Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
November 2022

Mathematics

StemUp Model Solution

Unit M1
(With calculator)
Foundation Tier



[GMC11]

GMC11

TUESDAY 29 NOVEMBER, 9.15am–11.00am

TIME

1 hour 45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page. **You are provided with Foundation Tier Additional Support Materials for use with this paper.**
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen.**
Answer **all twenty-six** questions.
All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

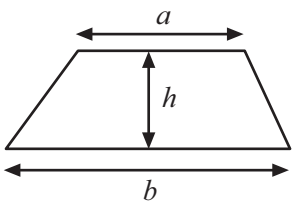
INFORMATION FOR CANDIDATES

Functional Mathematics is assessed in this unit.
The total mark for this paper is 100.
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 calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

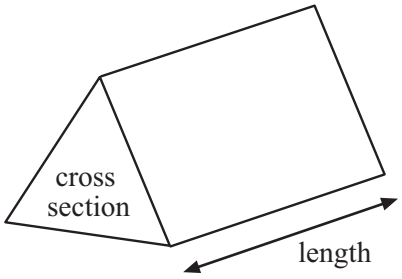
13325

Formula Sheet

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



Volume of prism = area of cross section × length



13325

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1 **(a)** Write down a multiple of 7 between 30 and 40

Answer 35 [1]

(b) 1, 2, 4 and 8 are the **only** factors of which number?

Answer 8 [1]

(c) Circle the pair of square numbers.

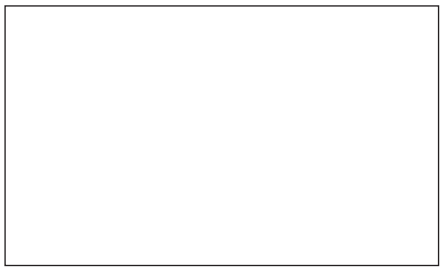
12 and 13 | 9 and 16 | 4 and 21 | 1 and 24

[1]

[Turn over

2 The name and some properties of a shape are listed below.

NAME – RECTANGLE



PROPERTIES

2 pairs of equal sides

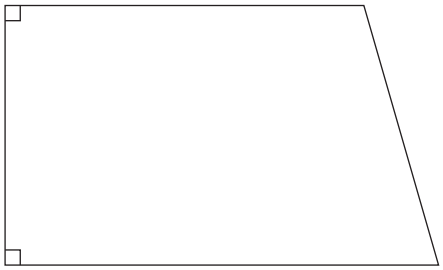
2 pairs of parallel sides

4 equal angles

2 lines of symmetry

Fill in the gaps to make the name and properties of the shape below correct.

NAME – TRAPEZIUM



PROPERTIES

No equal sides

1 pair of parallel sides

2 equal angles

0 lines of symmetry

[3]

3 A company asked customers to rate its service.

The last 20 customers gave the following ratings.

Very good	Excellent	Very good	Good	Satisfactory
Good	Satisfactory	Good	Very good	Excellent
Satisfactory	Good	Good	Excellent	Good
Excellent	Poor	Excellent	Satisfactory	Good

Complete the tally and frequency columns in the table below.

Rating	Tally	Frequency
Excellent	𝍸	5
Very good	|||	3
Good	𝍸 ||	7
Satisfactory	||||	4
Poor	|	1

[2]

[Turn over

4 Some scores from a Figure Skating championship are shown.

	Round 1	Round 2
Javier	91.84	179.75
Alexander	91.87	177.87
Matteo	91.09	



(a) Who had the highest Round 1 score?

Answer Alexander [1]

Total scores are found by adding Round 1 and Round 2 scores together.

(b) What is Javier's total score?

91.84 + 179.75 = 271.59

Answer 271.59 [1]

(c) Matteo's Round 2 score is 2.48 less than Alexander's Round 2 score.

What is Matteo's Round 2 score?

177.87 − 2.48 = 175.39

Answer 175.39 [1]

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(Questions continue overleaf)

[Turn over

5 This pictogram shows the ages of people entered for a fun run.

Age group	Number of people
0–10	
11–20	
21–30	
31–40	
41–50	
51–60	

 = 10 people

(a) What is the modal age group of people entered for the fun run?

Answer 31–40 [1]

(b) How many **more** people were in the 11–20 age group than the 51–60 age group?

45 − 30 = 15

Answer 15 [1]

13325

(c) Each runner gets 2 bottles of water.

How many bottles of water will be needed?

20 + 45 + 70 + 75 + 40 + 30 = 280 runners

280 × 2 = 560

Answer 560 [2]

[Turn over

6 **(a)** A joiner uses the formula below to find the total cost of a job.



total cost = £14 × number of hours worked + cost of materials

What is the total cost of a job taking 3 hours with materials costing £65?

$14 \times 3 + 65$

$= 42 + 65$

$= 107$

Answer £ 107 [2]

(b) The joiner has 60 metres of timber.

He uses 30% of his timber on a job.

How much timber does he use?

30% of $60 = 30 \div 100 \times 60$

$= 0.3 \times 60 = 18$

Answer 18 m [2]

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(c) The joiner has 9 litres of varnish.

He uses $\frac{1}{4}$ of this varnish on a job.

He needs 7 litres of varnish for a second job.

Has the joiner enough varnish for the second job?

Explain your answer with reasons.

$\frac{1}{4}$ of 9 = 9 ÷ 4 = 2.25 litres used

9 − 2.25 = 6.75 litres left

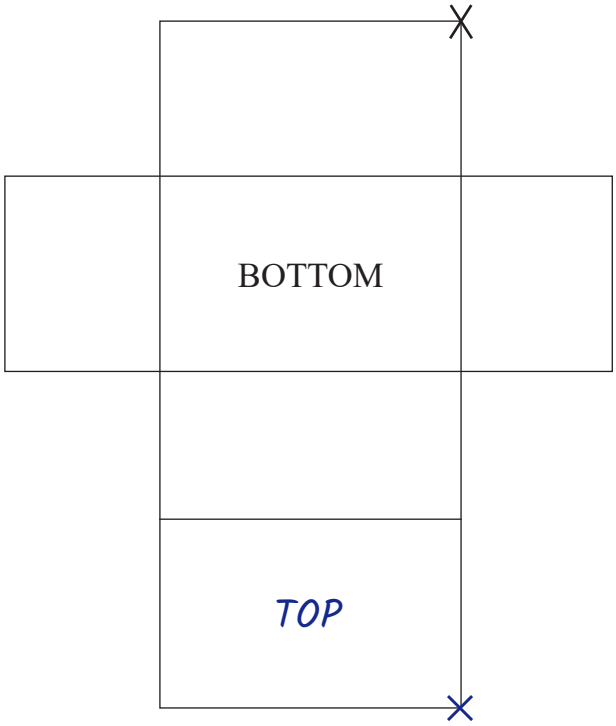
6.75 litres < 7 litres

No, he does not have enough varnish for the second job (he is 0.25 litres short).

[2]

[Turn over

7 Here is the net of a 3D shape.



(a) When the net is folded to make a shape, the face labelled BOTTOM in the diagram will be at the bottom of the shape.

Write the word TOP in the correct place to indicate which face will be at the top of the shape. [1]

(b) One of the vertices (corners) has been marked with an X

Mark with an X a vertex (corner) that will be touching it when the net is folded up to make the shape. [1]

(c) Amy thinks this is the net of a cuboid.

Jordan thinks it is the net of a cube.

Who is correct? You must explain your answer.

Answer Amy is correct because not all the faces are squares, some faces are rectangles, so it is a cuboid, not a cube [2]

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(Questions continue overleaf)

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8

Ulster Folk & Transport Museum

Entrance Prices

Adult £11

Child £6

Senior Citizen £8.50

10% discount for groups of 15 or more adults

(a) Two adults, two children and a senior citizen visit the museum.

How much change will there be from £50?

$2 \times 11 + 2 \times 6 + 8.50$

$= 22 + 12 + 8.50 = £42.50$

$50 - 42.50 = £7.50$

Answer £ 7.50 [2]

(b) A group of 46 adults visits the museum.

Riley thinks they are entitled to a total discount of at least £50

Is Riley correct?

Show all your working.

46 × £11 = £506

10% of £506 = 506 ÷ 10 = £50.60

£50.60 > £50

Yes, Riley is correct (the discount is at least £50).

[2]

(c) Sian works in the museum café 32 hours each week.

She earns £272 each week.

What is her hourly rate of pay?

272 ÷ 32 = 8.5

Answer £ 8.50 [2]

[Turn over

9 Insert a unit from the list to make each statement correct.

km	g	m	kg	mg	cm

(a) 1500 cm = 15 *m*

(b) 3.5 kg = 3500 *g*

(c) 67 mm > 6 *cm*

(d) 1200 g < 2 *kg*

[4]

10 **(a)** The temperature in Siberia rose from –15°C to –7°C.

By how many degrees did it rise?

$-7 - (-15) = -7 + 15 = 8$

Answer 8 °C [1]

(b) The temperature in Dublin was 4°C in the morning.

In the afternoon it fell by 7°C.

It then rose by 2°C in the evening.

What was the temperature in the evening?

$4 - 7 = -3$

$-3 + 2 = -1$

Answer −1 °C [1]

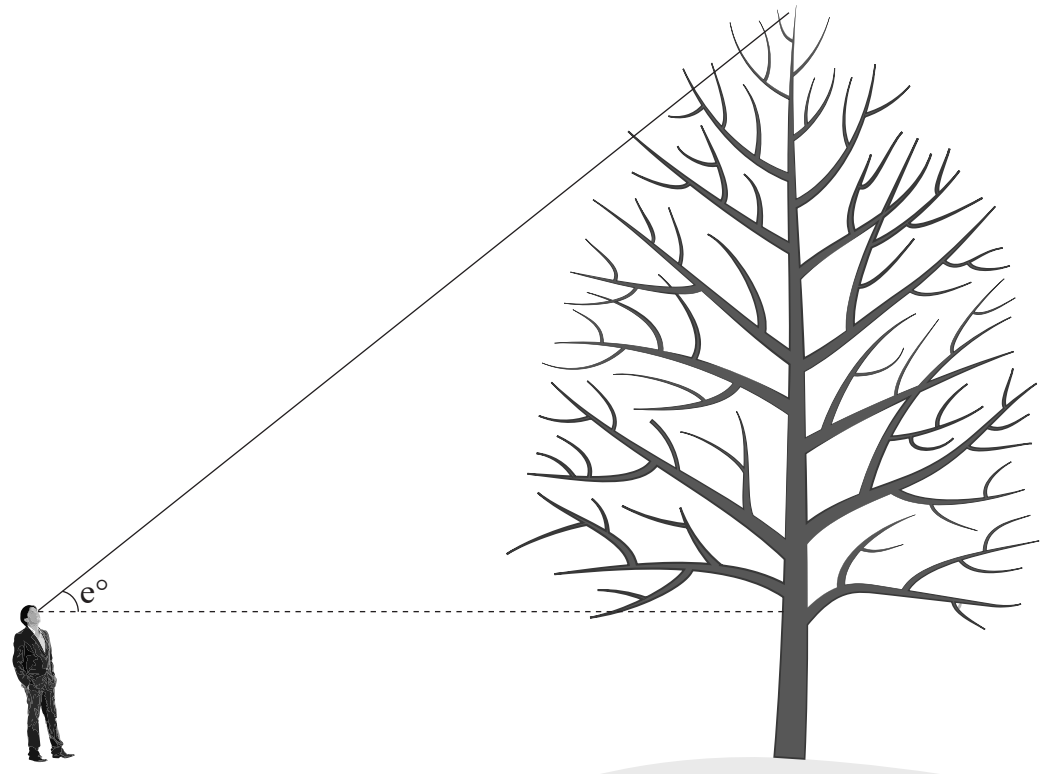
(c) Insert brackets to make the calculations correct.

(i) $8 \times (3 + 5) = 64$ [1]

(ii) $(7 - 5 + 8) \div 2 = 5$ [1]

[Turn over

11 A man stood and looked up to the top of a tree, as shown in the diagram.



(a) Measure the angle, e°, marked on the diagram.

Answer 39 ° [1]

(b) The man is approximately 2 m tall.

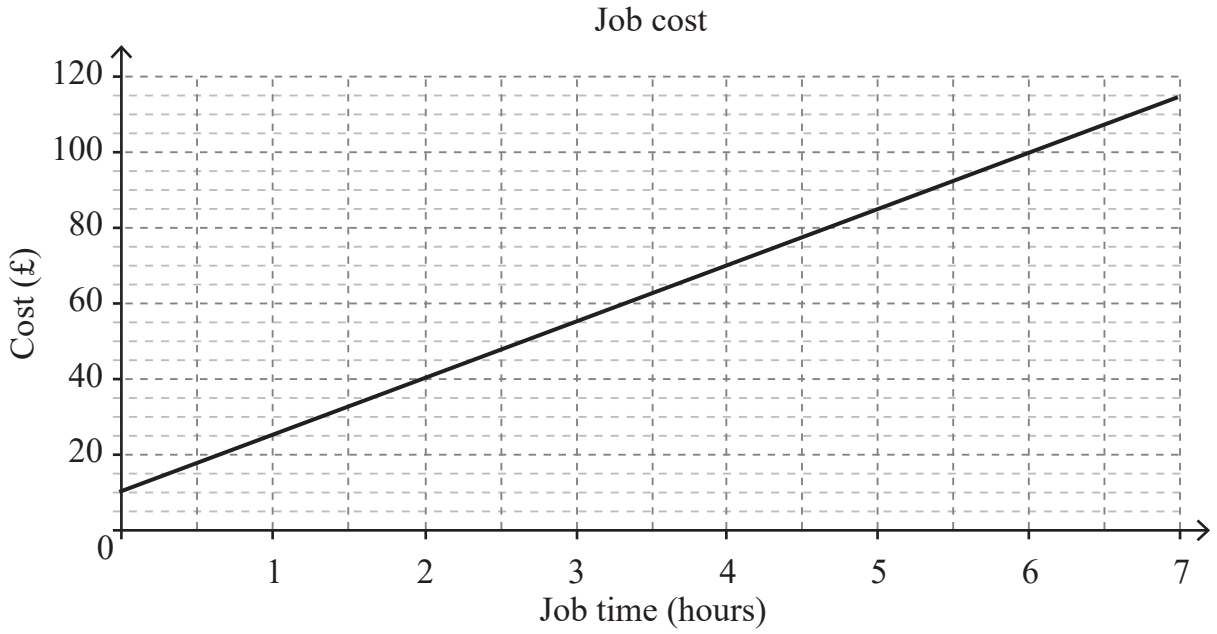
Use this fact to estimate the height of the tree.

The tree is about 4.5 times the height of the man

4.5 × 2 = 9

Answer 9 m [1]

12 Harry uses the graph below to price jobs.



(a) How much does a 5-hour job cost?

Answer £ 85 [1]

(b) Harry completes two jobs on Friday.

One job lasts an hour longer than the other.

What is the difference in cost?

From the graph: 1 hour job = £25, 2 hour job = £40

40 − 25 = 15 (each extra hour costs £15)

Answer £ 15 [2]

[Turn over

13 The owner of Rick's Restaurant recorded the total number of meals served each day for 6 days.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Number of meals	108	122	117	123	110	119

(a) Calculate the mean number of meals served per day.

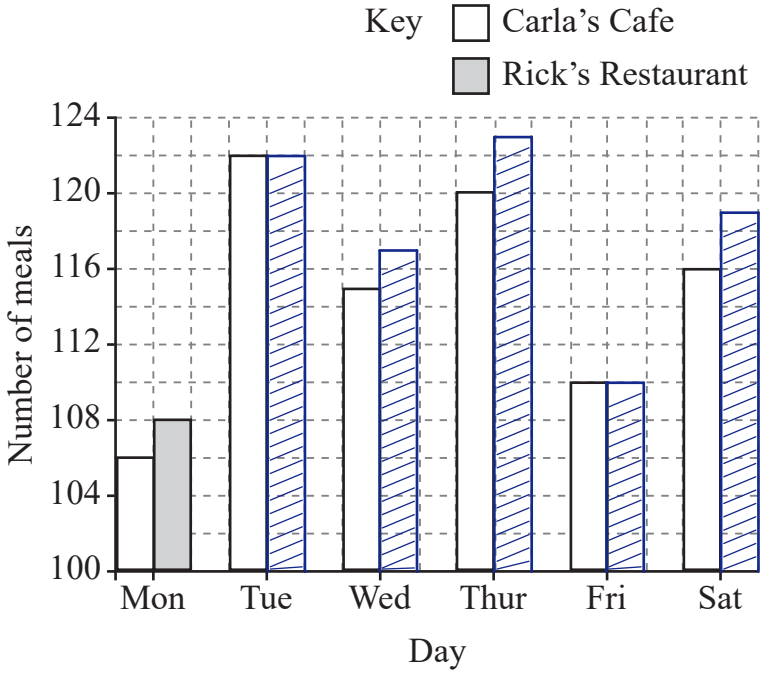
108 + 122 + 117 + 123 + 110 + 119 = 699

699 ÷ 6 = 116.5

Answer 116.5 [3]

(b) The owner of Carla's Cafe recorded the total number of meals served each day for the same 6-day period.

The results are shown in the diagram below.



(i) Complete the dual bar chart by drawing the bars for Rick's Restaurant.

The first one has been done for you. [2]

(ii) Without doing any calculations, state whether the mean number of meals served per day in Carla's Cafe is higher or lower than in Rick's Restaurant.

Give a reason for your answer.

Answer lower because none of Carla's bars are higher than Rick's; each day is the same or lower [1]

[Turn over

14 Fill in the missing values in each of the following boxes.

(a) 2.5% $= \frac{\boxed{2.5}}{100} = \frac{\boxed{5}}{200}$ [2]

(b) $\frac{9}{27} = \frac{2}{\boxed{6}}$ [1]

15

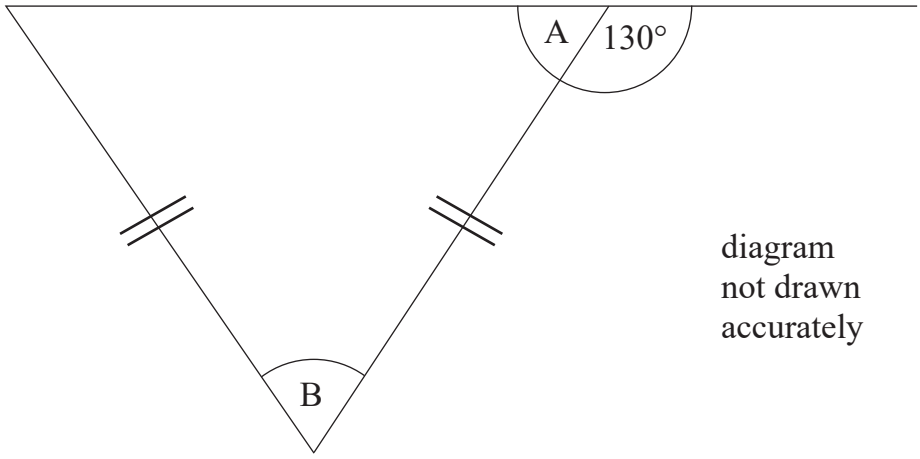


diagram
not drawn
accurately

Work out the sizes of the angles marked A and B in the diagram.

A = 180 − 130 = 50° (angles on a straight line add to 180°)
Isosceles triangle, so the base angles are equal: 50° and 50°
B = 180 − (2 × 50) = 80° (angles in a triangle add to 180°)

Answers A = 50 °

B = 80 °

[3]

[Turn over

16 A local drama group sold the following tickets.

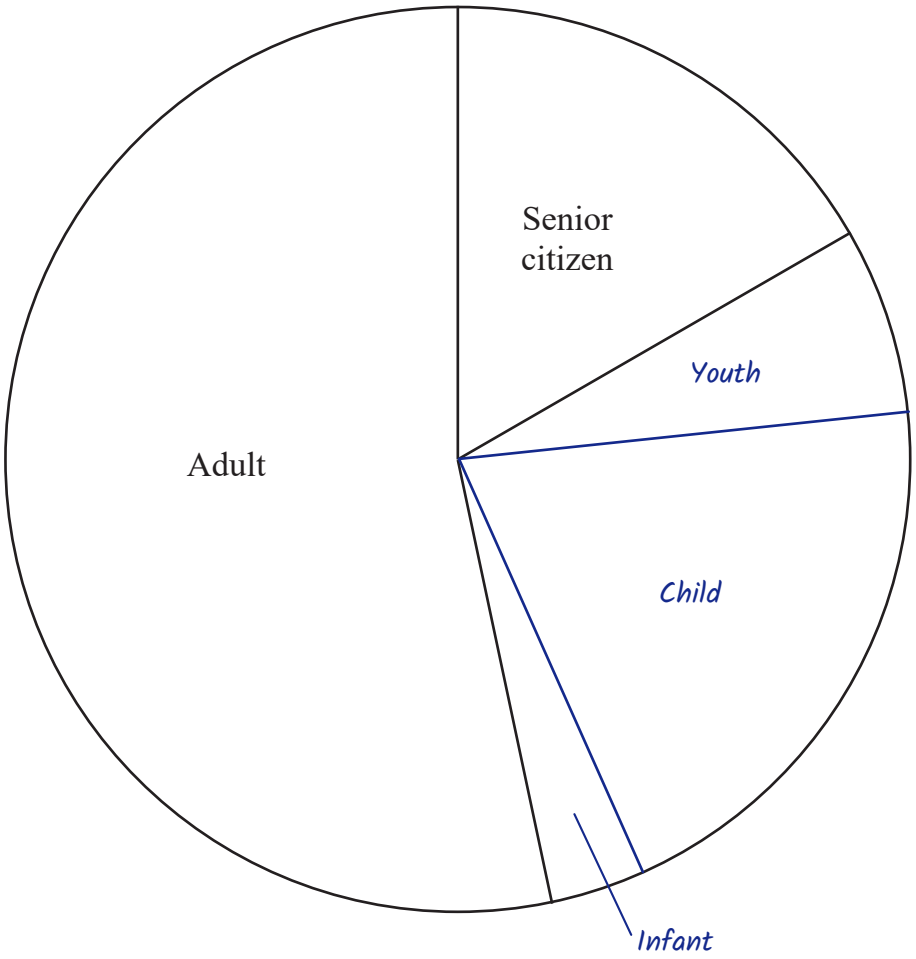
Type of ticket	Number of tickets sold
Senior citizen	15
Adult	48
Youth	6
Child	18
Infant	3

Total = 90 tickets
360 ÷ 90 = 4° per ticket
Youth 6 × 4 = 24°
Child 18 × 4 = 72°
Infant 3 × 4 = 12°

(a) The drama group leader started to draw a pie chart representing the number of tickets sold in each age category.

The first two sectors have been drawn.

Complete the pie chart.



[3]

(b) The table below includes the cost of the tickets.

Calculate the total income from ticket sales.

Type of ticket	Cost of ticket	No. of tickets sold
Senior citizen	£6	15
Adult	£10	48
Youth	£5	6
Child	£3	18
Infant	Free	3

$(6 \times 15) + (10 \times 48) + (5 \times 6) + (3 \times 18) + (0 \times 3)$

$= 90 + 480 + 30 + 54 + 0$

$= 654$

Answer £ 654 [2]

(c) At the interval, hot and cold drinks were sold as shown in the table below.

	Small	Medium	Large
Hot	4	24	7
Cold	3	12	15

The drama group leader said:

"Half of the medium drinks sold were cold."

Is this statement correct? Explain your answer.

Answer No because half of 36 medium drinks is 18,

but only 12 were cold (12 out of 36 is one third) [2]

[Turn over

17 **(a)** Write 5872 correct to 1 significant figure.

Answer 6000 [1]

(b) Find the cube root of 343

Answer 7 [1]

(c) Calculate $5.9^2 + \sqrt{80}$

Give your answer correct to 1 decimal place.

$5.9^2 + \sqrt{80} = 34.81 + 8.94427191...$
$= 43.75427191...$
$= 43.8$ (1 d.p.)

Answer 43.8 [2]

18 Mr Jenkins is a bus driver.

His standard rate of pay is £12 per hour.

At weekends he gets "time and a half".

If he works a split shift (two separate blocks of time) on any day he gets an additional £18 for that day.

Mr Jenkins' timesheet for the first week in January is shown below.

Monday	0800–1400
Tuesday	0730–0930 and 1500–2200
Wednesday	Off
Thursday	1500–2230
Friday	Off
Saturday	0800–1500
Sunday	1230–1830

Calculate Mr Jenkins' total pay for this week.

Mon 0800–1400 = 6 h

Tue 0730–0930 = 2 h and 1500–2200 = 7 h, total 9 h (split shift)

Thu 1500–2230 = 7.5 h

Weekdays: 6 + 9 + 7.5 = 22.5 h, 22.5 × £12 = £270

Weekend: Sat 7 h + Sun 6 h = 13 h

Time and a half = 12 × 1.5 = £18 per hour, 13 × £18 = £234

Split shift bonus = £18

Total = 270 + 234 + 18 = £522

Answer £ 522 [4]

[Turn over

19 **(a)** A farm worker can pick 90 strawberries every 5 minutes.

How many strawberries can the farm worker pick in an hour?

60 ÷ 5 = 12, 12 × 90 = 1080

Answer 1080 [1]

(b) The average picking rate for each worker is 1000 strawberries per hour.

There are 8 workers on the farm.

They need to pick 58 000 strawberries for a special order.

If they pick at the average rate, how long should it take them?

Give your answer in hours and minutes.

8 × 1000 = 8000 strawberries per hour
58000 ÷ 8000 = 7.25 hours
0.25 × 60 = 15 minutes

Answer 7 hours and 15 minutes [2]

20 **(a)** Simplify $5a + 2b - 3a - 8b$

Answer $2a - 6b$ [2]

(b) Solve $2(4x - 5) = 38$

$8x - 10 = 38$

$8x = 48$

$x = 6$

Answer $x =$ 6 [3]

21 Jenny invests £6000 in a Simple Interest savings account.

After 1 year she has £6270 in her account.

Calculate the annual percentage interest rate.

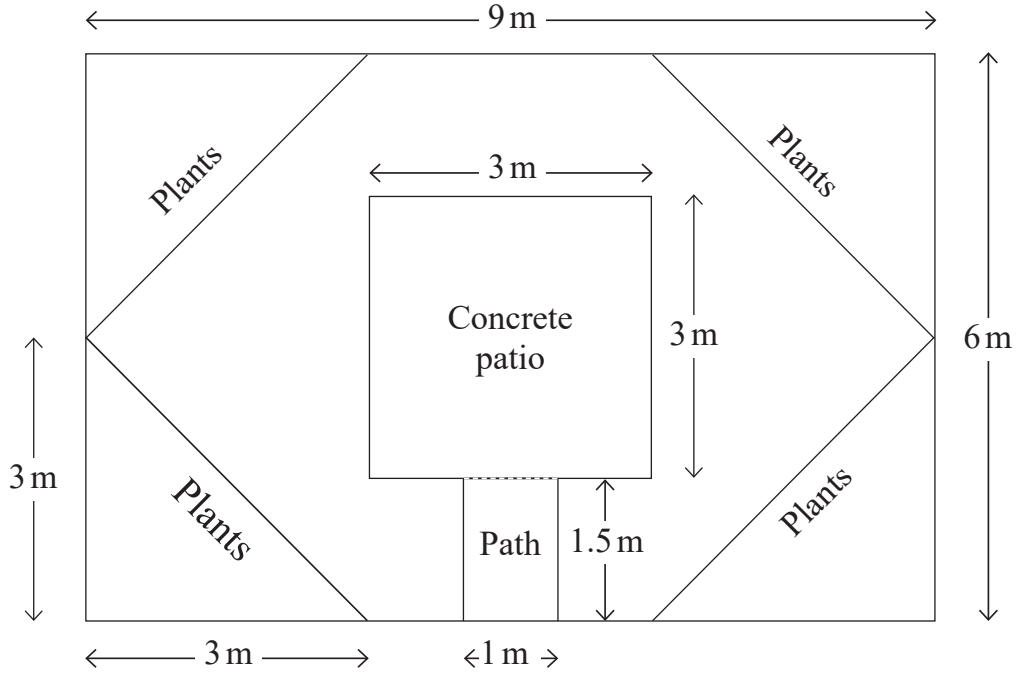
Interest = 6270 − 6000 = £270

$\frac{270}{6000} \times 100 = 4.5\%$

Answer 4.5 % [3]

[Turn over

22 The diagram shows the layout of a rectangular garden.



(a) There are four identical triangular sections of the garden covered with plants.

Calculate the area of one of these triangular sections.

You must include units with your answer.

Each triangle has base 3 m and height 3 m

Area = (3 × 3) ÷ 2 = 4.5 m²

Answer *4.5 m²* [3]

(b) The garden also has a rectangular path leading to a square concrete patio.

The remainder of the garden is covered by grass.

Calculate the total area of grass in the garden.

Garden = $9 \times 6 = 54\ m^2$

Plants = $4 \times 4.5 = 18\ m^2$

Patio = $3 \times 3 = 9\ m^2$

Path = $1.5 \times 1 = 1.5\ m^2$

Grass = $54 - 18 - 9 - 1.5 = 25.5\ m^2$

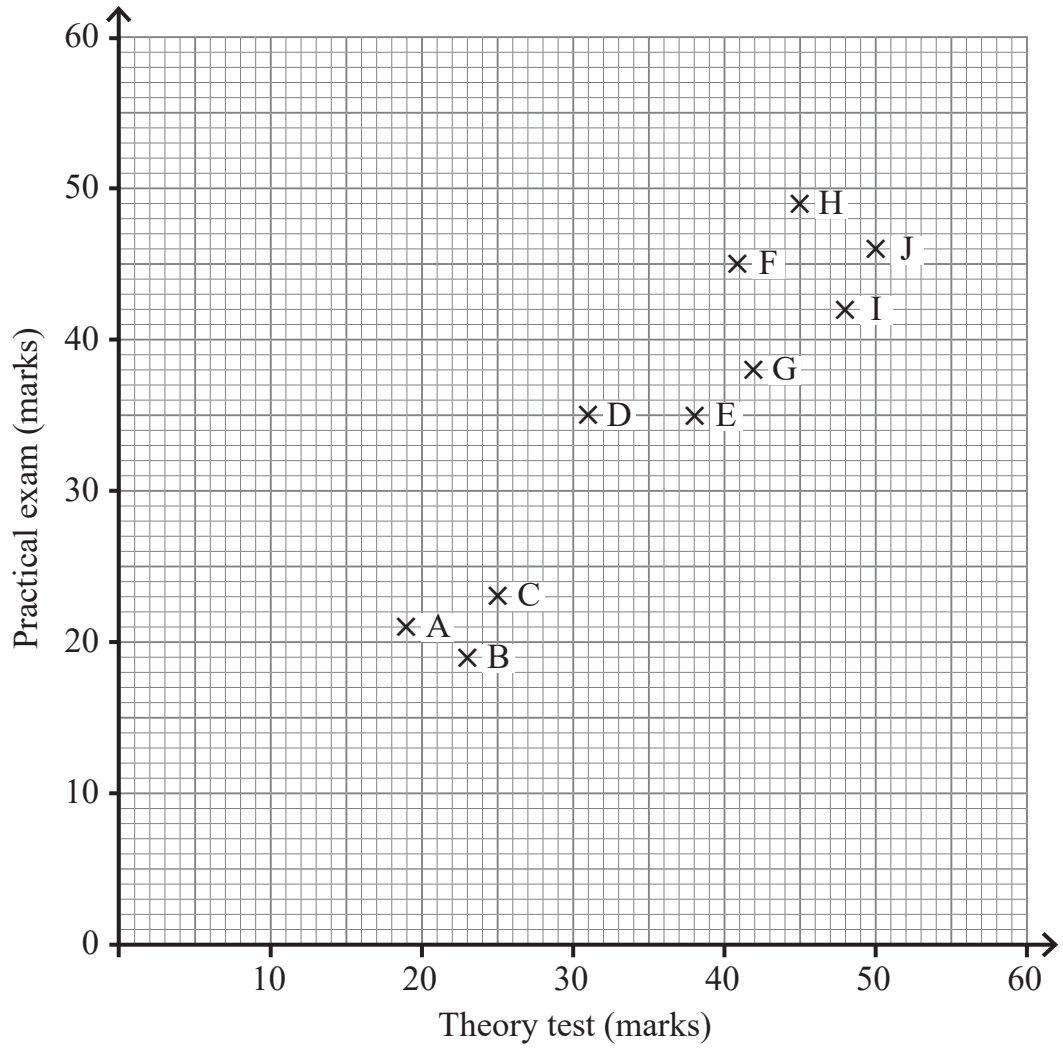
Answer 25.5 m^2 [3]

[Turn over



23 Ten job applicants completed a theory test and a practical exam.

The marks are shown in the scatter graph below.



(a) What was the highest mark obtained in the practical exam?

Answer 49 [1]

(b) One applicant scored a total of 80 marks.

Which applicant was this?

G: 42 + 38 = 80

Answer G [1]

24 The stem and leaf diagram shows the heights of 19 members of a sports team.

16	3	4	9						
17	1	2	4	5	6	7	8	9	9
18	0	2	3	5	5	8			
19	0								

Key 17 | 5 = 175 cm

Four new players attend trials to become the 20th member of the team.

Their heights are

Player A	185 cm
Player B	179 cm
Player C	177 cm
Player D	191 cm

If added to the team, which player would make

(a) the modal height greater than 180 cm?

Answer A (185 cm) [1]

(b) the range of the heights 28 cm?

Answer D (191 cm) [1]

(c) the median height 177.5 cm?

Answer C (177 cm) [1]

[Turn over



25 A coat has an original price of £87

Online Shop A offers a 33% discount.

Online Shop B offers a third off.

Which shop offers the greatest saving and how much greater is the saving in pence?

You must show all your working.

Shop A: 33% of £87 = 0.33 × 87 = £28.71

Shop B: $\frac{1}{3}$ of £87 = 87 ÷ 3 = £29

£29 > £28.71, so Shop B gives the greater saving

29 − 28.71 = £0.29 = 29p

Answer Shop ___B___ offers greater saving by ___29___ p [4]

26 Philip says $2\frac{1}{3} + 4\frac{1}{2} = 6\frac{2}{5}$

because 2 + 4 = 6 for the whole numbers,

1 + 1 = 2 on the numerator and

3 + 2 = 5 on the denominator.

Prove that he is incorrect by showing a step-by-step solution to the correct answer, without using a calculator.

Whole numbers: $2 + 4 = 6$

Fractions: $\frac{1}{3} + \frac{1}{2} = \frac{2}{6} + \frac{3}{6} = \frac{5}{6}$

So $2\frac{1}{3} + 4\frac{1}{2} = 6\frac{5}{6}$

The correct answer is $6\frac{5}{6}$ not $6\frac{2}{5}$, so Philip is incorrect.

(You cannot add the denominators.)

[3]

THIS IS THE END OF THE QUESTION PAPER

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For Examiner's use only	
Question Number	Marks
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November 2022

GCSE Mathematics

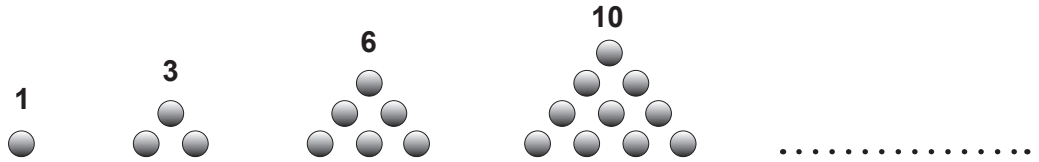
FOUNDATION TIER
ADDITIONAL SUPPORT MATERIALS
(For use in November 2022)

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Numbers

Highest Common Factor (HCF): The highest common factor is the largest number that divides evenly into two or more numbers, e.g. 4 is the HCF of 8 and 20

Triangular numbers – are a pattern of numbers which form triangles. Each number in the sequence adds a new row of dots to the triangle.



Trial and Improvement

This is a method of trying different values in an equation until you get a suitable solution (e.g. to 1 decimal place).

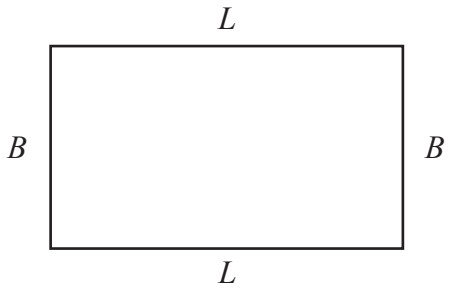
Range

The range of a set of data is the difference between the largest value and the smallest value in the data set.

Mean

The mean of a set of data is the sum of all the data values divided by the number of data values.

Area and Volume



The area of a rectangle is found by multiplying the length of the rectangle by the breadth.

$A = L \times B$ where A is area, L is length and B is breadth.

The area of a triangle is found by multiplying half the length of the base by the perpendicular height of the triangle.

$A = \frac{1}{2}bh$ where b is the base and h is the perpendicular height of the triangle.

The area of a circle is $A = \pi r^2$ where r is the radius of the circle.

The volume of a cuboid is found by multiplying the length by the breadth by the height of the cuboid.

$V = L \times B \times H$ where V is volume, L is length, B is breadth and H is height.

Angles

There are 180° on a straight line.
There are 180° inside a triangle.
An isosceles triangle is a triangle with 2 equal sides and 2 equal angles.
The sum of all the angles inside a polygon is given by $180(n - 2)$ where n is the number of sides in the polygon.

Pie Chart

In a pie chart, the total angle that corresponds to the entire data set is 360°

Probability

The sum of the probabilities of all outcomes equals 1

Compound Measures

$$\text{Average Speed} = \frac{\text{Distance}}{\text{Time}}$$

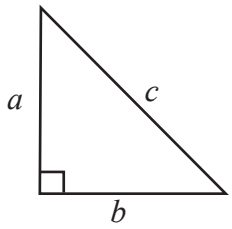
$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

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Pythagoras' Theorem

If a, b and c are the sides of a right angled triangle shown below, then

$$a^2 + b^2 = c^2$$



Midpoint of a line

If (x_1, y_1) and (x_2, y_2) are the end points of a line, then the coordinates of the midpoint M of the line are

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$