



**Annual Examinations for Secondary Schools 2022**

**YEAR 9**

**MATHEMATICS  
Main Paper**

**TIME: 1h 30min**

| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | Total<br>Main | Non<br>Calc | Global<br>Mark |
|----------|---|---|---|---|---|---|---|---|---|----|----|---------------|-------------|----------------|
| Mark     |   |   |   |   |   |   |   |   |   |    |    |               |             |                |

**DO NOT WRITE ABOVE THIS LINE**

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

Calculators are allowed but all necessary working must be shown.  
Answer ALL questions.

1. Jasmine goes on a short holiday. She takes 4 jumpers: one red, one blue, one white and one yellow. She also takes 3 skirts: one blue, one grey and one white.
- a) Fill in the possibility space below to show how Jasmine can combine her jumpers and skirts to make different outfits.

|        |           | Jumpers |          |           |            |
|--------|-----------|---------|----------|-----------|------------|
|        |           | Red (R) | Blue (B) | White (W) | Yellow (Y) |
| Skirts | Blue (B)  |         |          |           |            |
|        | Grey (G)  |         |          |           |            |
|        | White (W) |         |          |           |            |

- b) Find the probability that Jasmine wears:

i) a yellow jumper

Ans: \_\_\_\_\_

ii) a jumper and a skirt of the same colour

Ans: \_\_\_\_\_

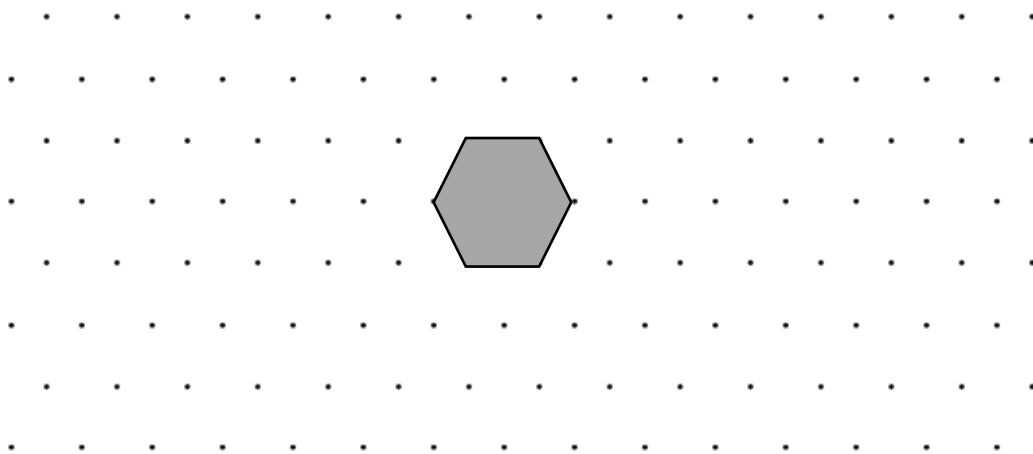
(4 marks)

2. a) The exterior angles of a pentagon are  $x^\circ$ ,  $(x + 54)^\circ$ ,  $(2x - 35)^\circ$ ,  $(x - 12)^\circ$  and  $(x + 41)^\circ$ . Work out the value of  $x$ .

Ans: \_\_\_\_\_

- b) Show that the interior angles of a regular 24-sided polygon are  $165^\circ$  each.

- c) Draw **six more** shapes to show that regular hexagons tessellate.



(6 marks)

3. O is the centre of the circle.

Work out the angles marked  $a$  and  $b$ . Give reasons for your answers.

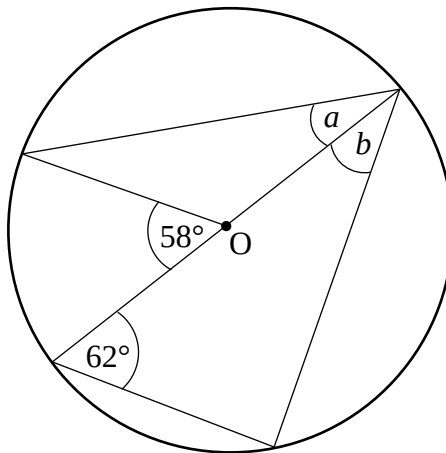


Diagram not drawn to scale

$a =$  \_\_\_\_\_

Reason: \_\_\_\_\_

$b =$  \_\_\_\_\_

Reason: \_\_\_\_\_

(4 marks)

4. a) Solve  $\frac{3x+2}{5} - \frac{x-1}{2} = 6$

Ans: \_\_\_\_\_

b) I think of two numbers,  $x$  and  $y$ , with  $x$  being the first number.

When I double the first number and add the second number, the answer is seventeen. When I treble the first number and subtract twice the second number, I get fifteen.

i) Write down two equations in terms of  $x$  and  $y$ .

Ans: \_\_\_\_\_; \_\_\_\_\_

ii) Solve your equations in part (i) to find  $x$  and  $y$ .

Ans:  $x =$  \_\_\_\_\_,  $y =$  \_\_\_\_\_

(9 marks)

5. Tom is standing on the lower side of the viewing deck of the Tower of Pisa, at a vertical height of 44.65 m above the ground.

Tom drops his camera case, which falls vertically down and lands at a distance of 3.46 m away from the foot of the tower.

- a) Calculate the slant height  $x$ .

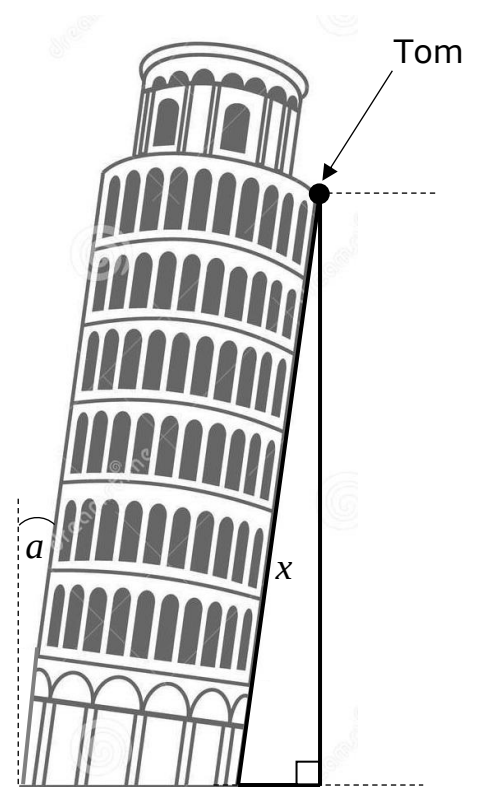


Diagram not drawn to scale

Ans: \_\_\_\_\_

- b) The tower has a cylindrical shape.

Work out the value of angle  $a$ , the angle the tower makes with the vertical.

Give your answer correct to 1 decimal place.

Ans: \_\_\_\_\_

(6 marks)

6. Alex wishes to buy a new mobile phone. He looks up the star rating for a particular mobile phone on the internet. The numbers on the bars below show the number of people who gave the particular star rating.

### Star Rating

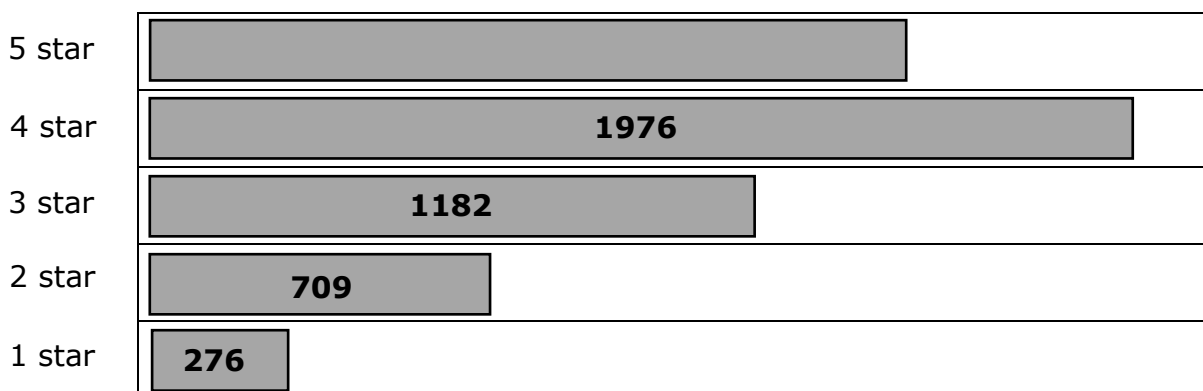


Diagram not drawn to scale

- a) The number of people who rated the mobile phone 5 star is 25% less than the number of people who rated the mobile phone 4 star. Calculate the number of people who gave a 5 star rating.

Ans: \_\_\_\_\_

- b) The star rating diagram can be written as a frequency table as seen below:

| Star Rating      | 5 | 4    | 3    | 2   | 1   |
|------------------|---|------|------|-----|-----|
| Number of people |   | 1976 | 1182 | 709 | 276 |

Complete the missing number in frequency table and use the table to work out:

- i) the total number of people who rated this mobile phone      Ans: \_\_\_\_\_

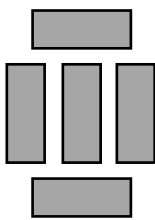
- ii) the mean star rating for this mobile phone

Ans: \_\_\_\_\_

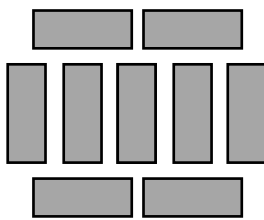
- iii) the modal star rating for this mobile phone

Ans: \_\_\_\_\_  
(6 marks)

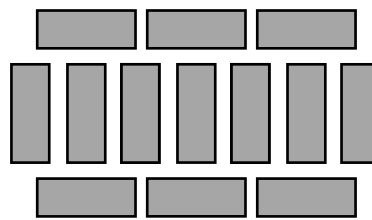
7. Here is a pattern made from rectangles.



Pattern 1



Pattern 2



Pattern 3

a) Draw Pattern 4.

b) How many rectangles are used in Pattern  $n$ ?

Ans: \_\_\_\_\_

c) How many rectangles are used in Pattern 17?

Ans: \_\_\_\_\_

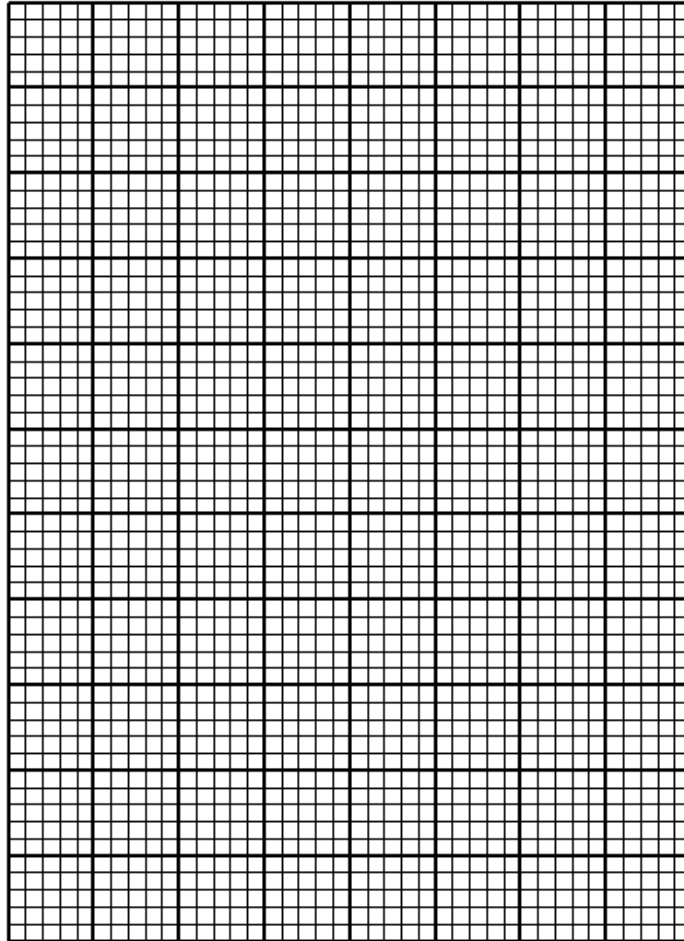
d) Which pattern is made up of 273 rectangles?

Ans: \_\_\_\_\_

(5 marks)

8. A straight line passes through the points  $(-4, -14)$ ,  $(-1, -5)$  and  $(3, 7)$ .

- a) On the grid below, using a scale of 1 cm as 1 unit on the  $x$ -axis and 1 cm as 2 units on the  $y$ -axis, plot the three points and draw the straight line.



- b) Work out the gradient of the line.

Ans: \_\_\_\_\_

- c) What is the value of the  $y$ -intercept?

Ans: \_\_\_\_\_

- d) Write down the equation of the straight line.

Ans: \_\_\_\_\_

(7 marks)

9. Kyle wants to make a wooden cube as shown in the diagram. He starts off with a wooden cubic block of side 8.5 cm and then drills a cylindrical hole of diameter 2.5 cm right through the wooden cubic block.

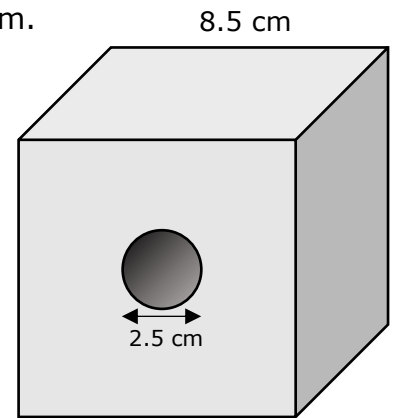


Diagram not drawn to scale

- a) Calculate the volume of the wood removed.

Ans: \_\_\_\_\_

- b) Work out the volume of the wood removed as a percentage of the volume of the whole wooden cube.

Ans: \_\_\_\_\_

- c) Kyle wishes to paint the outer faces of his wooden cube. Work out the area to be painted.

Ans: \_\_\_\_\_

(9 marks)

10. The diagram shows three seaside resorts A, B and C. The bearing of C from B is  $072^\circ$  while the bearing of A from B is  $333^\circ$ . B is 35 km from A and 42.5 km from C.

- a) Show the above information on the diagram.
- b) Using a scale of 1 cm to 5 km, construct a scale drawing showing the location of the three seaside resorts A, B and C.

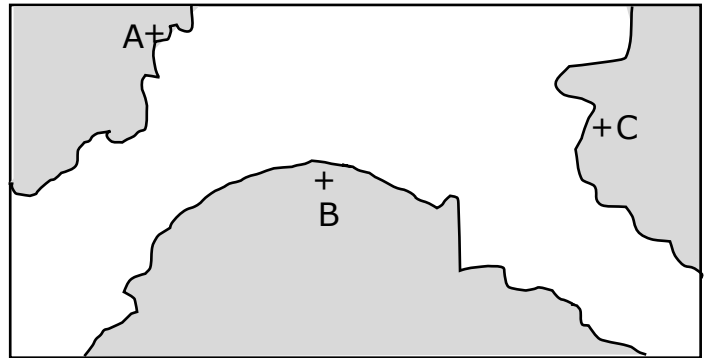


Diagram not drawn to scale



- c) Use your scale drawing to find:

i) the actual distance of A from C

Ans: \_\_\_\_\_

ii) the bearing of C from A

Ans: \_\_\_\_\_

- d) A speedboat travels at an average speed of 75 km/h across the bay from A to C. How long does the speedboat take to arrive at resort C? Give your answer to the nearest minute.

Ans: \_\_\_\_\_

(12 marks)

11. The diagram is made up of a sector and two identical isosceles triangles as shown.

- a) Show by giving reasons that angle  $x$  is  $44^\circ$ .

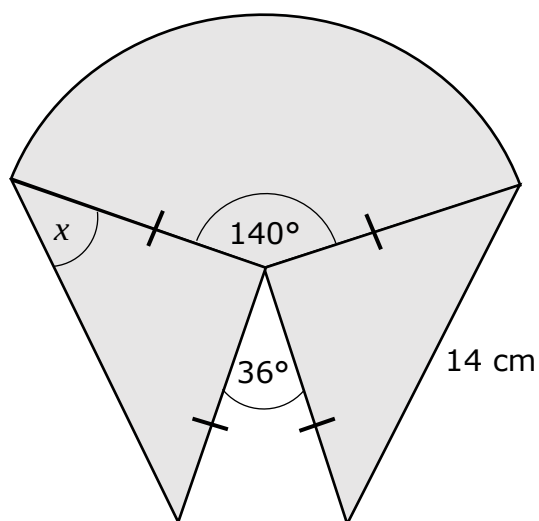


Diagram not drawn to scale

- b) The radius of the sector is 9.7 cm. The base of the isosceles triangles is 14 cm long. Calculate the perimeter of the shape, giving your answer correct to 2 s.f.

Ans: \_\_\_\_\_  
(7 marks)

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**END OF PAPER**

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