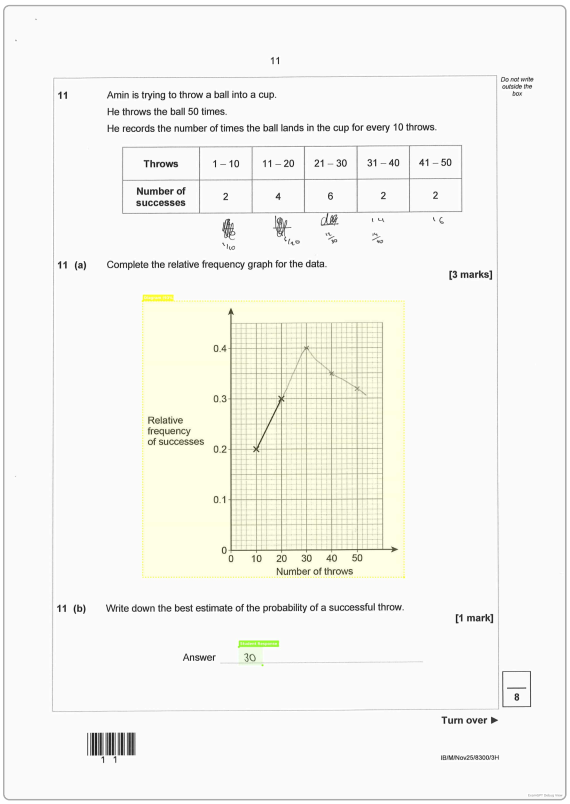
Question 11(a)

Probability > Statistics | P1 | U280, U580

Q: Amin is trying to throw a ball into a cup. He throws the ball 50 times. He records the number of times the ball lands in the cup for every 10 throws. Throws 1–10: 2 successes; 11–20: 4; 21–30: 6; 31–40: 2; 41–50: 2. Complete the relative frequency graph for the data. (Existing plotted points: (10, 0.2) and (20, 0.3); relative frequencies are cumulative: 0.2, 0.3, 0.4 for first three groups.)



11

11 Amin is trying to throw a ball into a cup.
He throws the ball 50 times.
He records the number of times the ball lands in the cup for every 10 throws.

Throws	1 – 10	11 – 20	21 – 30	31 – 40	41 – 50
Number of successes	2	4	6	2	2

Do not write outside the box

11 (a) Complete the relative frequency graph for the data. [3 marks]

11 (b) Write down the best estimate of the probability of a successful throw. [1 mark]

Answer 30

8

Turn over ▶

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Student Response (OCR):

Below the provided table, the student has written the following working out to calculate the points for the graph:
Under the '1 – 10' column: [scribbled out text] $\frac{2}{10}$
Under the '11 – 20' column: [scribbled out text] $\frac{6}{20}$
Under the '21 – 30' column: [scribbled out text] $\frac{12}{30}$
Under the '31 – 40' column: 14 with $\frac{14}{40}$ written below it.
Under the '41 – 50' column: 16
On the provided relative frequency graph, the student has plotted three additional points marked with crosses ('x') and connected them with straight lines, continuing from the pre-existing point at $(20, 0.3)$. The coordinates of the plotted points are:

- $(30, 0.4)$
- $(40, 0.35)$
- $(50, 0.32)$

Marking Analysis:

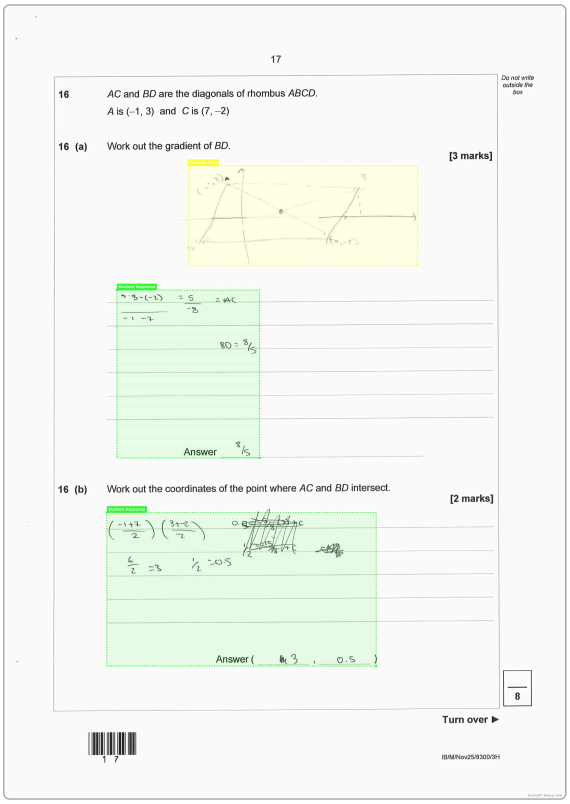
B3: Awarded — All three points $(30, 0.4)$, $(40, 0.35)$, and $(50, 0.32)$ are correctly plotted and connected with straight lines to complete the relative frequency graph.

Total Marks: 3/3

Question 16(a)

Algebra > Graphs | A10, G11 | U898, U889

Q: AC and BD are the diagonals of rhombus ABCD. A is (–1, 3) and C is (7, –2). Work out the gradient of BD.



17

16 *AC* and *BD* are the diagonals of rhombus *ABCD*.
A is (–1, 3) and *C* is (7, –2)

Do not write outside the box

16 (a) Work out the gradient of *BD*. [3 marks]

Answer 8/5

16 (b) Work out the coordinates of the point where *AC* and *BD* intersect. [2 marks]

Answer (3 , 0.5)

8

Turn over ►

IB/M/Nov25/8300/3H

Student Response (OCR):

The student has sketched an x-y coordinate grid with a rhombus $ABCD$. The vertices A and C are plotted and labelled with their coordinates $(-1, 3)$ and $(7, -2)$ respectively. The diagonals AC and BD are drawn intersecting at a central point.

$\frac{3-(-2)}{-1-7} = \frac{5}{-8} = AC$

$BD = 8/5$

Answer $8/5$

Marking Analysis:

M1: Awarded — The student has correctly set up the formula to find the gradient of the diagonal AC using $\frac{3-(-2)}{-1-7}$.

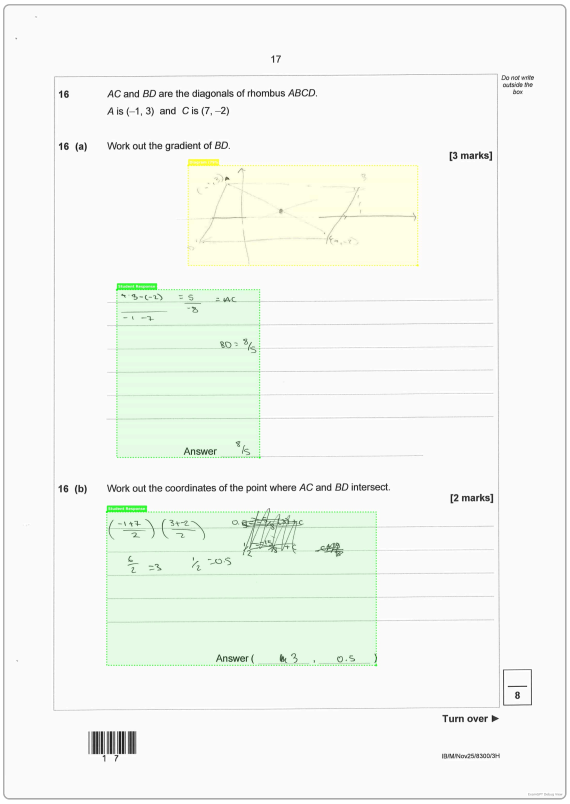
A1: Awarded — The student accurately evaluated the gradient of AC to get $\frac{5}{-8}$ (or $-\frac{5}{8}$).

A1: Awarded — The student correctly used the property that diagonals of a rhombus are perpendicular to find the negative reciprocal gradient of BD as $\frac{8}{5}$.

Total Marks: 3/3

Question 16(b) Algebra > Graphs A8, G11 U933

Q: AC and BD are the diagonals of rhombus ABCD. A is (–1, 3) and C is (7, –2). Work out the coordinates of the point where AC and BD intersect.



17

16 *AC* and *BD* are the diagonals of rhombus *ABCD*.
A is (–1, 3) and *C* is (7, –2)

Do not write outside the box

16 (a) Work out the gradient of *BD*. [3 marks]

Answer $\frac{8}{5}$

16 (b) Work out the coordinates of the point where *AC* and *BD* intersect. [2 marks]

Answer (3 , 0.5)

8

Turn over ►

IB/M/Nov25/8300/3H

Student Response (OCR):

```
(−1+7/2)\left(\frac{3+-2}{2}\right)$
6/2 = 3\frac{1}{2} = 0.5$
[scribbled out (0.5 = 8/5(3) + c)]
[scribbled out (1/2 = 24/5 + c)]
[scribbled out (c = −43/10)]
Answer line: Answer ( [scribbled out (unreadable mark)] 3 , 0.5 )
```

Marking Analysis:

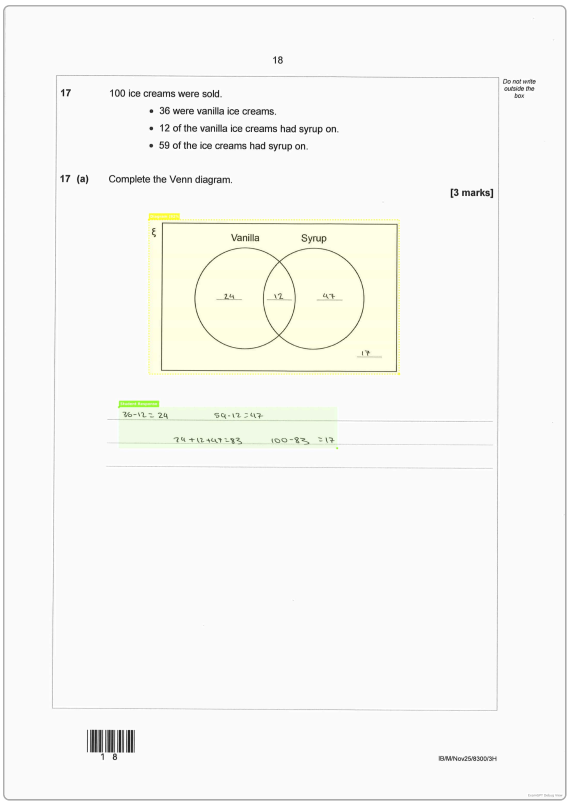
M1: Awarded — The method mark is awarded for correctly setting up the midpoint calculation for the diagonals using $\frac{-1+7}{2}$ and $\frac{3+-2}{2}$.

A1: Awarded — The accuracy mark is awarded for evaluating the coordinates correctly to give $(3, 0.5)$.

Total Marks: 2/2

Question 17(a) Probability P6 U476

Q: 100 ice creams were sold. 36 were vanilla ice creams. 12 of the vanilla ice creams had syrup on. 59 of the ice creams had syrup on. Complete the Venn diagram (two sets: Vanilla and Syrup, within a universal set of 100).



Student Response (OCR):

Based on the student's handwritten response in the image, here is the OCR transcription for Question 17(a):

Venn Diagram Entries:

- Vanilla only region: 24
- Intersection (Vanilla and Syrup): 12
- Syrup only region: 47
- Outside the circles: 17

Workings below the diagram:

$36 - 12 = 2459$ - 12 = 47$

$24 + 12 + 47 = 83100$ - 83 = 17$

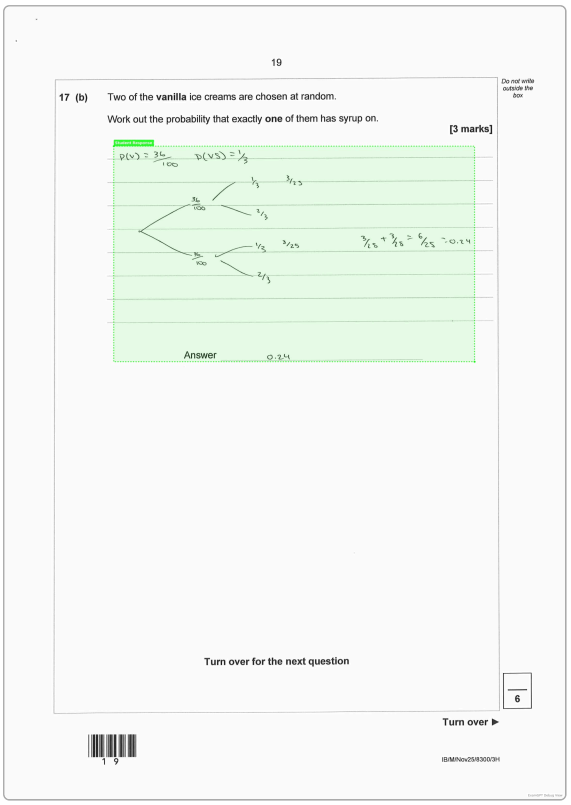
Marking Analysis:

B3: Awarded — All four regions of the Venn diagram are correctly completed with 24 (Vanilla only), 12 (intersection), 47 (Syrup only), and 17 (outside the circles), supported by fully correct working.

Total Marks: 3/3

Question 17(b) Probability P7 U104, U714

Q: 100 ice creams were sold. 36 were vanilla; 12 of the vanilla had syrup on (so 24 vanilla without syrup). Two of the vanilla ice creams are chosen at random. Work out the probability that exactly one of them has syrup on.



Student Response (OCR):

$P(v) = \frac{36}{100}$ \qquad $P(vs) = \frac{1}{3}$
Tree diagram drawn with the following labels:
First pair of branches:
Upper branch: $\frac{36}{100}$
Lower branch: $\frac{36}{100}$
Branches continuing from the upper first branch:
Upper branch: $\frac{1}{3}$ with $\frac{3}{25}$ at the end
Lower branch: $\frac{2}{3}$
Branches continuing from the lower first branch:
Upper branch: $\frac{1}{3}$ with $\frac{3}{25}$ at the end
Lower branch: $\frac{2}{3}$
Calculation to the right:
$\frac{3}{25} + \frac{3}{25} = \frac{6}{25} = 0.24$
Answer line: 0.24

Marking Analysis:

M0: Not Awarded — The first method mark requires finding the probability of choosing one vanilla with syrup and one without from the 36 vanilla ice creams without replacement, $\frac{12}{36} \times \frac{24}{35}$. The response incorrectly includes the total 100 ice creams and uses fixed single-stage probabilities of $\frac{36}{100}$ and $\frac{1}{3}$. Setting up the first pick out of 36 and the second pick out of 35 would earn this mark.

M0dep: Not Awarded — This mark is dependent on a valid method for one combination and requires multiplying that probability by 2 to account for both orders (syrup then no syrup, or no syrup then syrup). Because a valid single-outcome probability without replacement was not found, this dependent mark cannot be awarded.

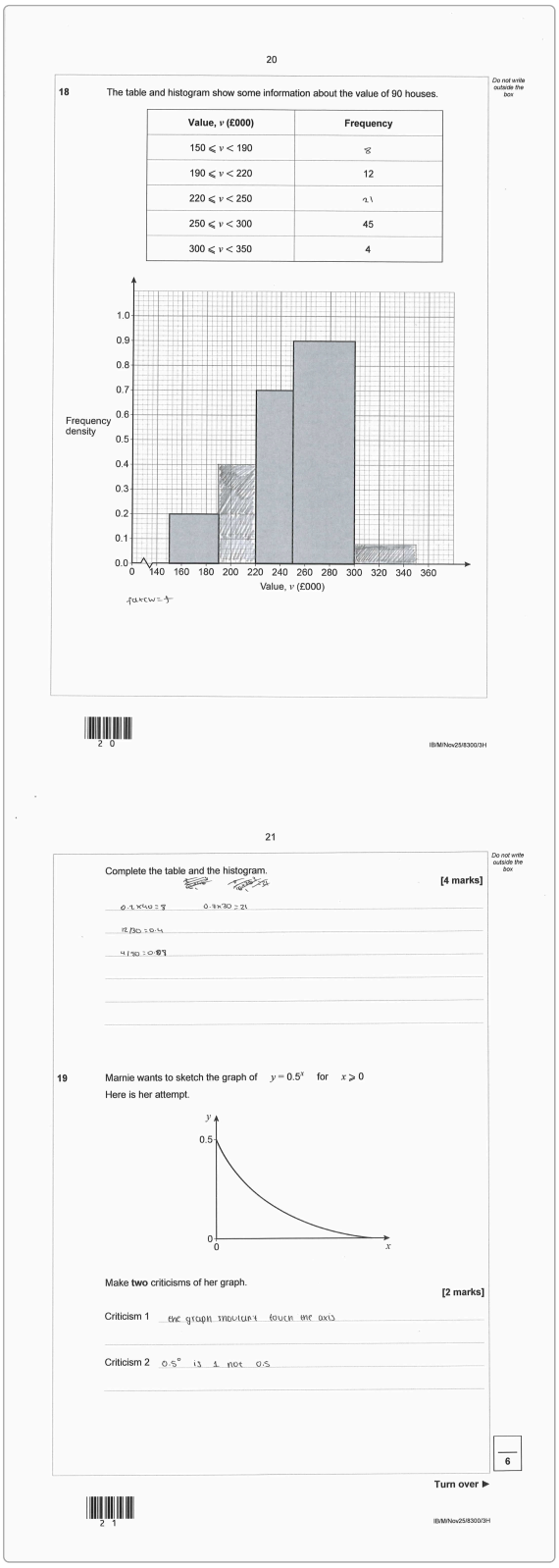
A0: Not Awarded — The accuracy mark requires a final probability of $\frac{16}{35}$ or approximately 0.457. The answer given is 0.24.

Total Marks: 0/3

Question 18

Statistics | S2 | U981, U312, U653, U506 +11

Q: The table and histogram show information about the value of 90 houses. Table: 150 ⩽ v < 190 frequency 6; 190 ⩽ v < 220 frequency 12; 220 ⩽ v < 250 frequency (missing); 250 ⩽ v < 300 frequency 45; 300 ⩽ v < 350 frequency 4. Histogram bars given: 150–190 height 0.2, 250–300 height 0.9. Complete the table and the histogram.



20

18 The table and histogram show some information about the value of 90 houses.

Do not write outside the box

Value, v (£000)	Frequency
$150 \leqslant v < 190$	8
$190 \leqslant v < 220$	12
$220 \leqslant v < 250$	21
$250 \leqslant v < 300$	45
$300 \leqslant v < 350$	4

2 0

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21

Do not write outside the box

Complete the table and the histogram. [4 marks]

19 Marnie wants to sketch the graph of $y = 0.5^x$ for $x > 0$

Here is her attempt.

Make **two** criticisms of her graph. [2 marks]

Criticism 1 the graph shouldn't touch the axis

Criticism 2 0.5° is not 0.5

6

Turn over ▶

2 1

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Student Response (OCR) ⚡:

Based on the student's handwritten response in the image, here is the extracted information:

In the table:

- For the class $150 \leqslant v < 190$, the student has written the frequency as 8.
- For the class $220 \leqslant v < 250$, the student has written the frequency as 21.

On the histogram:

- The student has drawn and shaded a bar for the interval 190 **to** 220 with a height (frequency density) of 0.4.
- The student has drawn and shaded a bar for the interval 300 **to** 350 with a height (frequency density) of 0.08.

Below the histogram:

- The student has written the formula: $fd \times cw = f$

[scribbled out (0.2×40)] [scribbled out (0.7×30)] $= 21$

$0.2 \times 40 = 80.7$ \times 30 = 21$

$12/30 = 0.4$

$4 / 50 = 0.08$

Marking Analysis ⚡: Gemini 3.1 Pro

M1: Awarded — This mark is for calculating a frequency density, either $12 \div 30 = 0.4$ or $4 \div 50 = 0.08$. The student has correctly shown both of these calculations.

A1: Awarded — This mark is for drawing a bar from 190 to 220 with a height of 0.4 and a bar from 300 to 350 with a height of 0.08. The student has drawn both bars correctly on the histogram.

M1: Awarded — This mark is for calculating a missing frequency, either $0.2 \times 40 = 8$ or $0.7 \times 30 = 21$. The student has correctly shown both of these calculations.

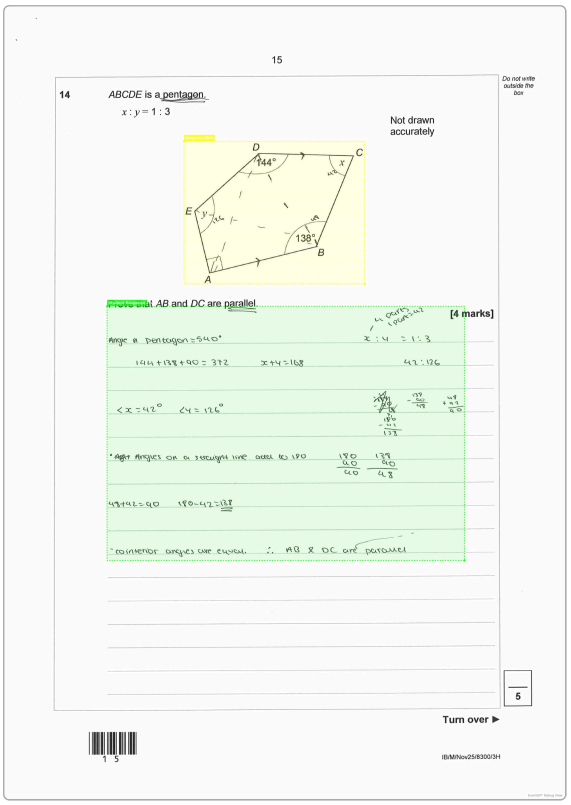
A1: Awarded — This mark is for entering 8 in the $150 \leqslant v < 190$ row and 21 in the $220 \leqslant v < 250$ row of the table. The student has completed the table correctly with these values.

Total Marks: 4/4

Question 14

Geometry and measures > Properties and constructions | G3, R5 | U427, U826

Q: ABCDE is a pentagon with x : y = 1 : 3. Angle at D = 144°, angle at A = 90°, angle EAB region and other marked angles; angle marked x is at C and angle marked y is at E, with a 138° angle at B. Prove that AB and DC are parallel.



Student Response (OCR):

On the diagram:

- Angle x at C is annotated with 42.
- Angle y at E is annotated with 126.
- Near angle B (138°), 48 and 49 are written inside the pentagon.
- Small arrows are drawn on lines AB and DC to indicate they are parallel.
- Faint dashed lines are drawn inside the pentagon.

Student's written response:

4 parts

1 part $= 42$

$x : y = 1 : 3$

Angle in pentagon = 540°

$144 + 138 + 90 = 372$x + y = 16842 : 126

$< x = 42^\circ$< y = 126^\circ$

[scribbled out 138] 13848$

[scribbled out - 90] -90+ 42$

[scribbled out 48] $- - -$---$

1804890

-42

$- - -$

138

- Adj Angles on a straight line add to 180180138

9090

$- - -$---$

9048

$48 + 42 = 90180$ - 42 = \underline{\underline{138}}$

- co interior angles are equal. $\therefore AB \,\&\, DC$ are parallel

Marking Analysis:

M1: Awarded — The mark required finding the sum of interior angles in a pentagon (540°). You correctly stated 'Angle in pentagon = 540°'.

M1dep: Awarded — The mark required subtracting the known angles from 540° and dividing by the total parts $(1 + 3 = 4)$. You calculated $144 + 138 + 90 = 372$, found $x + y = 168$, and divided by 4 to get $x = 42^\circ$.

A1: Awarded — The mark required showing that the co-interior angles add up to 180° (or that $180^\circ - 42^\circ = 138^\circ$). You showed $180 - 42 = 138$.

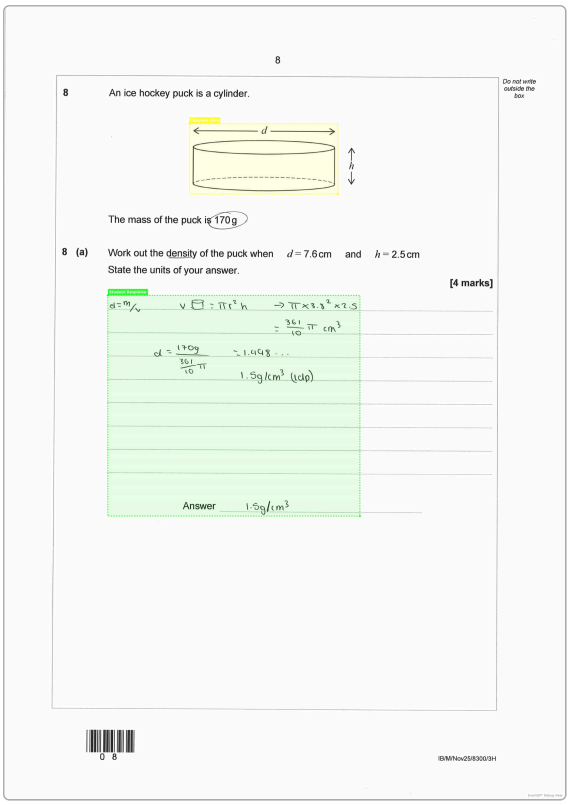
B0: Not Awarded — The mark required fully correct geometric reasons for the proof, specifically stating that co-interior (allied) angles sum to 180°. You wrote 'co interior angles are equal', which is incorrect because co-interior angles are supplementary (add up to 180°), not equal. To earn this mark, state that 'co-interior angles add up to 180°'.

Total Marks: 3/4

Question 8(a)

Number > Measures and accuracy | N13, G16 | U915

Q: An ice hockey puck is a cylinder with diameter d and height h. The mass of the puck is 170 g. Work out the density of the puck when d = 7.6 cm and h = 2.5 cm. State the units of your answer.



8

8 An ice hockey puck is a cylinder.

Do not write outside the box

The mass of the puck is 170 g

8 (a) Work out the density of the puck when $d = 7.6\,\text{cm}$ and $h = 2.5\,\text{cm}$

State the units of your answer.

[4 marks]

$d = m/v$ v (cylinder) $= \pi r^2 h \rightarrow \pi \times 3.8^2 \times 2.5$

$= \frac{361}{10}\pi\ \text{cm}^3$

$d = \frac{170}{\frac{361}{10}\pi} \approx 1.498\ldots$

$1.5\,\text{g/cm}^3$ (1dp)

Answer $1.5\,\text{g/cm}^3$

0 8

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Student Response (OCR):

$d = m/v$v \text{ [cylinder drawing]} = \pi r^2 h \rightarrow \pi \times 3.8^2 \times 2.5$

$= \frac{361}{10}\pi\ \text{cm}^3$

$d = \frac{170g}{\frac{361}{10}\pi}$= 1.498\dots$

1.5g/cm^3 (1dp)

Answer line: ____1.5g/cm^3____

Marking Analysis:

M1: Awarded — Correct method to calculate the volume of the cylinder using $\pi \times 3.8^2 \times 2.5$, giving $\frac{361}{10}\pi\ \text{cm}^3$ (or 36.1π).

M1: Awarded — Correct method to calculate density by dividing the mass of $170\ \text{g}$ by the calculated volume.

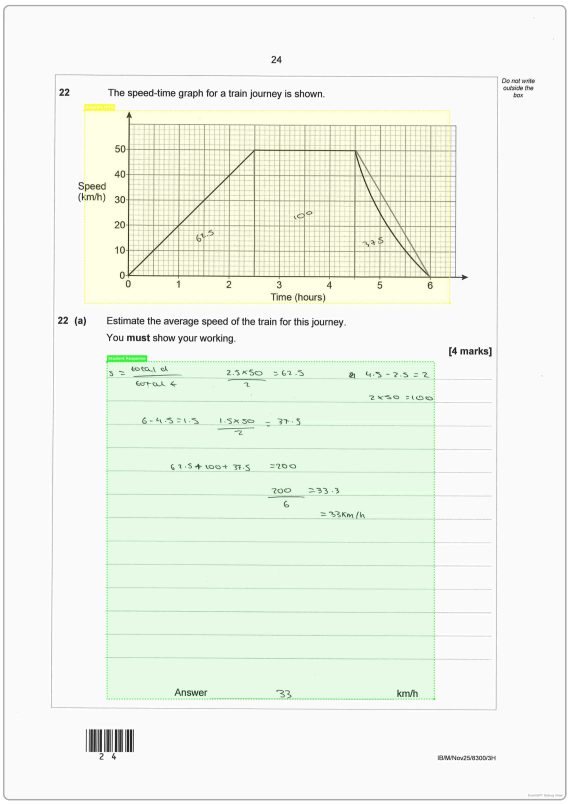
A1: Awarded — Accurate numerical value of 1.5 (from $1.498\ldots$), falling within the required range $[1.49, 1.5]$.

B1: Awarded — Correct unit of g/cm^3 clearly stated.

Total Marks: 4/4

Question 22(a) Algebra > Graphs A14, R11 U151

Q: The speed-time graph for a train journey is shown. Speed rises from 0 at time 0 to 50 km/h at 2.5 hours (straight line), stays at 50 km/h until 4.5 hours, then curves down to 0 at 6 hours. Estimate the average speed of the train for this journey. You must show your working.



Student Response (OCR):

Based on the student's handwritten response in the image, here is the transcription:

Graph annotations:

- A straight line has been drawn connecting the points $(4.5, 50)$ and $(6, 0)$.
- The value "62.5" is written inside the triangular area between $t = 0$ and $t = 2.5$.
- The value "100" is written inside the rectangular area between $t = 2.5$ and $t = 4.5$.
- The value "37.5" is written inside the triangular area between $t = 4.5$ and $t = 6$.

Student working:

$s = \frac{\text{total d}}{\text{total t}}$

$\frac{2.5 \times 50}{2} = 62.5$ [scribbled out mark] $4.5 - 2.5 = 2$

$2 \times 50 = 100$

$6 - 4.5 = 1.5\frac{1.5 \times 50}{2} = 37.5$

$62.5 + 100 + 37.5 = 200$

$\frac{200}{6} = 33.\dot{3}$

$= 33\text{km/h}$

Answer line:

Answer $33 km/h

Marking Analysis:

M1: Awarded — The first method mark is awarded for correctly calculating the area of the initial triangle as $\frac{2.5 \times 50}{2} = 62.5$ and the central rectangle as $2 \times 50 = 100$.

M1: Awarded — The second method mark is awarded for estimating the area under the curved section using a triangle: $\frac{1.5 \times 50}{2} = 37.5$.

M1dep: Awarded — The dependent method mark is awarded for dividing the estimated total distance of 200 km by the total time of 6 hours.

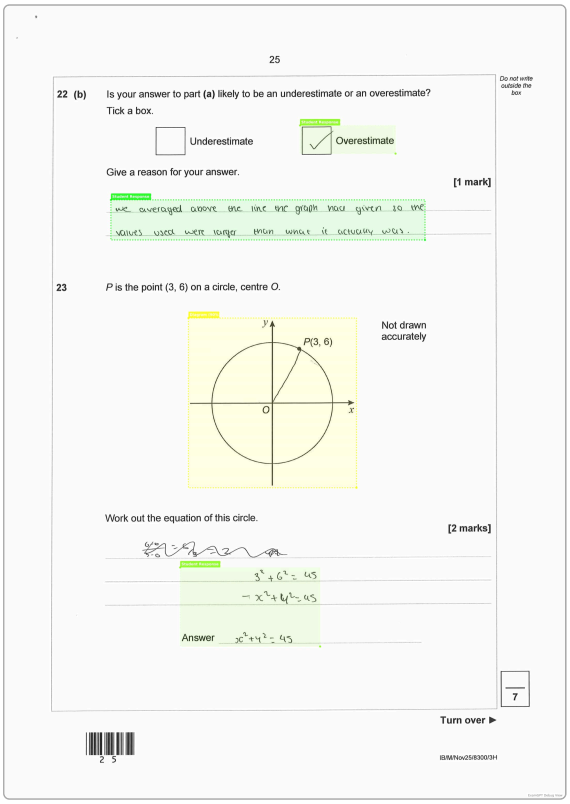
A1: Awarded — The accuracy mark is awarded for the correct final answer of 33 km/h, which lies within the acceptable range of $[31, 35]$.

Total Marks: 4/4

Question 23

Algebra > Graphs | A8, G11 | U889

Q: P is the point (3, 6) on a circle, centre O (the origin). Work out the equation of this circle.



25

22 (b) Is your answer to part (a) likely to be an underestimate or an overestimate?
Tick a box.

☐ Underestimate ☑ Overestimate

Give a reason for your answer. [1 mark]

we overgued above the line the graph was given to the values used were larger than what it actually was.

23 *P* is the point (3, 6) on a circle, centre *O*.

Not drawn accurately

Work out the equation of this circle. [2 marks]

$3^2 + 6^2 = 45$

$x^2 + y^2 = 45$

Answer $x^2 + y^2 = 45$

7

Turn over ▶

25

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Student Response (OCR):

[scribbled out (\frac{6-0}{3-0} = 2)] [scribbled out (illegible working)]
$3^2 + 6^2 = 45$
$x^2 + y^2 = 45$
Answer $x^2 + y^2 = 45$

Marking Analysis:

M1: Awarded — The method mark required finding the value of r^2 using the coordinates of the point on the circle, which you showed correctly as $3^2 + 6^2 = 45$.

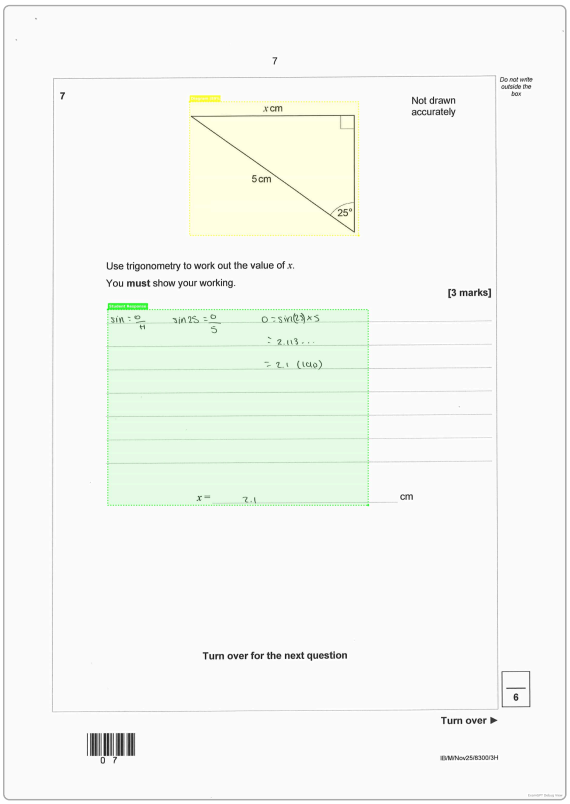
A1: Awarded — The accuracy mark required the complete equation of the circle centred at the origin, which you correctly stated as $x^2 + y^2 = 45$.

Total Marks: 2/2

Question 7

Geometry and measures > Mensuration and calculation | G15 | U164

Q: A right-angled triangle has hypotenuse 5 cm (the sloping side from top-left to bottom-right), the horizontal top side is x cm, the right angle is at the top-right, and the angle at the bottom-right is 25°. Use trigonometry to work out the value of x. You must show your working.



Student Response (OCR):

$\sin = \frac{O}{H}$\sin 25 = \frac{0}{5}$O = \sin(25) \times 5$
$= 2.113\ldots$
$= 2.1$ (1dp)
Answer line $x = 2.1$ cm

Marking Analysis:

M1: Awarded — The trigonometric ratio $\sin = \frac{\text{O}}{\text{H}}$ is correctly stated and applied to the 25° angle.

M1dep: Awarded — The equation is correctly set up and rearranged as $O = \sin(25) \times 5$ to solve for the opposite side.

A1: Awarded — The calculation gives $2.113\ldots$, which rounds accurately to 2.1, falling within the required range of $[2.1, 2.12]$.

Total Marks: 3/3