

Paper 2

Structure of the marking scheme

Candidate responses are marked according to different scales, depending on the types of response anticipated. Scales labelled A divide candidate responses into two categories (correct and incorrect), scales labelled B divide responses into three categories (correct, partially correct, and incorrect), and so on. The scales and the marks that they generate are summarised in this table:

Scale label	A	B	C	D
No of categories	2	3	4	5
5-mark scale	0, 5	0, 2, 5	0, 2, 3, 5	0, 2, 3, 4, 5
10-mark scale		0, 4, 10	0, 4, 6, 10	0, 3, 5, 7, 10
15-mark scale			0, 5, 10, 15	0, 5, 8, 10, 15

A general descriptor of each point on each scale is given below. More specific directions in relation to interpreting the scales in the context of each question are given in the scheme, where necessary.

Marking scales – level descriptors

A-scales (two categories)

- incorrect response (no credit)
- correct response (full credit)

B-scales (three categories)

- response of no substantial merit (no credit)
- partially correct response (partial credit)
- correct response (full credit)

C-scales (four categories)

- response of no substantial merit (no credit)
- response with some merit (low partial credit)
- almost correct response (high partial credit)
- correct response (full credit)

D-scales (five categories)

- response of no substantial merit (no credit)
- response with some merit (low partial credit)
- response about half-right (mid partial credit)
- almost correct response (high partial credit)
- correct response (full credit)

In certain cases, typically involving incorrect rounding, omission of units, a misreading that does not oversimplify the work, or an arithmetical error that does not oversimplify the work, a mark that is one mark below the full-credit mark may be awarded. This level of credit is referred to as *Full Credit –1*, and these types of errors are identified with an asterisk (*). Thus, for example, in Scale 10C, *Full Credit –1* of 9 marks may be awarded.

No marks may be awarded other than those on the appropriate scale, and *Full Credit –1*.

In general, accept a candidate’s work in one part of a question for use in subsequent parts of the question, unless this oversimplifies the work involved.

Summary of mark allocations and scales to be applied

Question 1 (10)

10D

Question 2 (20)

(a) 10C

(b) 10D

Question 3 (20)

(a), (b) 15D

(c) 5D

Question 4 (45)

(a) 10B

(b), (c) 15D

(d)(i), (ii) 10C

(d)(iii) 10C

Question 5 (30)

(a), (b) 15C

(c) 5A

(d) 10C

Question 6 (30)

(a), (b) 15D

(c) 10C

(d) 5B

Question 7 (15)

15D

Question 8 (35)

(a)(i) 10C

(a)(ii) 10C

(b) 15D

Question 9 (35)

(a) 10B

(b) 10C

(c) 15D

Question 10 (25)

(a) 10C

(b) 5D

(c) 5D

(d) 5D

Question 11 (20)

(a) 10D

(b) 5C

(c) 5B

Question 12 (15)

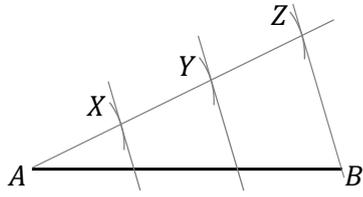
(a) 10C

(b) 5D

Model Solutions & Marking Notes

Note: The model solutions for each question are not intended to be exhaustive – there may be other correct solutions. Any Examiner unsure of the validity of the approach adopted by a particular candidate to a particular question should contact his / her Advising Examiner.

Q1	Model Solution – 10 Marks	Marking Notes
	B D C A	Scale 10D (0, 3, 5, 7, 10) Accept D as rotation for up to <i>High Partial Credit</i> , but not for <i>Full Credit</i> <i>Low Partial Credit</i> <ul style="list-style-type: none">• 1 correct <i>Mid Partial Credit</i> <ul style="list-style-type: none">• 2 correct <i>High Partial Credit</i> <ul style="list-style-type: none">• 3 correct

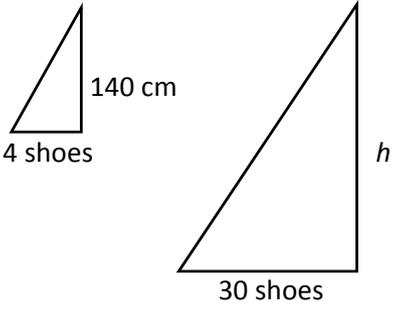
Q2	Model Solution – 20 Marks	Marking Notes
(a)	<p>Construction presented, with all necessary construction lines.</p> 	<p>Scale 10C (0, 4, 6, 10) Tolerance: ± 2 mm</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • [AB] divided in 3 equal parts, with no construction lines • Ray from A or B, with points X, Y, and Z within tolerance • Complete sketch <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • Points X, Y and Z within tolerance and finished outside tolerance
(b)	<p>Let $AD = h$ and $AB = 5a$. Area rectangle = $5ah$ Left-hand shaded area: $ah + \frac{1}{2} \times 2a \times h = 2ah$ Right-hand shaded area: $ah + \frac{1}{2} \times a \times h = 1.5ah$ % shaded = $\frac{3.5ah}{5ah} \times 100 = 70$ [%] OR Unshaded region: $\frac{1}{2} \times 2a \times h + \frac{1}{2} \times a \times h = 1.5ah$ % shaded = $\frac{3.5ah}{5ah} \times 100 = 70$ [%]</p>	<p>Scale 10D (0, 3, 5, 7, 10) Accept correct answer without % sign (70) Accept solutions where particular dimensions of shape are chosen (as long as these are consistent with the question)</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Finds the area (or the percentage or fraction of the total area) of a relevant shape • Correct formula with relevant substitution <p><i>Mid Partial Credit</i></p> <ul style="list-style-type: none"> • Finds the area of one of the shaded regions <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • Finds the area of both shaded regions • Finds the area of the unshaded region • Correct answer without work <p><i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * if the answer is not given as a percentage, for example 0.7 or $\frac{70}{100}$

Q3	Model Solution – 20 Marks	Marking Notes
(a), (b)	<p>(a) $\frac{4}{3}\pi r^3 = \frac{4}{3}\pi(6)^3$ $= 288\pi$ [mm³]</p> <p>(b) Volume of large sphere: $\frac{4}{3}\pi r^3 = \frac{4}{3}\pi(25)^3$ $= \frac{62500}{3}\pi$ [mm³]</p> <p>Number of ball bearings: $\frac{62500}{3} \div 288 = 72.3 \dots$ i.e. 73</p>	<p>Scale 15D (0, 5, 8, 10, 15)</p> <p>In (a), accept correct answer without units</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Substitutes radius into correct formula • Relevant division <p><i>Mid Partial Credit</i></p> <ul style="list-style-type: none"> • Volume of one sphere correct <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • Volumes of both spheres correct • One error and finishes correctly, for example $4\pi r^2$ or $k\pi r^3$ (where $k \in \mathbb{Q}$, $k \neq \frac{4}{3}$) used instead of $\frac{4}{3}\pi r^3$ • Correct answers without work <p><i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * if the answer in (a) is not in terms of π • Apply a * if there is no rounding or incorrect rounding in (b)
(c)	$\frac{4}{3}\pi R^3 = 350 \times 288\pi$ $\Rightarrow R^3 = 75600$ $\Rightarrow R = 42.2 \dots = 42$ [mm] [nearest mm]	<p>Scale 5D (0, 2, 3, 4, 5)</p> <p>Accept correct answer without units</p> <p>Accept a candidate's volume formula from (a) and (b) for <i>Full Credit</i> here, as long as it involves a power of R greater than 1.</p> <p>If the power of R is 1, award at most <i>High Partial Credit</i>.</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • $350 \times 288\pi$ • Forms an equation using $\frac{4}{3}\pi R^3$ <p><i>Mid Partial Credit</i></p> <ul style="list-style-type: none"> • Forms correct equation using $\frac{4}{3}\pi R^3$ <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • Finds R^3 • One error and finishes correctly • Correct answer without work <p><i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * if there is no rounding or incorrect rounding, if a * has not been applied for incorrect rounding in (b)

Q4	Model Solution – 45 Marks	Marking Notes
(a)	$8 + 39 = 47$ $\Rightarrow p = 7$	<p>Scale 10B (0, 4, 10)</p> <p>Accept correct answer without work</p> <p><i>Partial Credit</i></p> <ul style="list-style-type: none"> • Work of merit for range <p><i>Full Credit – 1</i></p> <ul style="list-style-type: none"> • Apply a * if $p = 47$ instead of 7
(b), (c)	<p>(b)(i) 19 [copies]</p> <p>(b)(ii) $\frac{17+1}{2} = 9\text{th value,}$ i.e. median = 21 [copies]</p> <p>(c) $\frac{431}{17} = 25.35 \dots$ $= 25.4$ [copies] [1 D.P.]</p>	<p>Scale 15D (0, 5, 8, 10, 15)</p> <p>Accept correct answers without work</p> <p>Accept correct answers without units</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Work of merit in the relevant part • 1 value correct (mode, median, or mean), but in the wrong part <p><i>Mid Partial Credit</i></p> <ul style="list-style-type: none"> • 1 part correct ((b)(i), (b)(ii), or (c)) <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • 2 parts correct • All 3 values correct, 1 in the correct part and the other 2 swapped <p><i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * for no rounding or incorrect rounding in (c)
(d) (i), (ii)	<p>(i) 19 [copies]</p> <p>(ii) $\frac{18+1}{2} = 9.5\text{th value,}$ i.e. median = $\frac{21+25}{2}$ $= 23$ [copies]</p>	<p>Scale 10C (0, 4, 6, 10)</p> <p>Accept correct answers without work</p> <p>Accept correct answers without units</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Work of merit in (ii) • 1 value correct (mode or median), but in the wrong part <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • 1 part correct ((i) or (ii))
(d) (iii)	<p>18-week total = $18 \times 28.5 = 513$</p> <p>18th week = $513 - 431$ $= 82$ [copies]</p>	<p>Scale 10C (0, 4, 6, 10)</p> <p>Accept correct answers without units</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Work of merit for mean <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • Total number of copies for 18 weeks (513) • One error and finishes correctly • Correct answer without work

Q5	Model Solution – 30 Marks	Marking Notes												
(a), (b)	<p>(a) Any three even positive numbers, for example: 2, 4, 6.</p> <p>(b) $1 - \frac{2}{7} = \frac{5}{7}$ or 0.71...</p>	<p>Scale 15C (0, 5, 10, 15)</p> <p>Accept correct answers without work <i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Work of merit in (a) or (b) <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • (a) or (b) correct • Work of merit in (a) and (b) 												
(c)	<p>The total number of pens must be a multiple of 7</p> <p style="text-align: center;">OR</p> <p>There would be $\frac{2}{7} \times 20 = 5.7$... red pens in the box</p> <p style="text-align: center;"><i>or any other valid explanation</i></p>	<p>Scale 5A (0, 5)</p>												
(d)	<p>Ratio red : blue : green = 2 : 5 : $\frac{7}{3}$</p> <p>$\therefore P(\text{blue}) = \frac{5}{9\frac{1}{3}} = \frac{15}{28}$</p> <p style="text-align: center;">OR</p> <p>$P(\text{blue}) = \frac{5}{7} \times 75\% = \frac{5}{7} \times \frac{3}{4} = \frac{15}{28}$</p> <p style="text-align: center;">OR</p> <p>Trial and improvement:</p> <table border="1" data-bbox="256 1182 901 1417"> <thead> <tr> <th>Trial</th> <th>Red or Blue (3 parts)</th> <th>Green (1 part)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>7 (2 + 5)</td> <td>$\frac{7}{3}$</td> </tr> <tr> <td>2</td> <td>14 (4 + 10)</td> <td>$\frac{14}{3}$</td> </tr> <tr> <td>3</td> <td>21 (6 + 15)</td> <td>$\frac{21}{3} = 7$</td> </tr> </tbody> </table> <p>Trials 1 and 2 are not possible $P(\text{blue}) = \frac{15}{28}$</p> <p style="text-align: center;">OR</p> <p>Let the ratio red : blue : green = 2 : 5 : x</p> <p>$P(\text{green}) = \frac{x}{x+7} = \frac{1}{4}$</p> <p>$\therefore x = \frac{7}{3}$</p> <p>$P(\text{blue}) = \frac{5}{7+\frac{7}{3}} = \frac{15}{28}$</p>	Trial	Red or Blue (3 parts)	Green (1 part)	1	7 (2 + 5)	$\frac{7}{3}$	2	14 (4 + 10)	$\frac{14}{3}$	3	21 (6 + 15)	$\frac{21}{3} = 7$	<p>Scale 10C (0, 4, 6, 10)</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Mention of 75% or $\frac{3}{4}$ • Work of merit for trial and improvement, for example: mentions 2 and 5; $\frac{7}{28}$; $\frac{21}{28}$ <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • Finds $[x =] \frac{7}{3}$ or finds $9\frac{1}{3}$ • Finds ratio of blue to green (for example, 15 and 7), or finds ratio of blue to total (for example, 15 and 28) • Correct answer without work <p><i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * for the answer not given as a fraction in its simplest form
Trial	Red or Blue (3 parts)	Green (1 part)												
1	7 (2 + 5)	$\frac{7}{3}$												
2	14 (4 + 10)	$\frac{14}{3}$												
3	21 (6 + 15)	$\frac{21}{3} = 7$												

Q6	Model Solution – 30 Marks	Marking Notes
(a), (b)	<p>(a) $\frac{96+90}{360} = \frac{186}{360}$ or $\frac{31}{60}$ or equivalent</p> <p>(b) 160 150 170 120 96° 90° 102° 72°</p> <p>$90^\circ \rightarrow 150$ $\Rightarrow 360^\circ \rightarrow 150 \times 4 = 600$ $\Rightarrow 96^\circ \rightarrow \frac{96}{360} \times 600 = 160$ $170 \rightarrow \frac{170}{600} \times 360 = 102^\circ$ $600 - (160 + 150 + 170) = 120$ $360 - (96 + 90 + 102) = 72^\circ$</p>	<p>Scale 15D (0, 5, 8, 10, 15)</p> <p>5 answers are required for (a) and (b) combined</p> <p>In (b), accept answers without units (degree symbol)</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Work of merit, for example mention of $96 + 90$ or 360 <p><i>Mid Partial Credit</i></p> <ul style="list-style-type: none"> • 2 correct answers <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • 3 correct answers • 5 correct answers, but with no supporting work for (b)
(c)	<p><i>Any questions relating to eating or exercise that would generate each type of data, for example:</i></p> <p>Numerical continuous: What volume of water do you drink each day?</p> <p>Numerical discrete: How many press-ups can you do in 30 seconds?</p> <p>Categorical nominal: Which do you prefer, pizza or salad?</p>	<p>Scale 10C (0, 4, 6, 10)</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Work of merit in one question, for example: a question that would generate numerical data for one of the first 2 questions; or a question that would generate categorical [ordinal] data for the third question <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • 2 questions correct <p><i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * to a question that is not about eating or exercise, the first time it occurs.
(d)	<p>So that the results aren't biased</p> <p style="text-align: center;">OR</p> <p>So that results will apply to the whole population instead of just the sample or any other valid explanation</p>	<p>Scale 5B (0, 2, 5)</p> <p><i>Partial Credit</i></p> <ul style="list-style-type: none"> • Answer of some merit, for example refers to accuracy / inaccuracy of results

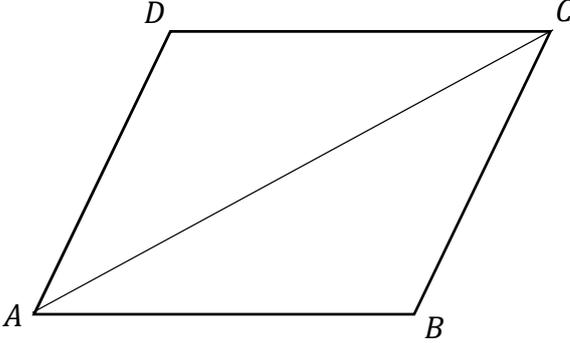
Q7	Model Solution – 15 Marks	Marking Notes
	<p>Diagram:</p>  <p> $\frac{h}{30} = \frac{140}{4}$ $\Rightarrow h = 30 \times \frac{140}{4} = 1050 \text{ cm}$ $= 10.5 \text{ [m]}$ </p>	<p>Scale 15D (0, 5, 8, 10, 15)</p> <p>Accept correct answer without units Diagram(s) not necessary for <i>Full Credit</i></p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Draws 1 labelled diagram (with 2 relevant labels) <p><i>Mid Partial Credit</i></p> <ul style="list-style-type: none"> • Sets up one ratio correctly • Solves correctly from incorrect ratios <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • Sets up correct equation • Correct answer without work <p><i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * if the answer is given in cm • Apply a * if the answer is calculated using trigonometric ratios (for example, using tan)

Q8	Model Solution – 35 Marks	Marking Notes
(a)(i)	$\cos Y = \frac{10}{12}$ $Y = \cos^{-1} \frac{10}{12}$ $= 33.557 \dots^\circ = 33.6^\circ [1 \text{ D.P.}]$ <p style="text-align: center;">OR</p> $ BC = \sqrt{12^2 - 10^2} = 2\sqrt{11}$ $\tan Y = \frac{2\sqrt{11}}{10} \quad \text{or} \quad \sin Y = \frac{2\sqrt{11}}{12}$ $Y = \tan^{-1} \frac{2\sqrt{11}}{10} \quad \text{or} \quad \sin^{-1} \frac{2\sqrt{11}}{12}$ $= 33.557 \dots^\circ = 33.6^\circ [1 \text{ D.P.}]$ <p style="text-align: center;">OR</p> $\sin \angle ACB = \frac{10}{12}$ $ \angle ACB = \sin^{-1} \frac{10}{12} = 56.4426 \dots^\circ$ $Y = 180^\circ - 90^\circ - 56.4426 \dots^\circ$ $= 33.5574 \dots^\circ = 33.6^\circ [1 \text{ D.P.}]$	<p>Scale 10C (0, 4, 6, 10)</p> <p>Accept answer given in radians or gradients</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • A trigonometric ratio with some correct substitution • Incorrect trigonometric ratio, for example $\tan Y = \frac{10}{12}$, and finishes correctly <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • $\cos Y = \frac{10}{12}$ or equivalent • $\angle ACB$ correct (56.4°) • Correct answer without work <p><i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * if the units (for example, degree symbol) are incorrect or omitted • Apply a * for no rounding or incorrect rounding

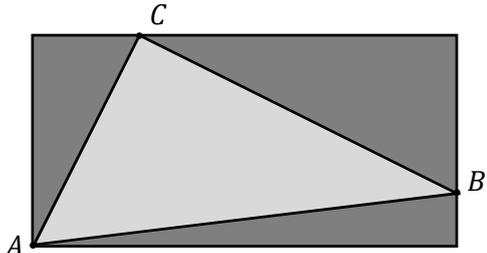
Q8	Model Solution – 35 Marks	Marking Notes
(a)(ii)	$x^2 + x^2 = 12^2$ $2x^2 = 144$ $x = \sqrt{72}$ $x = 8.485 \dots = 8.49 \text{ [2 D.P.]}$ <p style="text-align: center;">OR</p> $\cos 45^\circ = \frac{x}{12} \quad \text{or} \quad \sin 45^\circ = \frac{x}{12}$ $x = 12\cos 45^\circ \text{ or } 12 \sin 45^\circ$ $x = 8.485 \dots = 8.49 \text{ [2 D.P.]}$ <p style="text-align: center;">OR</p> <p>Draw line from D perpendicular to AC:</p> $\frac{12}{x} = \frac{x}{6}$ $x^2 = 72$ $x = \sqrt{72}$ $x = 8.485 \dots = 8.49 \text{ [2 D.P.]}$ <p style="text-align: center;">OR</p> <p>Draw line from D perpendicular to AC:</p> $\cos 45^\circ = \frac{6}{x} \quad \text{or} \quad \sin 45^\circ = \frac{6}{x}$ $x = \frac{6}{\cos 45^\circ} \quad \text{or} \quad \frac{6}{\sin 45^\circ}$ $x = 8.485 \dots = 8.49 \text{ [2 D.P.]}$	<p>Scale 10C (0, 4, 6, 10)</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Some correct use of Pythagoras' Theorem • A trigonometric ratio with some correct substitution • Incorrect trigonometric ratio and finishes correctly • Mention of 45° <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • $2x^2 = 144$ • $x = \frac{6}{\cos 45^\circ}$ or $\frac{6}{\sin 45^\circ}$ • $x = 12\cos 45^\circ$ or $12 \sin 45^\circ$ • $x^2 = 72$ • One error and finishes correctly • Correct answer without work <p><i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * for no rounding or incorrect rounding, if a * has not been applied for no or incorrect rounding in (a)(i) • Apply a * if the calculator is in the incorrect mode

Q8	Model Solution – 35 Marks	Marking Notes
(b)	<p>Method 1:</p> $ \angle PRQ = 22^\circ$ $ \angle Q \text{ internal} = 180 - 2 \times 22 = 136^\circ$ $ \angle Q \text{ external} = 360 - 136 = 224^\circ$ $ \angle T = \frac{224}{2} = 112^\circ$ <p style="text-align: center;">OR</p> <p>Method 2:</p> <p><i>Extend PQ to a point M on k and join R to M.</i></p> $ \angle PRM = 90^\circ$ $ \angle PRQ = 22^\circ$ $ \angle QRM = 90^\circ - 22^\circ = 68^\circ$ $ \angle RMQ = 68^\circ$ $ \angle T = 180 - 68^\circ = 112^\circ$	<p>Scale 15D (0, 5, 8, 10, 15)</p> <p>Step 1 Accept work without reasons for <i>Full Credit</i></p> <p>Step 2 Accept up to step 3 without work in Method 1</p> <p>Step 3 <i>Low Partial Credit</i></p> <p>Step 4</p> <ul style="list-style-type: none"> • Indication that the sum of the angles in a triangle is 180° • Indication that the angle at the centre of a circle is twice the angle at the circumference standing on the same arc <p>• 1 step correct</p> <p>Step 2 <i>Mid Partial Credit</i></p> <ul style="list-style-type: none"> • 2 steps correct <p><i>High Partial Credit</i></p> <p>• 3 steps correct</p> <ul style="list-style-type: none"> • Correct answer without work <p>Step 3 <i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * if the units are incorrect or omitted, if a * has not been applied for incorrect or omitted units in (a)(i) <p>Step 4</p>

Q9	Model Solution – 35 Marks	Marking Notes
(a)	<p>Axiom</p> <p>Corollary</p> <p>Proof</p>	<p>Scale 10B (0, 4, 10)</p> <p><i>Partial Credit</i></p> <ul style="list-style-type: none"> • 1 correct
(b)	<p>(i) “it must be a square”</p> <p>(ii) <i>Answer:</i> False</p> <p><i>Justification:</i></p> <p>A rectangle has 4 right angles but might not be a square</p> <p style="text-align: center;"><i>or any other valid justification</i></p>	<p>Scale 10C (0, 4, 6, 10)</p> <p>Part (b) requires 3 answers: completing the converse in (i); the answer in (ii); and the reason in (ii).</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • 1 answer correct <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • 2 answers correct

Q9	Model Solution – 35 Marks	Marking Notes
(c)	<p>Step 1: <i>Diagram:</i></p>  <p><i>Given:</i> Parallelogram $ABCD$.</p> <p><i>To Prove:</i> $AB = CD$ and $BC = AD$</p> <p><i>Construction:</i> Join A to C with a line segment.</p> <hr/> <p>Step 2: <i>Proof:</i> $\angle CAB = \angle ACD$ and $\angle ACB = \angle CAD$ <i>Reason:</i> Alternate angle theorem</p> <hr/> <p>Step 3: $[AC]$ is common to both triangles</p> <hr/> <p>Step 4: $\triangle ACD$ is congruent to $\triangle CAB$ <i>Reason:</i> ASA</p> <hr/> <p>Step 5: $\therefore AB = CD$ and $BC = AD$</p>	<p>Scale 15D (0, 5, 8, 10, 15)</p> <p>Accept proof without reasons for up to <i>High Partial Credit</i>.</p> <p>Proof must have both reasons to achieve <i>Full Credit</i>.</p> <p>Accept proof without Step 3 for <i>Full Credit</i>.</p> <p>Accept Step 1 with “To Prove” not filled in, or filled in incorrectly.</p> <p>If “To Prove” is filled in correctly in Step 1, accept Steps 1, 2, and 4 for <i>Full Credit</i>.</p> <p>Steps must be in a logical order to be considered correct.</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Diagram (including diagonal drawn) <p><i>Mid Partial Credit</i></p> <ul style="list-style-type: none"> • 2 steps correct <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • 3 steps correct

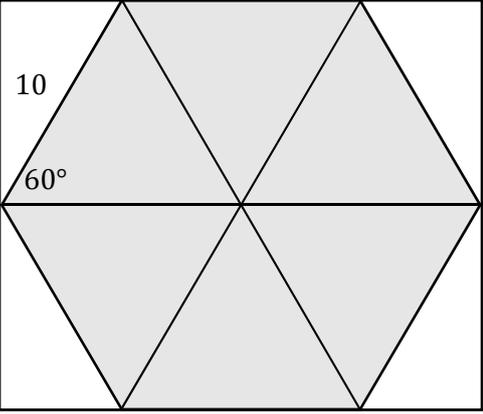
Q10	Model Solution – 25 Marks	Marking Notes
Note: Work on the diagram can be awarded credit in at most one part.		
(a)	<p>A (2, 1) B (10, 2) C (4, 5)</p>	<p>Scale 10C (0, 4, 6, 10)</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • 1 correct • All three reversed (y, x) <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • 2 correct <p><i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * if the points are incorrectly labelled • Apply a * if just 1 of the 6 ordinates is incorrect
(b)	<p><i>Using slopes:</i></p> $\text{Slope } [AC] = \frac{5-1}{4-2} = 2$ $\text{Slope } [BC] = \frac{5-2}{4-10} = \frac{3}{-6} = -\frac{1}{2}$ <p>Product of slopes = $(2) \left(-\frac{1}{2}\right) = -1$</p> <p>⇒ right angle at C</p> <p style="text-align: center;">OR</p> <p><i>Using Pyth Thm:</i></p> $ AC = \sqrt{2^2 + 4^2} = \sqrt{20}$ $ BC = \sqrt{3^2 + 6^2} = \sqrt{45}$ $ AB = \sqrt{1^2 + 8^2} = \sqrt{65}$ $(\sqrt{65})^2 = (\sqrt{20})^2 + (\sqrt{45})^2$ <p>So $AB ^2 = AC ^2 + BC ^2$</p>	<p>Scale 5D (0, 2, 3, 4, 5)</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Correct relevant formula (for example, for slope or distance, or Pythagoras Theorem) with some relevant substitution • Indication of property of slopes of perpendicular lines • Indicates that the angle in a semi-circle is 90° <p><i>Mid Partial Credit</i></p> <ul style="list-style-type: none"> • Slope of AC or BC correct • Finds lengths of 2 sides • Constructs a semi-circle with diameter [AB] <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • Slope of AC and BC correct • Finds length of 3 sides • One error and finishes correctly

Q10	Model Solution – 25 Marks	Marking Notes
Note: Work on the diagram can be awarded credit in at most one part.		
(c)	$ AC = \sqrt{2^2 + 4^2} = \sqrt{20}$ $ BC = \sqrt{3^2 + 6^2} = \sqrt{45}$ $\text{Area} = \frac{1}{2} \times \sqrt{20} \times \sqrt{45}$ $= 15$ <p style="text-align: center;">OR</p> <p>Construct rectangle as below, containing A, B, and C:</p>  $\text{Area rectangle} = 8 \times 4 = 32$ $\text{Area 3 small triangles}$ $= \frac{1}{2}(8 \times 1) + \frac{1}{2}(6 \times 3) + \frac{1}{2}(4 \times 2)$ $= 4 + 9 + 4 = 17$ $\Rightarrow \text{Area } ABC = 32 - 17 = 15$	<p>Scale 5D (0, 2, 3, 4, 5)</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Correct formula with relevant substitution <p><i>Mid Partial Credit</i></p> <ul style="list-style-type: none"> • Finds AC or BC • Area of rectangle correct • Area of 1 of the 3 small triangles correct <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • Area of rectangle and 1 small triangle correct • Finds AC and BC

Q10	Model Solution – 25 Marks	Marking Notes
Note: Work on the diagram can be awarded credit in at most one part.		
(d)	$ AB = \sqrt{1^2 + 8^2} = \sqrt{65}$ $\frac{1}{2} \times AB \times CD = 15$ $\Rightarrow \frac{1}{2} \times \sqrt{65} \times CD = 15$ $\Rightarrow CD = \frac{15 \times 2}{\sqrt{65}}$ $= \frac{30}{\sqrt{65}} \text{ or } \frac{6\sqrt{65}}{13}$ <p style="text-align: center;">OR</p> <p>Equation of AB:</p> $y - 1 = \frac{1}{8}(x - 2)$ <p>Equation of DC:</p> $y - 5 = -8(x - 4)$ <p>D (point of intersection of these):</p> $4 = \frac{1}{8}x - \frac{1}{4} + 8x - 32$ <p>i.e. $65x = 290$</p> <p>so $x = \frac{58}{13}$ and $y = \frac{17}{13}$</p> <p>So $CD = \sqrt{\left(4 - \frac{58}{13}\right)^2 + \left(5 - \frac{17}{13}\right)^2}$</p> $= \frac{30}{\sqrt{65}} \text{ or } \frac{6\sqrt{65}}{13}$	<p>Scale 5D (0, 2, 3, 4, 5)</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Correct formula with relevant substitution <p><i>Mid Partial Credit</i></p> <ul style="list-style-type: none"> • AB correct • Equations of AB and CD correct <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • $\frac{1}{2} \times \sqrt{65} \times CD = 15$ • Correct answer without work • Coordinates of D correctly found $\left(\frac{58}{13}, \frac{17}{13}\right)$ • One error and finishes correctly <p><i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * if the answer is not given in surd form

Q11	Model Solution – 20 Marks	Marking Notes
(a)	r t q $y = 2x - 3$	<p>Scale 10D (0, 3, 5, 7, 10)</p> <p>Accept correct answers without work</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • 1 line correct • 1 aspect of equation correct (slope or y-intercept) <p><i>Mid Partial Credit</i></p> <ul style="list-style-type: none"> • 2 lines correct • Equation correct <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • 3 lines correct • Equation correct and 1 line correct
(b)	$2x + 3 = x - 3$ $x = -6$ $y = -6 - 3 = -9$ <p>Ans: $(-6, -9)$</p> <p style="text-align: center;">OR</p> <p>E2: $y = 2x + 3$</p> <p>E1 $\times (-1)$: $\underline{-y = -x + 3}$</p> $0 = x + 6$ $x = -6$ $y = -6 - 3 = -9$ <p>Ans: $(-6, -9)$</p>	<p>Scale 5C (0, 2, 3, 5)</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Some work of merit in solving the simultaneous equations algebraically, for example $2x + 3 = x - 3$; or one equation rearranged • Correct answer without work <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • 1 value correct ($x = -6$ or $y = -9$) with supporting algebraic work • One error and finishes correctly • Correct answer subbed into both equations
(c)	$3 + 3 = 6$	<p>Scale 5B (0, 2, 5)</p> <p>Accept correct answer without work</p> <p><i>Partial Credit</i></p> <ul style="list-style-type: none"> • Work of merit, for example: vertical line drawn to cut r and t; or y intercepts correct; or correct distance formula with relevant substitution <p><i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * if x-intercepts are used instead of y-intercepts

Q12	Model Solution – 15 Marks	Marking Notes
(a)	$\sin 60^\circ = \frac{x}{10}$ $\Rightarrow x = 10 \times \frac{\sqrt{3}}{2} = 5\sqrt{3} \text{ [units]}$	<p>Scale 10C (0, 4, 6, 10)</p> <p>Accept correct answer without units</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • A trigonometric ratio with some correct substitution • Incorrect trigonometric ratio, for example $\tan 60^\circ = \frac{10}{x}$, and finishes correctly <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • $\sin 60^\circ = \frac{x}{10}$, or equivalent (for example, $\frac{x}{10} = \frac{\sqrt{3}}{2}$) • One error and finishes correctly • Correct answer without work <p><i>Full Credit –1</i></p> <ul style="list-style-type: none"> • Apply a * if the answer is not in surd form • Apply a * if the calculator is in the incorrect mode

Q12	Model Solution – 15 Marks	Marking Notes
(b)	<p>Using 6 equilateral triangles:</p> $6 \times \left(\frac{1}{2} \times \text{base} \times \text{height}\right)$ $= 6 \times \left(\frac{1}{2} \times 10 \times 5\sqrt{3}\right)$ $= 6 \times 25\sqrt{3}$ $= 150\sqrt{3} \text{ [square units]}$ <p style="text-align: center;">OR</p>  <p>Inscribe hexagon in rectangle of width $2 \times 10 = 20$ and height $2x = 10\sqrt{3}$:</p> $\text{Area rect} - 4 \times \text{area tri from (a)}$ $= (20 \times 10\sqrt{3}) - 4 \times \left(\frac{1}{2} \times 5 \times 5\sqrt{3}\right)$ $= 200\sqrt{3} - 50\sqrt{3}$ $= 150\sqrt{3} \text{ [square units]}$	<p>Scale 5D (0, 2, 3, 4, 5)</p> <p>Accept correct answer without units</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Breaks one equilateral triangle in half • Inscribes hexagon in relevant rectangle • Correct formula with relevant substitution • Finds the base of the triangle in (a) <p><i>Mid Partial Credit</i></p> <ul style="list-style-type: none"> • Gets area of a relevant triangle • Gets area of a relevant rectangle <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • One error and finishes correctly • Correct answer without work <p><i>Full Credit -1</i></p> <ul style="list-style-type: none"> • Apply a * if the answer is not given in the form $a\sqrt{3}$, where $a \in \mathbb{N}$, if a * has not been applied for an answer not in surd form in (a).

Marcanna Breise as ucht freagairt trí Ghaeilge

Léiríonn an tábla thíos an méid marcanna breise ba chóir a bhronnadh ar iarrthóirí a ghnóthaíonn níos mó ná 75% d'iomlán na marcanna.

N.B. Ba chóir marcanna de réir an ghnáthráta a bhronnadh ar iarrthóirí nach ghnóthaíonn níos mó ná 75% d'iomlán na marcanna don scrúdú. Ba chóir freisin an marc bóonais sin **a shlánú síos**.

Tábla 300 @ 5%

Bain úsáid as an tábla seo i gcás na n-ábhar a bhfuil 300 marc san iomlán ag gabháil leo agus inarb é 5% gnáthráta an bhónais.

Bain úsáid as an ngnáthráta i gcás 225 marc agus faoina bhun sin. Os cionn an mharc sin, féach an tábla thíos.

Bunmharc	Marc Bónais
226	11
227 - 233	10
234 - 240	9
241 - 246	8
247 - 253	7
254 - 260	6

Bunmharc	Marc Bónais
261 - 266	5
267 - 273	4
274 - 280	3
281 - 286	2
287 - 293	1
294 - 300	0