kd^2, \qquad \text{where k is a constant.}$$

(i) Use a pair of values from the table to show that $k = 0.02$.

(ii) Joe decides to make a mega-pizza, with diameter 52 cm.

Use the formula to find the number of olives needed for a mega-pizza.

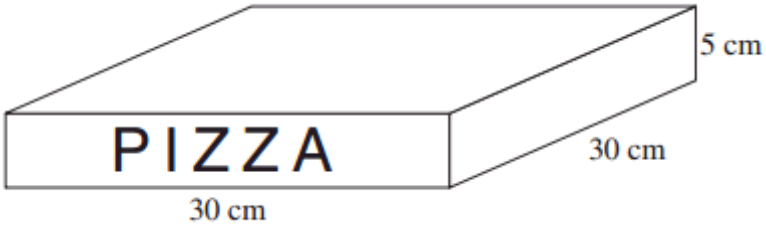
(b) Joe is asked to make a pizza in the shape of a square with sides of length 25 cm. He decides to use the same number of olives as would be needed on a round pizza with the same area.

How many olives will be needed?

(b) Joe uses a microwave oven to heat lasagne. The time taken for heating is inversely proportional to the power setting (in watts). It takes ten minutes at a power setting of 240 watts to heat the lasagne.

How long would it take at a power setting of 500 watts?

(c) Joe's standard pizza boxes have dimensions as shown.



(i) What is the surface area of one box?

(ii) Draw a picture to show the box needed for the new mega-pizza, similar to the one shown above in part (i). Put all the dimensions into your diagram.

(iii) What is the volume of this new box?

Question **(50 marks)**

A firework is fired upwards from the top of a building. The height, *h* metres, reached by the firework after *t* seconds, is given by $h = 5 + 4t - t^2$.

(i) By using your calculator, or otherwise, complete the table below.

t, seconds	0	1	2	3	4	5	6
h, metres							

(ii) Hence, or otherwise, graph the function of $h = 5 + 4t - t^2$, in the domain $0 \leq t \leq 6$.

(b) Use your graph to find

(i) the height of the building

(ii) the maximum height reached by the firework

(iii) the number of seconds taken for the firework to reach a height of 8 metres above the base of the building for the first time

(iv) how high the firework is after 4.5 seconds

(c) Eoin thinks that there is something wrong with the firework by looking at the graph. Do you agree with Eoin? Explain your answer fully.

You may use this page for extra work.

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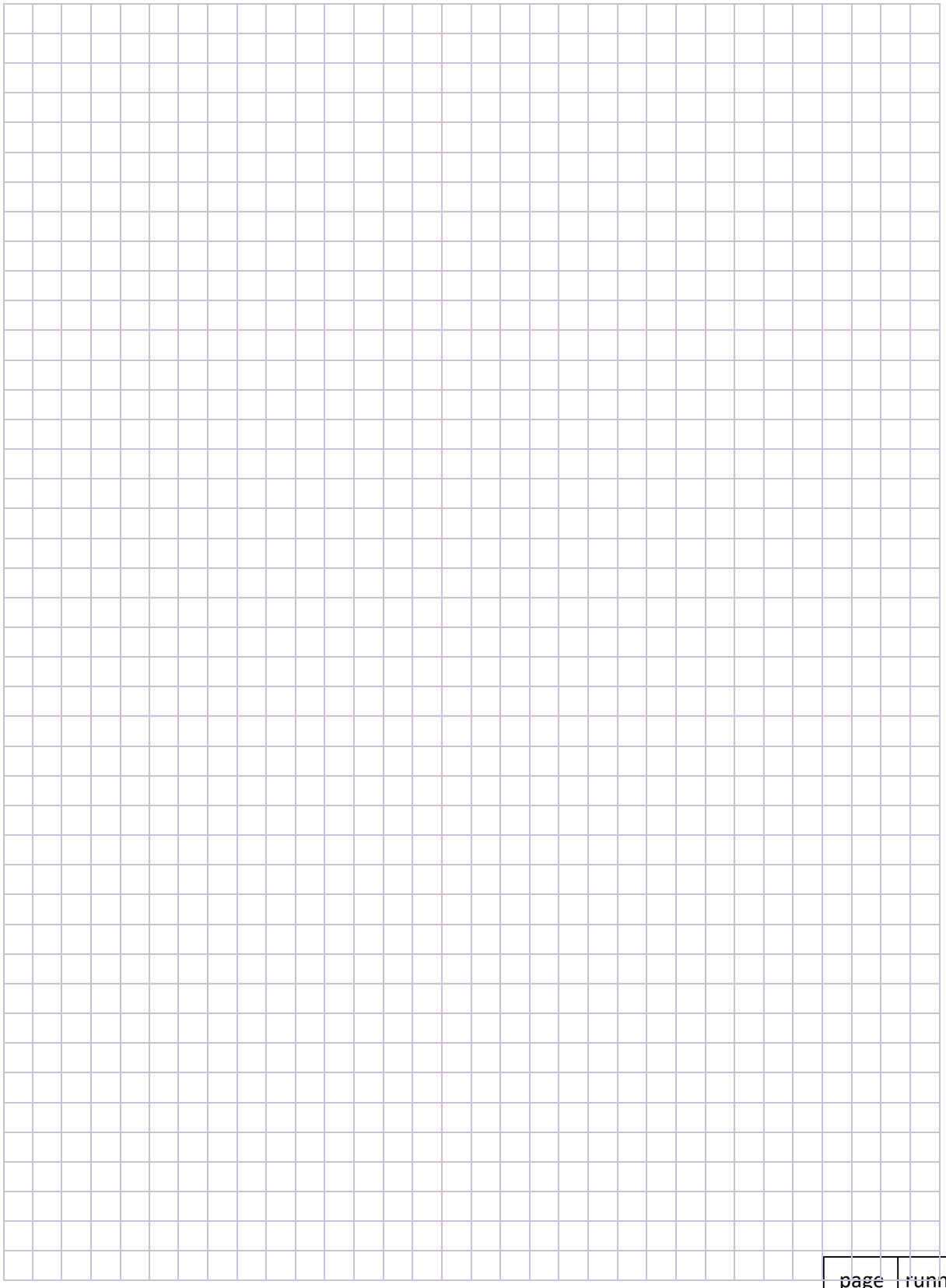

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Question **(50 marks)**

(a) Photographs can be developed in 3 sizes; large, medium or small sizes. They can be in 2 colours; black and white or in colour and they can be in 2 formats; glossy finish or a matt finish.

In how many different ways can photographs be developed?

(b) A bag contains 5 red, 3 green and 7 blue marbles.

A marble is selected at random from the bag.

What is the probability that the marble is

(i) red

(ii) green

(iii) blue or green

(iv) not blue?

(c) A die is thrown 100 times.

(i) How many times would you expect to throw a six?

The results of the 100 rolls are recorded in the following table.

Score	1	2	3	4	5	6
Frequency	18	15	19	17	16	15

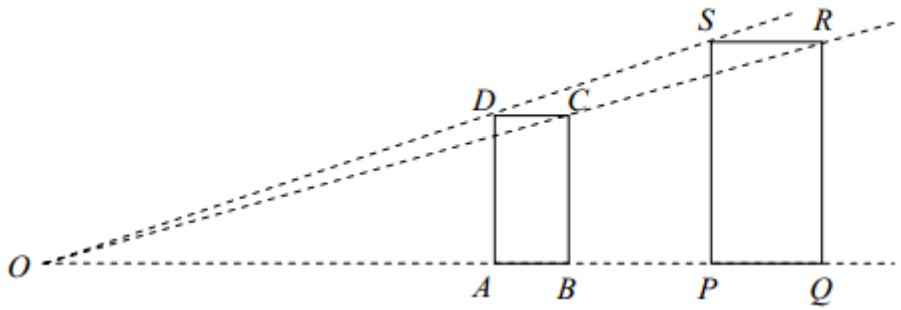
(ii) What is the relative frequency of a score of 6? Write your answer in its simplest fraction form.

(iii) What is the relative frequency of getting an even number? Write your answer as a percentage.

Question **(50 marks)**

(a) The rectangle PQRS is the image of the rectangle ABCD under an enlargement with centre O. The scale factor is 1·5.

| AB| = 3 cm and |QR| = 9 cm

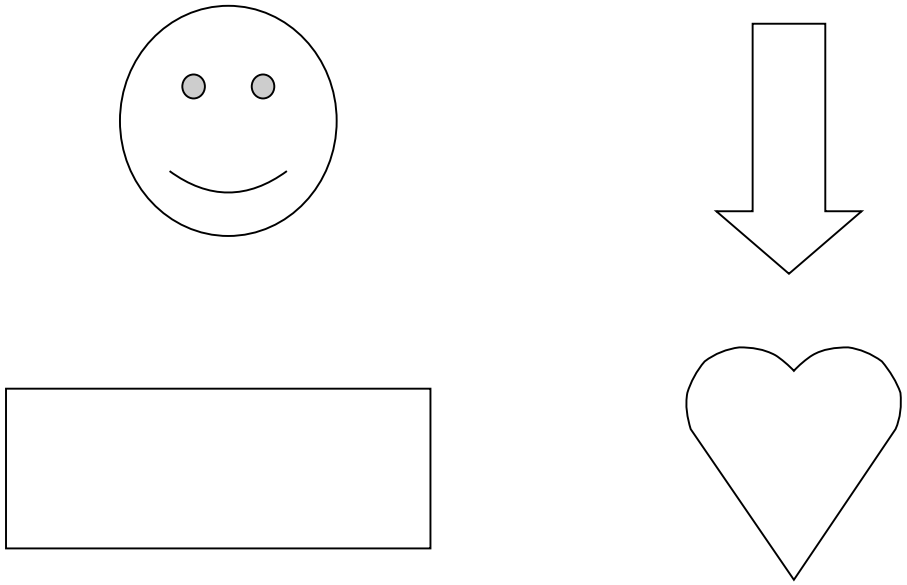


(i) Calculate | PQ |

(ii) Calculate | BC |

(iii) Find the area of the rectangle PQRS

(b) Draw **all** the axes of symmetry onto each of the shapes shown.



(c) The lines m and n are parallel.

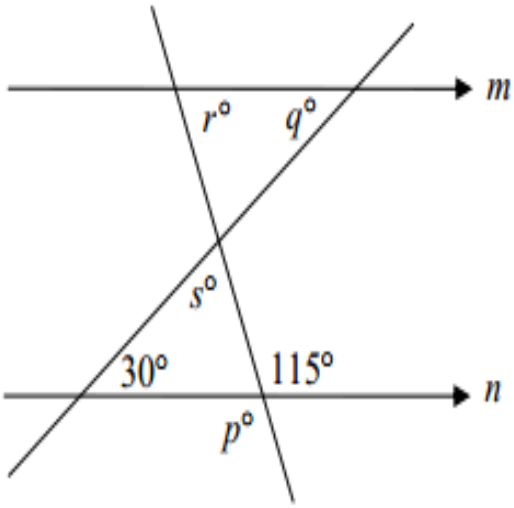
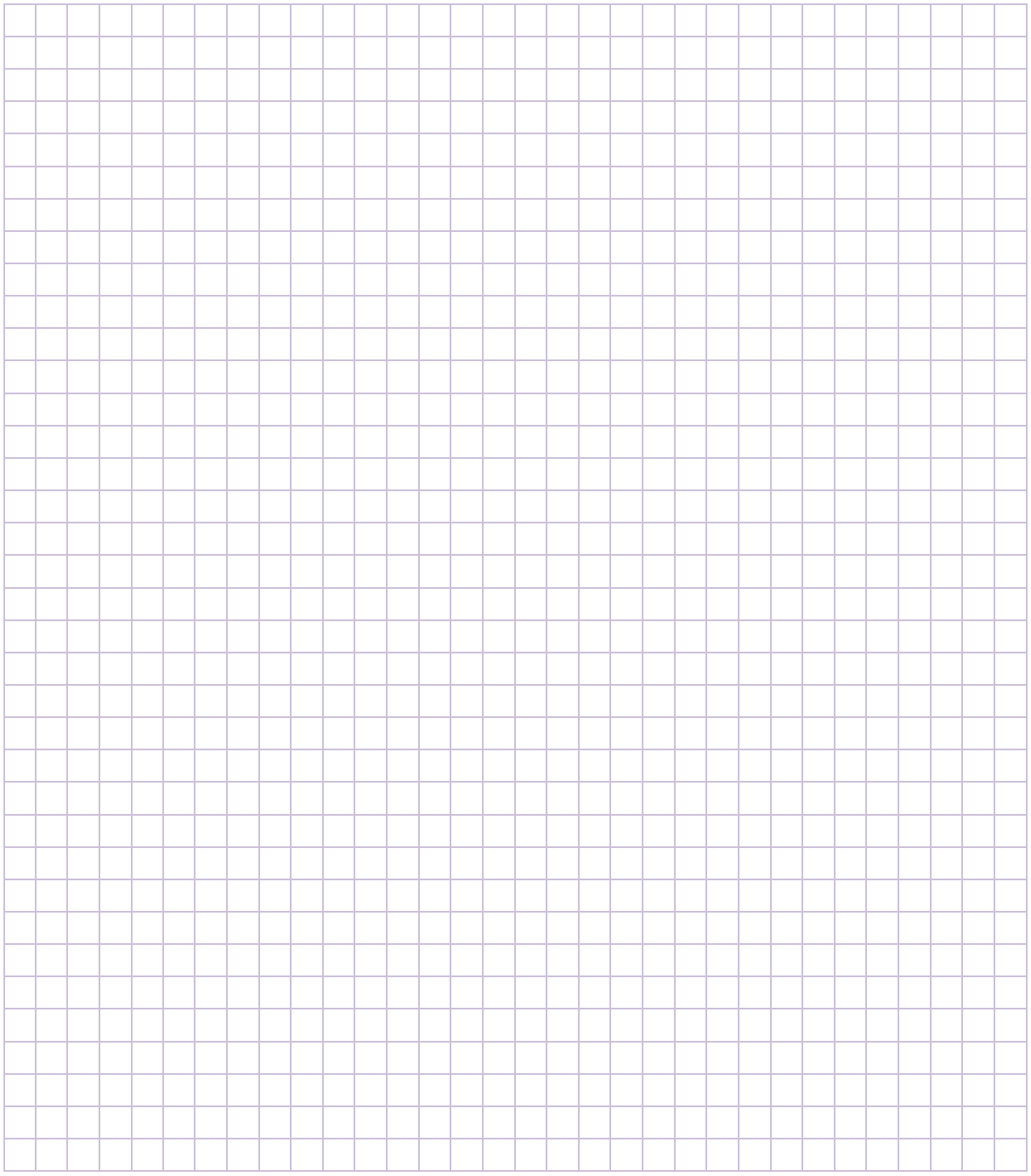
(i) Find the value of p.

(ii) Find the value of q.

(iii) Find the value of r.

(iv) Find the value of s.

You may use this page for extra work.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