Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2025

Mathematics

StemUp Model Solution

Unit M7 Paper 1
(Non-Calculator)
Higher Tier

[GMC71]



GMC71

WEDNESDAY 4 JUNE, 9.15am – 10.30am

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page, on blank pages or tracing paper.
Complete in black ink only. **Do not write with a gel pen.**
Questions which require drawing or sketching should be completed using an HB pencil.
All working **must** be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.
You **must not** use a calculator for this paper.
Answer **all seventeen** questions.

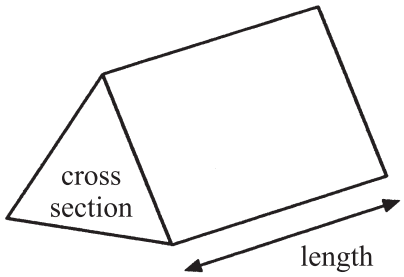
INFORMATION FOR CANDIDATES

The total mark for this paper is 50.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a ruler, compasses and a protractor.
The Formula Sheet is on page 2.

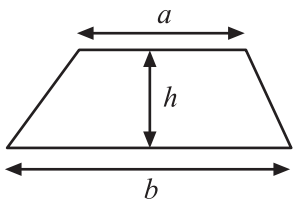
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Formula Sheet

Volume of prism = area of cross section × length

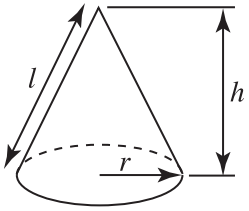


Area of trapezium = $\frac{1}{2}(a+b)h$



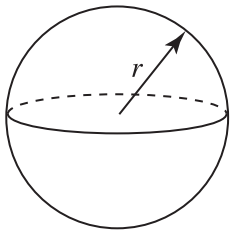
Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

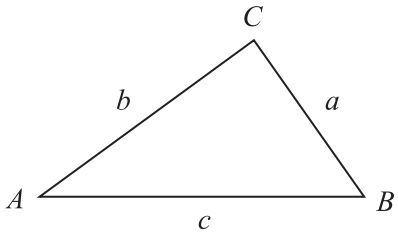


Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



In any triangle *ABC*



Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$

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1 A rectangular wall measures 4.7 metres by 2.9 metres.

Tiles cost £29.75 per square metre.

Estimate the cost to tile the wall.

Show your working out clearly.

$4.7 \approx 5$, $2.9 \approx 3$, £29.75 ≈ £30

Area ≈ $5 \times 3 = 15\ m^2$

Cost ≈ 15×30 = £450

Answer £ 450 [3]

[Turn over

2 **(a)** A square number and a cube number add together to give a total of 52

Write down the two numbers.

Square numbers: 1, 4, 9, 16, 25, 36, 49

Cube numbers: 1, 8, 27

25 + 27 = 52

Answer 25 and 27 [1]

(b) Write down the triangular number between 40 and 50

1, 3, 6, 10, 15, 21, 28, 36, 45, 55

Answer 45 [1]

3 How much bigger is 35% of £120 than $\frac{1}{3}$ of £120?

$\frac{1}{3}$ of £120 = 120 ÷ 3 = £40

10% of £120 = £12

30% of £120 = 3 × 12 = £36

5% of £120 = £6

35% of £120 = 36 + 6 = £42

42 − 40 = £2

Answer £ 2 [3]

[Turn over

4 Jackie chooses chips or mash or baby boiled potatoes for a side order.

The probability she chooses chips is 0.65

The probability she chooses mash is 0.2

What is the probability that Jackie chooses baby boiled potatoes?

$0.65 + 0.2 = 0.85$

$1 - 0.85 = 0.15$

Answer 0.15 [2]

5 **(a)** 2 cm represents 15 km on a map.

How many kilometres are represented by 12 cm on the map?

12 ÷ 2 = 6

6 × 15 = 90 km

Answer 90 km [2]

(b) A different map has a scale of 1: 25 000

John measures the distance between two points on this map to be 8 cm.

Is the actual distance, in km, between these two points greater than 10 km?

Show your working out clearly.

1 cm represents 25 000 cm

8 cm represents 8 × 25 000 = 200 000 cm

200 000 cm = 2000 m = 2 km

2 km < 10 km, so not greater than 10 km

Answer No [2]

[Turn over

6 The ratio of girls to boys in an athletics club is 3:5

There are 45 **boys** in the club.

$\frac{1}{4}$ of the children are sprinters.

How many children are sprinters?

Boys: 5 parts = 45, so 1 part = 45 ÷ 5 = 9

Girls = 3 × 9 = 27

Total children = 45 + 27 = 72

Sprinters = 72 ÷ 4 = 18

Answer 18 [3]

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7 Hilary is ordering T-shirts for a school trip.

She has to pay a £60 design fee and an amount for each T-shirt.

The total cost of 40 T-shirts is £380

What is the **total** cost of 30 T-shirts?

380 − 60 = £320 for 40 T-shirts

320 ÷ 40 = £8 per T-shirt

30 × 8 = £240

Total = 60 + 240 = £300

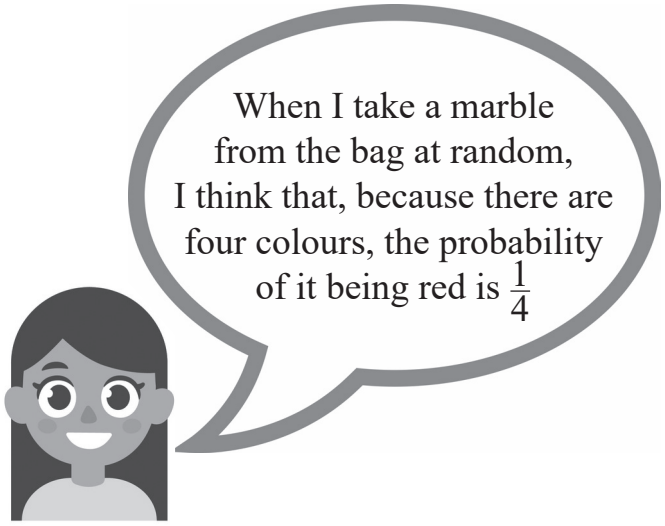
Answer £ 300 [4]

[Turn over

8 **(a)** A bag contains 20 coloured marbles.

The marbles are coloured red, green, blue and orange.

Rosie says



Explain why Rosie **might not** be correct in what she thinks.

Answer *There might not be the same number of marbles of each colour, e.g. only 1 of the 20 might be red.* [1]

(b) A different bag contains 20 coloured marbles.

The marbles are coloured red, green, blue and orange.

The bag has 2 red marbles and 7 green marbles.

The probability of choosing a blue marble is $\frac{2}{5}$

How many orange marbles are there in the bag?

$\frac{2}{5} \times 20 = 8$ blue marbles

$2 + 7 + 8 = 17$

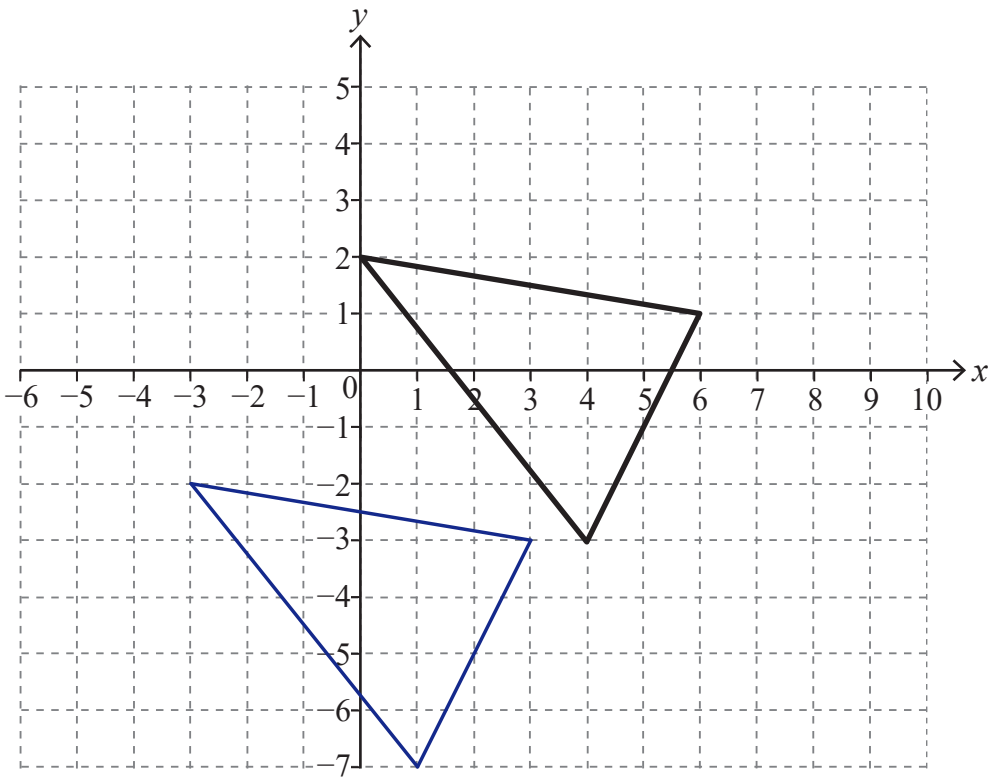
Orange $= 20 - 17 = 3$

Answer 3 [2]

[Turn over



9 **(a)** Draw the image of the triangle shown after a translation of 3 units left and 4 units down.



[2]

(b) A different triangle, PQR, was translated 4 units right and 6 units down.

The **image** of the point P **after** this different translation is (8 , –4)

What were the coordinates of the original point P?

x: 8 − 4 = 4

y: −4 + 6 = 2

Answer (4 , 2) [2]

10 The exterior angle of a regular polygon is 9°

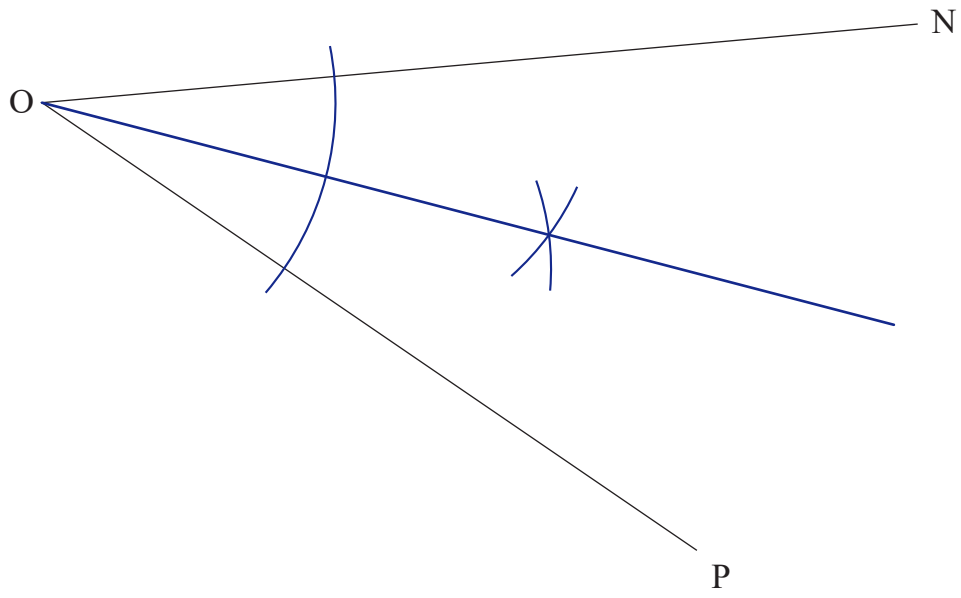
How many sides has the polygon?

Number of sides = 360 ÷ 9 = 40

Answer 40 [2]

11 Using a ruler and compasses only, construct the bisector of the angle NOP below.

Do not rub out your construction arcs.



[2]

[Turn over

12 Jacqui and Gil each flip a coin a number of times.

Jacqui says, "The coin was 'Heads' 6 times out of 13, so I think it is a fair coin."

Gil says, "The coin was 'Heads' 15 times out of 32, so I think it is a fair coin."

Whose conclusion is more reliable?

Explain your answer clearly.

Jacqui: 6 out of 13 flips

Gil: 15 out of 32 flips

Answer Gil because he flipped the coin more times (32 is more than 13), so his results are more reliable. [2]

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13 **(a)** Write the binary number 10111 as a decimal number.

16 8 4 2 1

1 0 1 1 1

16 + 4 + 2 + 1 = 23

Answer 23 [1]

(b) Write the decimal number 34 as a binary number.

32 16 8 4 2 1

1 0 0 0 1 0

34 = 32 + 2

Answer 100010 [1]

[Turn over

14 A parallelogram is enlarged by scale factor 5

(a) How many times bigger is the perimeter of the enlargement than the perimeter of the original?

Answer 5 [1]

(b) How many times bigger is the area of the enlargement than the area of the original?

$5^2 = 25$

Answer 25 [1]

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15 Given that

$$2x + 3y = 10$$
$$5x - 2y = 44$$

work out the value of $9x + 5y$

A solution by trial and improvement will not be accepted.

$(2x + 3y = 10) \times 2$: $4x + 6y = 20$

$(5x - 2y = 44) \times 3$: $15x - 6y = 132$

Add: $19x = 152$

$x = 152 \div 19 = 8$

$2(8) + 3y = 10$

$3y = 10 - 16 = -6, \quad y = -2$

$9x + 5y = 9(8) + 5(-2) = 72 - 10 = 62$

Answer 62 [5]

[Turn over

16 The volume of water in a reservoir was 9×10^8 cubic metres.

The volume increased by 30%

Work out the new volume.

Give your answer in **standard form**.

30% of $9 \times 10^8 = 0.3 \times 9 \times 10^8 = 2.7 \times 10^8$

$9 \times 10^8 + 2.7 \times 10^8 = 11.7 \times 10^8$

$= 1.17 \times 10^9$

Answer 1.17×10^9 cubic metres [3]

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17 Write down the value of

(a) 3^0

Answer 1 [1]

(b) 5^{-1}

Answer $\frac{1}{5}$ [1]

(c) 10^{-3}

Answer $\frac{1}{1000}$ [1]

(d) $1^y + y^0$

1 + 1

Answer 2 [1]

THIS IS THE END OF THE QUESTION PAPER

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Examiner Number

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