Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
November 2025

Mathematics

StemUp Model Solution

Unit M2
(With calculator)
Foundation Tier



[GMC21]

GMC21

TUESDAY 18 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 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.**
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 **may** use a calculator for this paper.
Answer **all thirty-one** questions.

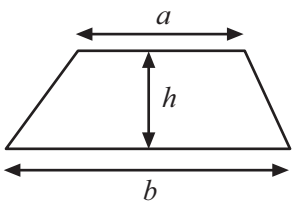
INFORMATION FOR CANDIDATES

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.

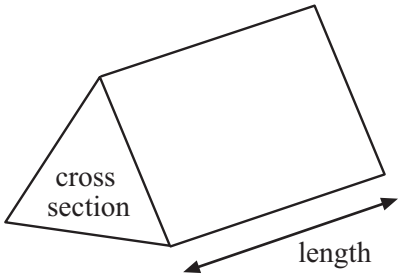
15153

Formula Sheet

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



Volume of prism = area of cross section × length



15153

1 Steve's earnings were £2700 per month.

His pension contribution was 8% of his earnings.

(a) How much was Steve's pension contribution per month?

8% of 2700 = 2700 ÷ 100 × 8

= 216

Answer £ 216 [2]

His employer also made a pension contribution of 3% of Steve's earnings.

(b) How much would the **total** pension contributions be each **year**?

3% of 2700 = 2700 ÷ 100 × 3 = 81

Per month: 216 + 81 = 297

Per year: 297 × 12 = 3564

Answer £ 3564 [2]

[Turn over

2 Minibuses can transport 15 passengers at a time.

There are 110 passengers waiting in a queue.

(a) What is the **minimum** number of minibuses needed to transport everyone in the queue?

110 ÷ 15 = 7.333...

7 minibuses only carry 105, so 8 are needed

Answer 8 [2]

(b) Assuming that all other minibuses were full, how many passengers will be in the last minibus?

15 × 7 = 105, 110 − 105 = 5

Answer 5 [1]

3 Look at these numbers.

2835 **4283**

How much more is the digit **8** worth in 2835 than in 4283?

8 in 2835 is worth 800

8 in 4283 is worth 80

800 − 80 = 720

Answer 720 [2]

4 When ordering posts for a double-sided fence, a joiner uses the rule

"Divide the number of panels by 2 and then add 1"

(a) How many posts are needed for a double-sided fence with 16 panels?

16 ÷ 2 + 1 = 8 + 1 = 9

Answer 9 [1]

(b) If the joiner ordered 11 posts, how many panels does he need?

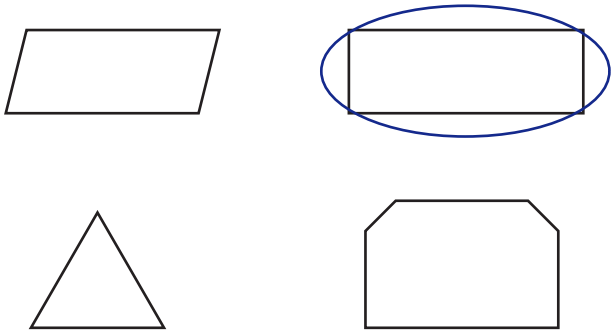
11 − 1 = 10

10 × 2 = 20

Answer 20 [2]

[Turn over

5 **(a)** Circle the shape that has exactly two lines of symmetry.



[1]

(b) **Calculate** the size of angle q.

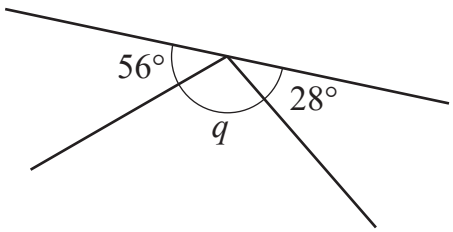
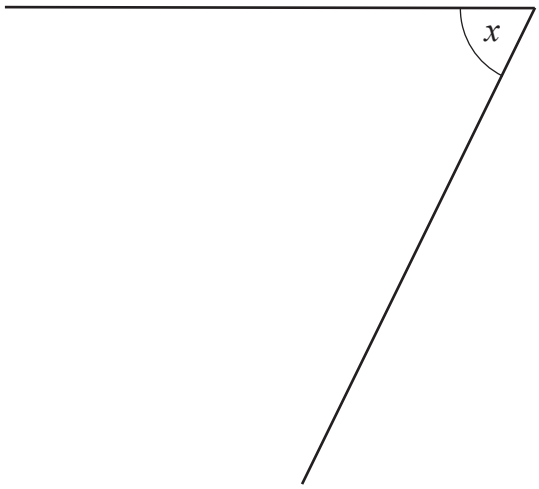


diagram not drawn accurately

$q = 180 - (56 + 28) = 180 - 84 = 96$

Answer 96 ° [2]

(c) Use a **protractor** to measure the size of angle x.



Answer 64 ° [1]

15153

6 Mary is a chef in a burger bar.

She has 8.3 kg of burger mix.

Mary uses 125 g of burger mix in each burger.

How many burgers can Mary make?

8.3 kg = 8300 g

8300 ÷ 125 = 66.4

so 66 whole burgers

Answer 66 [2]

[Turn over



7 The number of visitors to a tourist attraction over a six-year period is given in the table.

Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Number of visitors	7910	6920	9430	38 500	34 050	6150

(a) What is the **range** of the number of visitors over the six-year period?

38 500 − 6150 = 32 350

Answer 32 350 visitors [1]

(b) Rick has started calculating the **mean** number of visitors over the six-year period.

Complete Step 2 and write down the mean.

Step 1: 7910 + 6920 + 9430 + 38 500 + 34 050 + 6150 = 102 960

Step 2: 102 960 ÷ 6 = 17 160

Answer The mean is 17 160 visitors [2]

(c) There were 15 000 visitors in 2021

The new mean, over the seven years, is calculated.

Which of the following statements is true?

Circle your answer.

the mean increases **the mean decreases** **the mean stays the same** [1]

8 The scores of 12 students in a test are

44	31	77	40	16	46
79	68	51	20	50	48

(a) What is the median test score?

16, 20, 31, 40, 44, 46, 48, 50, 51, 68, 77, 79

Middle two values are 46 and 48

(46 + 48) ÷ 2 = 47

Answer 47 [2]

Naomi designs this tally and frequency table to put the scores into groups.

Test score	Tally	Frequency
20–29		
30–39		
40–49		
50–59		
60–69		
70–79		

(b) Write down one criticism of Naomi's tally and frequency table.

Answer There is no group for the score of 16 (nothing below 20), so 16 cannot be put in the table [1]

[Turn over

9 Work out the value of $2^3 + 3^2$

$2^3 = 2 \times 2 \times 2 = 8$

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

$8 + 9 = 17$

Answer 17 [2]

10 Kasper wants to set a new 4-digit passcode for his phone.

He wants the first 2 digits to be a prime number between 20 and 30

He wants the last 2 digits to be a square number between 20 and 30

Write down both passcodes that he could use.

Primes between 20 and 30: 23, 29

Square number between 20 and 30: 25

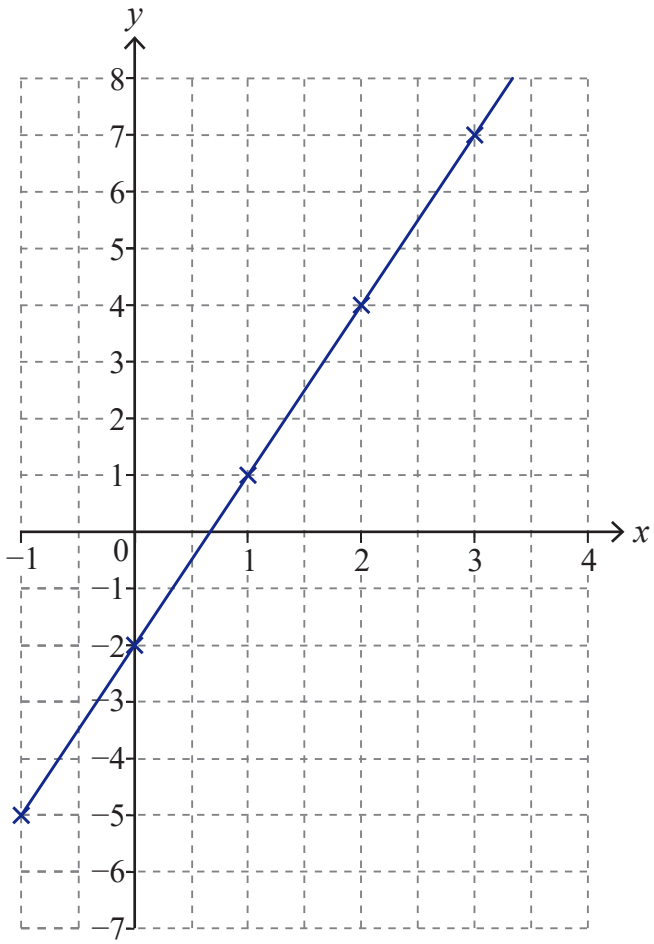
Answer 2325 and 2925 [2]

11 (a) (i) Complete the table for $y = 3x - 2$

x	−1	0	1	2	3
y	−5	−2	1	4	7

[1]

(ii) On the grid below, draw the graph of $y = 3x - 2$



[2]

(b) Solve the equation $3x - 2 = 5.5$

$3x = 5.5 + 2 = 7.5$

$x = 7.5 \div 3 = 2.5$

Answer $x =$ 2.5 [2]

[Turn over

12 (a) Claire bought 350 bonds at a cost of £4.20 per bond.

Later she bought another 200 bonds, but cannot remember how much she paid per bond.

The total amount she paid for all the bonds was £2500

Calculate how much Claire paid per bond when she bought the 200 bonds.

Show your working out clearly.

350 × 4.20 = £1470

2500 − 1470 = £1030 for the 200 bonds

1030 ÷ 200 = £5.15 per bond

Answer £ 5.15 [4]

(b) The "return on investment" value is the percentage profit Claire made.

Claire sold the bonds a year later for a total of £2850

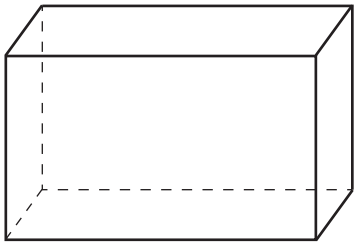
What was her "return on investment" value?

Profit = 2850 − 2500 = £350

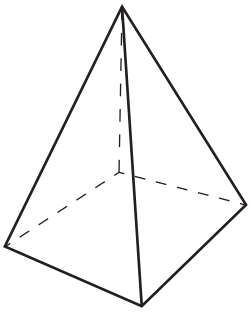
350 ÷ 2500 × 100 = 14

Answer 14 % [2]

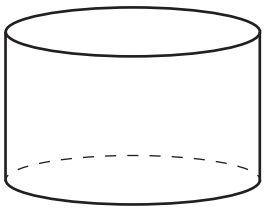
13



Shape A



Shape B



Shape C

(a) What is the mathematical name of Shape A?

Answer Cuboid [1]

(b) Complete the sentences.

(i) Shape B has 8 edges. [1]

(ii) Shape B has 5 vertices. [1]

(c) Complete the sentence with the correct shape.

A net of Shape C would consist of 2 circles and a

rectangle. [1]

[Turn over

14 The six angles in two different triangles are listed in descending order.

The first four angles are 120° 80° 72° 40°

Find the size of the **smallest** angle that would complete the list.

Angles in each triangle add up to 180°

120 + 80 and 120 + 72 are over 180, so 120° goes with 40°

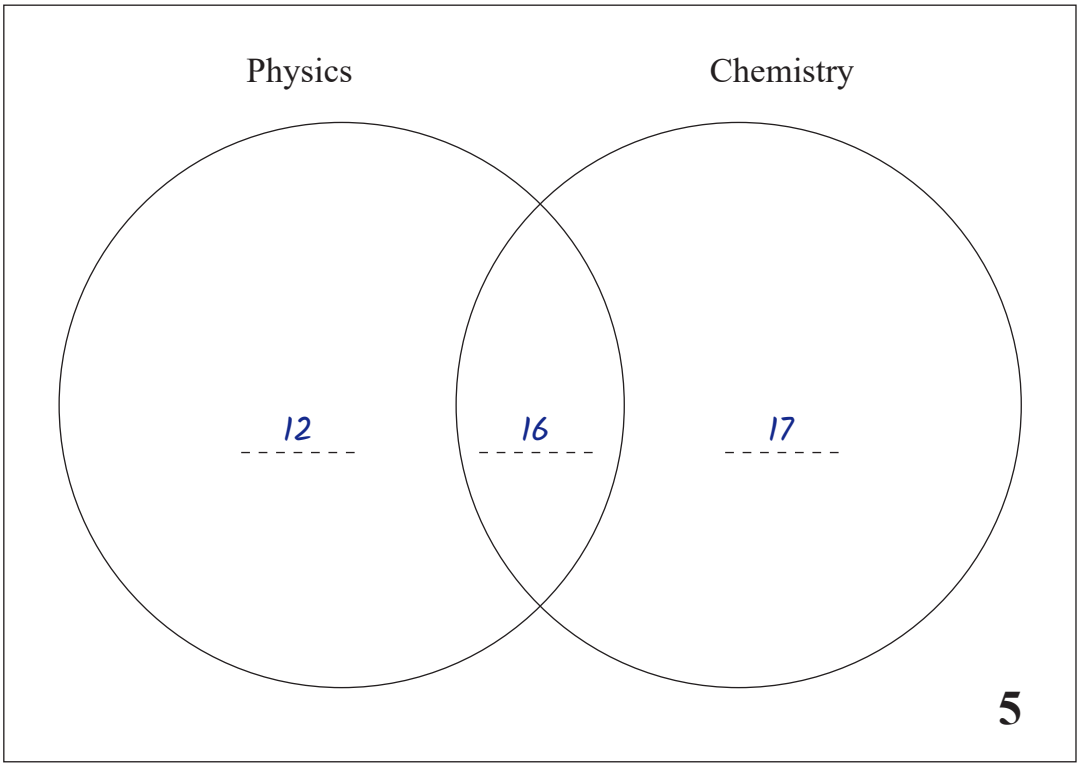
120 + 40 = 160, third angle = 180 − 160 = 20°

80 + 72 = 152, third angle = 180 − 152 = 28°

List: 120°, 80°, 72°, 40°, 28°, 20°

Answer *20* ° [3]

15



The Venn diagram represents 50 students.

12 students study Physics but not Chemistry.

28 students study Physics.

Complete the Venn diagram to find the number of students who study Chemistry but not Physics.

Physics and Chemistry: 28 − 12 = 16

Chemistry only: 50 − 12 − 16 − 5 = 17

Answer 17 [3]

[Turn over

16 Pupils were asked to vote for how much homework they should get each week.

85 voted to have homework every night

105 voted not to have homework at all

110 voted to have homework on three nights per week

What percentage of pupils voted not to have homework at all?

Total = 85 + 105 + 110 = 300

105 ÷ 300 × 100 = 35

Answer 35 % [2]

17 Use your calculator to find the value of

$$\frac{47.8 - 4.5^2}{15.6 + 4.85}$$

Round your answer to 2 decimal places.

$47.8 - 4.5^2 = 47.8 - 20.25 = 27.55$

15.6 + 4.85 = 20.45

27.55 ÷ 20.45 = 1.347188264...

Answer 1.35 [2]

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18 At a sports match

$\frac{5}{8}$ of the crowd supported the home team

$\frac{1}{3}$ of the crowd supported the away team

The rest of the crowd did not support either team.

What fraction of the crowd did not support either team?

$\frac{5}{8} + \frac{1}{3} = \frac{15}{24} + \frac{8}{24} = \frac{23}{24}$

$1 - \frac{23}{24} = \frac{1}{24}$

Answer $\frac{1}{24}$ [2]

[Turn over



19 A property developer bought a house for £84 000

He sold the house, making a profit of 12%

How much did he sell the house for?

12% of 84 000 = 0.12 × 84 000 = 10 080

84 000 + 10 080 = 94 080

Answer £ 94 080 [3]

20 A quadrilateral has angles as shown in the diagram below.

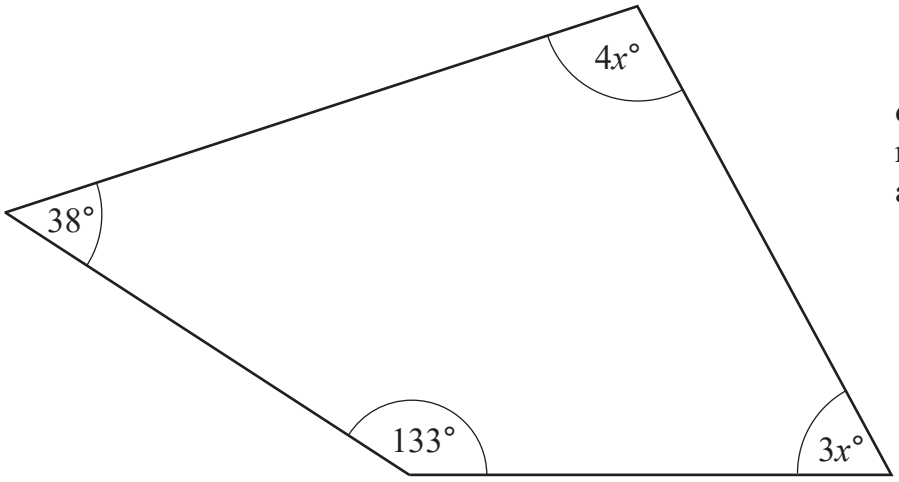


diagram not drawn accurately

Find the value of x

Show your working out clearly.

Angles in a quadrilateral add up to 360°

$4x + 3x + 38 + 133 = 360$

$7x + 171 = 360$

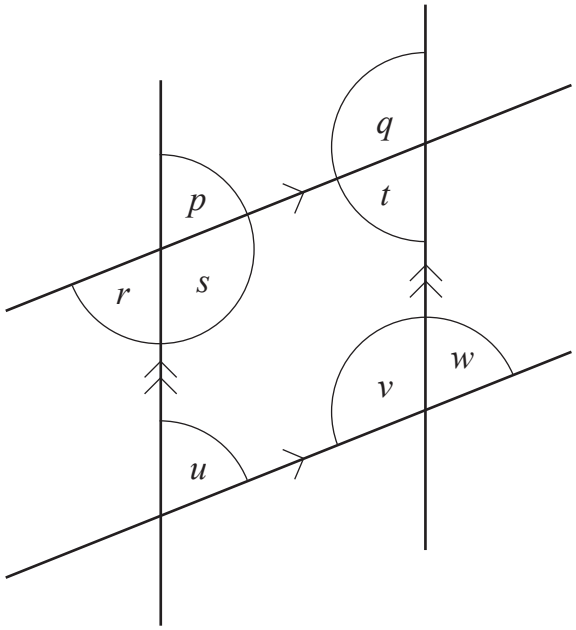
$7x = 360 - 171 = 189$

$x = 189 \div 7 = 27$

Answer $x =$ 27 [4]

[Turn over

21



(a) Name an angle alternate to angle r Answer u [1]

(b) Name an angle corresponding to angle u Answer p [1]

(c) What is the sum of angle t and angle v? Answer 180 ° [1]

22 Barbara wants to investigate the number of hours adults spend on social media.

She gives a questionnaire to a random sample of 60 members of a pensioners' club.

One of the questions is shown below.

How many hours do you spend on social media?

1 – 5 ☐

5 – 10 ☐

10 – 20 ☐

(a) Give **one** criticism of the **sample** she has selected.

Answer *Pensioners do not represent all adults, the sample only includes older people* [1]

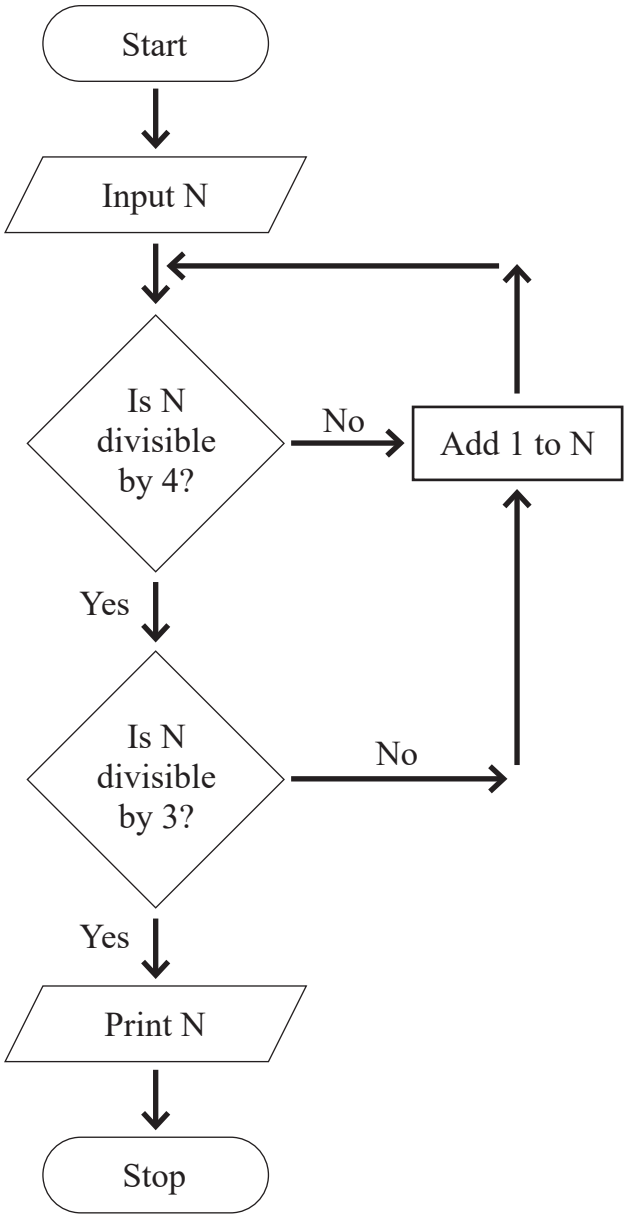
(b) Give **two** criticisms of the **questionnaire**.

1 *No time period is given (e.g. per day or per week)*

2 *The groups overlap (5 is in 1 – 5 and 5 – 10) and there is no box for 0 hours or more than 20 hours* [2]

[Turn over

23 **(a)** Starting with N = 31, use the flow chart to find the number printed.



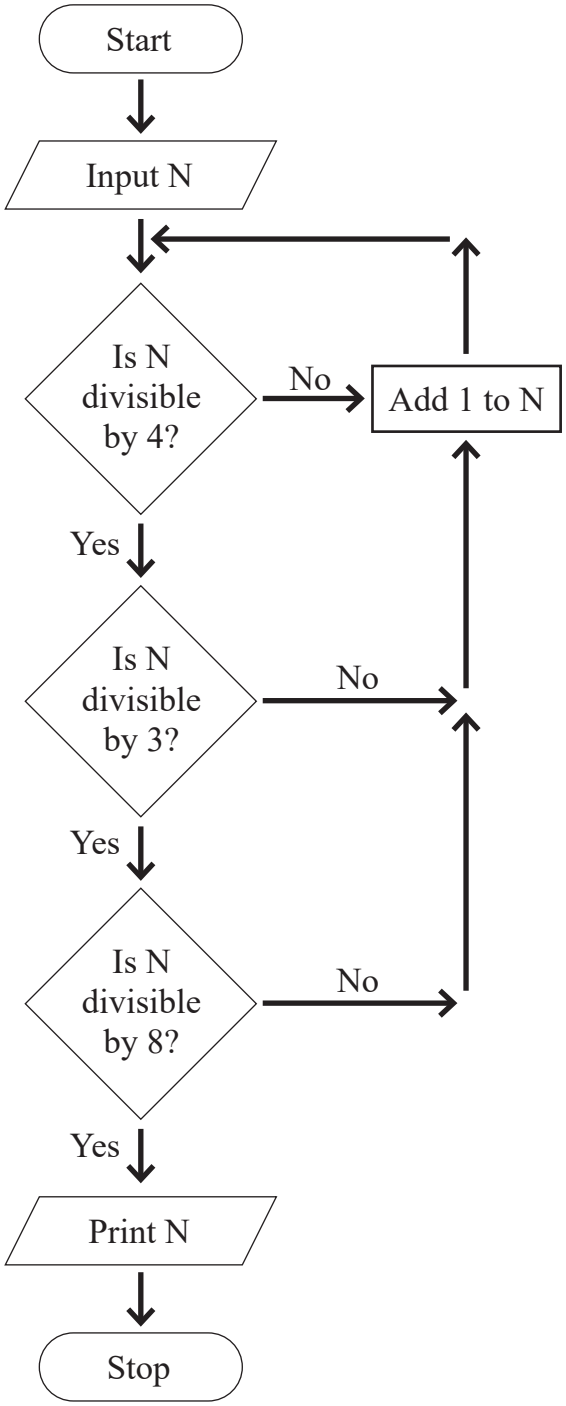
31 → 32 (÷ 4 yes, ÷ 3 no) → 33 → 34 → 35 → 36

36 ÷ 4 = 9 and 36 ÷ 3 = 12, so print 36

Answer 36 [2]

(b) A third decision box is added.

Starting with N = 31, find the number printed now.



36 is not divisible by 8

Add 1: 37, ..., 48

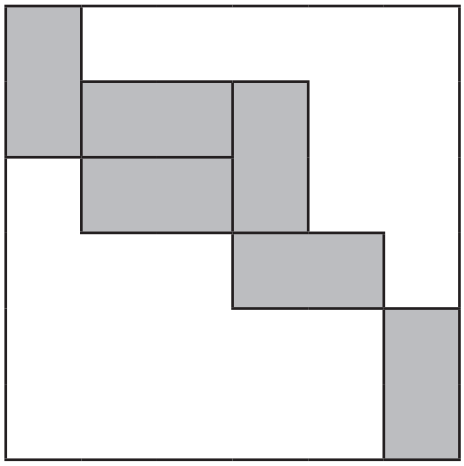
48 ÷ 4 = 12, 48 ÷ 3 = 16, 48 ÷ 8 = 6

so print 48

Answer 48 [1]

[Turn over

24 Six equal rectangles are placed inside a square of side 60 cm as shown in the diagram.



Calculate the area of the **unshaded** part of the square.

Show your working out clearly.

Width of rectangle = 60 ÷ 6 = 10 cm

Length of rectangle = 60 ÷ 3 = 20 cm

Area of one rectangle = 20 × 10 = 200 cm^2

Shaded = 6 × 200 = 1200 cm^2

Square = 60 × 60 = 3600 cm^2

Unshaded = 3600 − 1200 = 2400

Answer 2400 cm^2 [4]

25 In March, a household electricity bill was £340

In June, the electricity bill was 15% less than in March.

In September, the electricity bill was 15% more than in June.

How much **less** was the bill in September than the bill in March?

June: 340 × 0.85 = £289

September: 289 × 1.15 = £332.35

340 − 332.35 = £7.65

Answer £ 7.65 [4]

26 150 expressed as a product of prime factors is $2 \times 3 \times 5^2$

What is the smallest number that 150 can be multiplied by to give a **square** number?

$150 = 2 \times 3 \times 5^2$

Pair up the 2 and the 3: multiply by $2 \times 3 = 6$

$150 \times 6 = 900 = 30^2$

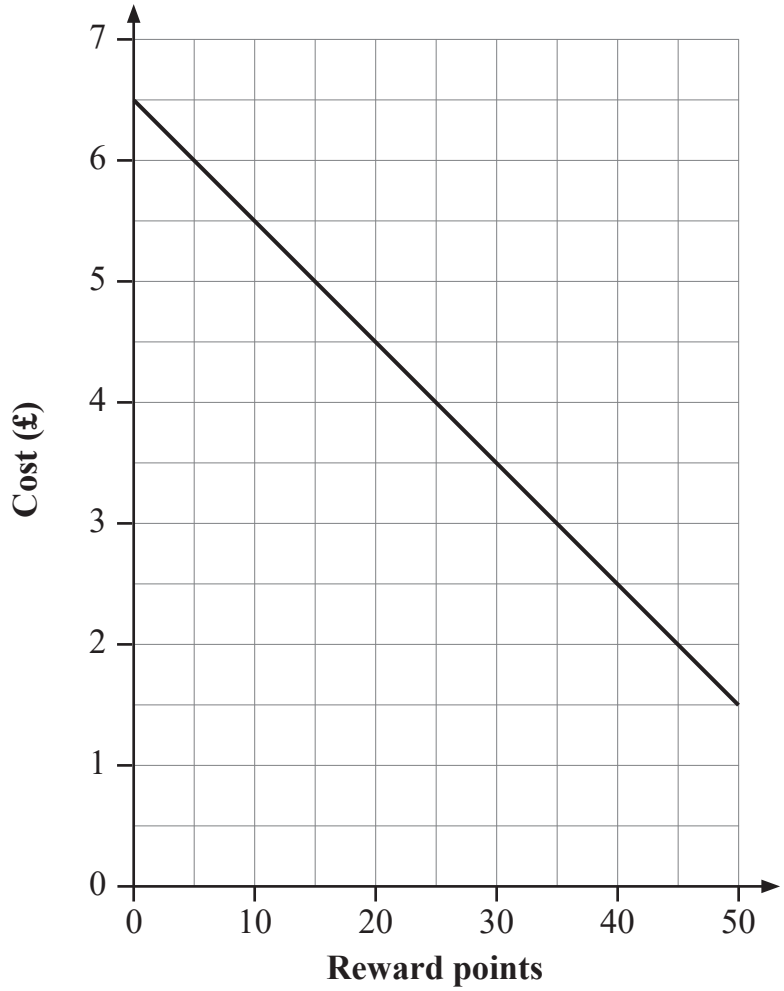
Answer 6 [2]

[Turn over

27 A supermarket offers discounts for customers who have collected reward points.

The graph shows the price of a tin of biscuits with reward points.

Customers can use a maximum of 50 reward points for each tin of biscuits.



(a) How much does a tin of biscuits cost with no reward points?

Answer £ 6.50 [1]

(b) How much is each reward point worth in pence?

50 points: 6.50 − 1.50 = £5 off

500p ÷ 50 = 10p per point

Answer 10 p [2]

(c) A customer wants to buy two tins of biscuits.

They have 85 reward points.

How much will they have to pay in total?

Without points: 2 × 6.50 = £13

85 points (50 + 35) × 10p = £8.50 off

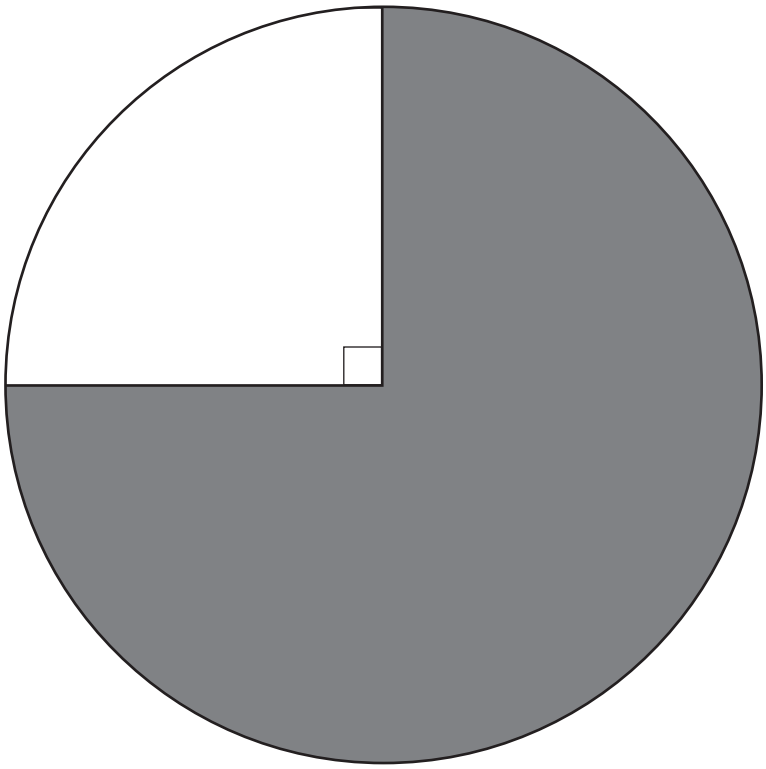
13 − 8.50 = £4.50

Answer £ 4.50 [2]

[Turn over

28 The circle below has a diameter of 8 cm.

Calculate the shaded area.



Radius = 8 ÷ 2 = 4 cm

Area of circle = $\pi \times 4^2$ = 50.26548246...

Shaded = $\frac{3}{4} \times$ 50.26548246... = 37.69911184...

= 37.7 (3 s.f.)

Answer 37.7 cm^2 [3]

29 Calculate the perimeter of the shape shown.

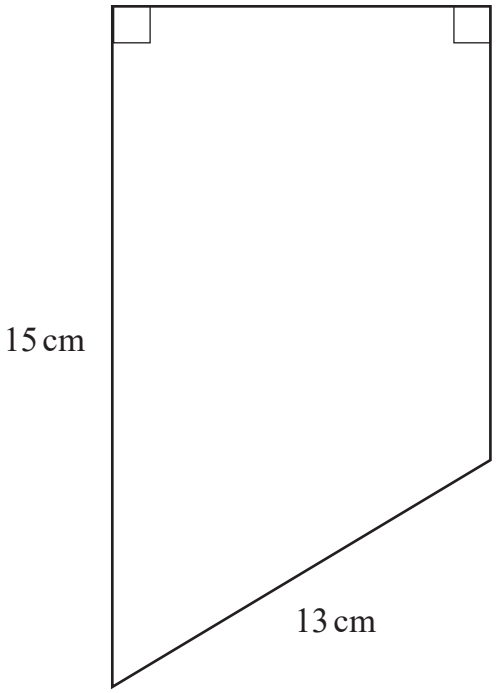


diagram not drawn accurately

Show your working out clearly.

Missing side x (top): vertical drop = 15 − 10 = 5 cm

$13^2 = 5^2 + x^2$

$x^2 = 169 - 25 = 144$

$x = \sqrt{144} = 12$ cm

Perimeter = 15 + 12 + 10 + 13 = 50

Answer 50 cm [4]

[Turn over

30 The grouped frequency table shows the journey times to school for pupils.

Time t (minutes)	Frequency	Midpoint x	fx
$10 \leqslant t < 20$	13	15	195
$20 \leqslant t < 30$	23	25	575
$30 \leqslant t < 40$	9	35	315
$40 \leqslant t < 50$	5	45	225

Calculate an estimate for the mean journey time to school for pupils.

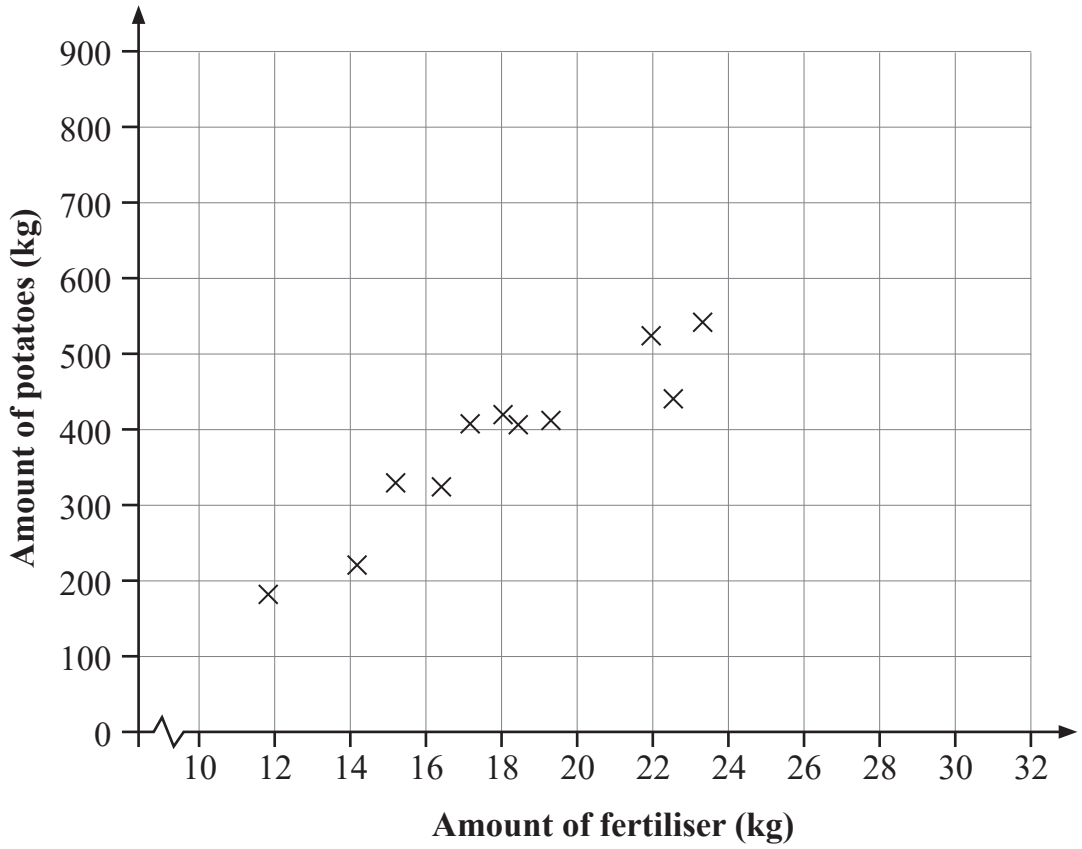
$\Sigma fx = 195 + 575 + 315 + 225 = 1310$

$\Sigma f = 13 + 23 + 9 + 5 = 50$

Mean $= 1310 \div 50 = 26.2$

Answer 26.2 minutes [4]

31 The scatter graph shows positive correlation between the amount of potatoes produced (kg) and the amount of fertiliser used (kg).



Zara suggests drawing a line of best fit to estimate the amount of potatoes produced when the amount of fertiliser used is 32 kg.

(a) Give a statistical reason why this would not be recommended.

32 kg is outside the range of the data (extrapolation) [1]

(b) Suggest an amount of fertiliser for which a line of best fit could be used.

Answer 18 kg [1]

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Question Number	**Marks**
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