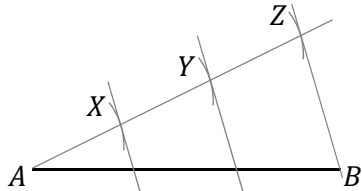


Paper 2 : Marking Scheme 2017

The Left Side is the solution.

The Right Side shows how the marks were awarded.

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

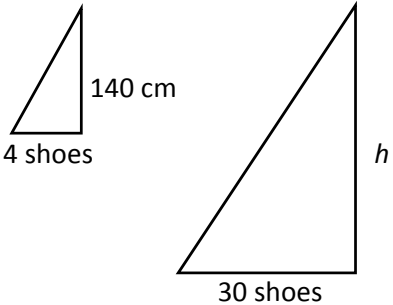
Q2	Model Solution – 20 Marks	Marking Notes
(a)	<p>Construction presented, with all necessary construction lines.</p> 	<p>Scale 10C (0, 4, 6, 10)</p> <p>Tolerance: ± 2 mm</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • [AB] divided in 3 equal parts, with no construction lines • 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 $AB = 5a$.</p> <p>Area rectangle = $5ah$</p> <p>Left-hand shaded area:</p> $ah + \frac{1}{2} \times 2a \times h = 2ah$ <p>Right-hand shaded area:</p> $ah + \frac{1}{2} \times a \times h = 1.5ah$ <p>% shaded = $\frac{3.5ah}{5ah} \times 100 = 70$ [%]</p> <p style="text-align: center;">OR</p> <p>Unshaded region:</p> $\frac{1}{2} \times 2a \times h + \frac{1}{2} \times a \times h = 1.5ah$ <p>% shaded = $\frac{3.5ah}{5ah} \times 100 = 70$ [%]</p>	<p>Scale 10D (0, 3, 5, 7, 10)</p> <p>Accept correct answer without % sign (70)</p> <p>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) $\frac{4}{3}\pi r^3 = \frac{4}{3}\pi(6)^3$ $= 288\pi \text{ [mm}^3\text{]}$</p> <p>(b) Volume of large sphere: $\frac{4}{3}\pi r^3 = \frac{4}{3}\pi(25)^3$ $= \frac{62500}{3}\pi \text{ [mm}^3\text{]}$</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)	<p>$\frac{4}{3}\pi R^3 = 350 \times 288\pi$ $\Rightarrow R^3 = 75600$ $\Rightarrow R = 42.2 \dots = 42 \text{ [mm]}$ [nearest mm]</p>	<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. 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)	$8 + 39 = 47$ $\Rightarrow p = 7$	Scale 10B (0, 4, 10) Accept correct answer without work <i>Partial Credit</i> <ul style="list-style-type: none"> Work of merit for range <i>Full Credit – 1</i> <ul style="list-style-type: none"> Apply a * if $p = 47$ instead of 7
(b), (c)	(b)(i) 19 [copies] (b)(ii) $\frac{17+1}{2} = 9\text{th value,}$ i.e. median = 21 [copies] (c) $\frac{431}{17} = 25.35 \dots$ $= 25.4$ [copies] [1 D.P.]	Scale 15D (0, 5, 8, 10, 15) Accept correct answers without work Accept correct answers without units <i>Low Partial Credit</i> <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 <i>Mid Partial Credit</i> <ul style="list-style-type: none"> 1 part correct ((b)(i), (b)(ii), or (c)) <i>High Partial Credit</i> <ul style="list-style-type: none"> 2 parts correct All 3 values correct, 1 in the correct part and the other 2 swapped <i>Full Credit –1</i> <ul style="list-style-type: none"> Apply a * for no rounding or incorrect rounding in (c)
(d) (i), (ii)	(i) 19 [copies] (ii) $\frac{18+1}{2} = 9.5\text{th value,}$ i.e. median = $\frac{21+25}{2}$ $= 23$ [copies]	Scale 10C (0, 4, 6, 10) Accept correct answers without work Accept correct answers without units <i>Low Partial Credit</i> <ul style="list-style-type: none"> Work of merit in (ii) 1 value correct (mode or median), but in the wrong part <i>High Partial Credit</i> <ul style="list-style-type: none"> 1 part correct ((i) or (ii))
(d) (iii)	18-week total = $18 \times 28.5 = 513$ 18th week = $513 - 431$ $= 82$ [copies]	Scale 10C (0, 4, 6, 10) Accept correct answers without units <i>Low Partial Credit</i> <ul style="list-style-type: none"> Work of merit for mean <i>High Partial Credit</i> <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</p> <p><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>OR</p> <p>There would be $\frac{2}{7} \times 20 = 5.7$... red pens in the box</p> <p><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>OR</p> <p>$P(\text{blue}) = \frac{5}{7} \times 75\% = \frac{5}{7} \times \frac{3}{4} = \frac{15}{28}$</p> <p>OR</p> <p>Trial and improvement:</p> <table border="1"> <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> <p>$P(\text{blue}) = \frac{15}{28}$</p> <p>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° → 150 ⇒ 360° → 150 × 4 = 600 ⇒ 96° → $\frac{96}{360} \times 600 = 160$ 170 → $\frac{170}{600} \times 360 = 102^\circ$ 600 – (160 + 150 + 170) = 120 360 – (96 + 90 + 102) = 72°</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>OR</p> <p>So that results will apply to the whole population instead of just the sample <i>or any other valid explanation</i></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

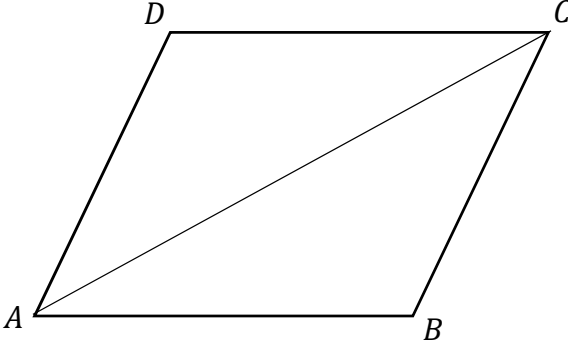
Q7	Model Solution – 15 Marks	Marking Notes
	<p>Diagram:</p>  $\frac{h}{30} = \frac{140}{4}$ $\Rightarrow h = 30 \times \frac{140}{4} = 1050 \text{ cm}$ $= 10.5 \text{ [m]}$	<p>Scale 15D (0, 5, 8, 10, 15)</p> <p>Accept correct answer without units Diagram(s) not necessary for <i>Full Credit</i></p> <p><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

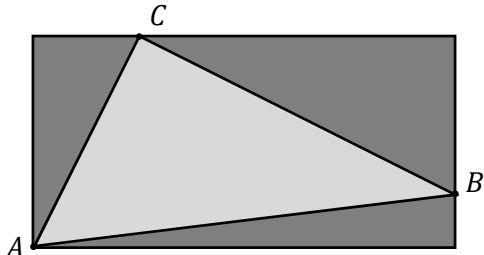
Q8	Model Solution – 35 Marks	Marking Notes
(a)(ii)	$x^2 + x^2 = 12^2$ $2x^2 = 144$ $x = \sqrt{72}$ $x = 8.485 \dots = 8.49 \text{ [2 D.P.]}$ <p style="text-align: center;">OR</p> $\cos 45^\circ = \frac{x}{12} \quad \text{or} \quad \sin 45^\circ = \frac{x}{12}$ $x = 12\cos 45^\circ \text{ or } 12\sin 45^\circ$ $x = 8.485 \dots = 8.49 \text{ [2 D.P.]}$ <p style="text-align: center;">OR</p> <p>Draw line from <i>D</i> perpendicular to <i>AC</i>:</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 <i>D</i> perpendicular to <i>AC</i>:</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"> $2x^2 = 144$ $x = \frac{6}{\cos 45^\circ} \text{ or } \frac{6}{\sin 45^\circ}$ $x = 12\cos 45^\circ \text{ or } 12\sin 45^\circ$ $x^2 = 72$ 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>Accept work without reasons for <i>Full Credit</i></p> <p>Accept up to step 3 without work in Method 1</p> <p><i>Low Partial Credit</i></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><i>Mid Partial Credit</i></p> <p>• 2 steps correct</p> <p><i>High Partial Credit</i></p> <p>• 3 steps correct</p> <p>• Correct answer without work</p> <p><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)

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><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>	<p>Scale 15D (0, 5, 8, 10, 15)</p> <p>Accept proof without reasons for up to <i>High Partial Credit</i>. Proof must have both reasons to achieve <i>Full Credit</i>. Accept proof without Step 3 for <i>Full Credit</i>. Accept Step 1 with “To Prove” not filled in, or filled in incorrectly. If “To Prove” is filled in correctly in Step 1, accept Steps 1, 2, and 4 for <i>Full Credit</i>. 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
	<p>Step 2: <i>Proof:</i> $\angle CAB = \angle ACD$ and $\angle ACB = \angle CAD$ <i>Reason:</i> Alternate angle theorem</p>	
	<p>Step 3: $[AC]$ is common to both triangles</p>	
	<p>Step 4: $\triangle ACD$ is congruent to $\triangle CAB$ <i>Reason:</i> ASA</p>	
	<p>Step 5: $\therefore AB = CD$ and $BC = AD$</p>	

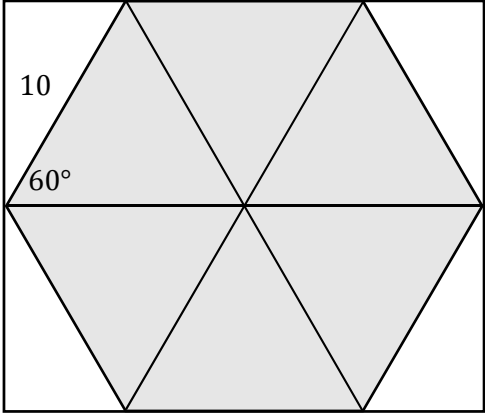
Q10	Model Solution – 25 Marks	Marking Notes
Note: Work on the diagram can be awarded credit in at most one part.		
(a)	$A (2, 1)$ $B (10, 2)$ $C (4, 5)$	<p>Scale 10C (0, 4, 6, 10)</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • 1 correct • All three reversed (y, x) <p><i>High 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>$\Rightarrow$ 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>  $\text{Area rectangle} = 8 \times 4 = 32$ <p>Area 3 small triangles</p> $= \frac{1}{2}(8 \times 1) + \frac{1}{2}(6 \times 3) + \frac{1}{2}(4 \times 2)$ $= 4 + 9 + 4 = 17$ $\Rightarrow \text{Area } ABC = 32 - 17 = 15$	<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 $y = 2x - 3$	Scale 10D (0, 3, 5, 7, 10) Accept correct answers without work <i>Low Partial Credit</i> <ul style="list-style-type: none"> • 1 line correct • 1 aspect of equation correct (slope or y-intercept) <i>Mid Partial Credit</i> <ul style="list-style-type: none"> • 2 lines correct • Equation correct <i>High Partial Credit</i> <ul style="list-style-type: none"> • 3 lines correct • Equation correct and 1 line correct
(b)	$2x + 3 = x - 3$ $x = -6$ $y = -6 - 3 = -9$ Ans: $(-6, -9)$ <p style="text-align: center;">OR</p> E2: $y = 2x + 3$ E1 $\times (-1)$: $\underline{-y = -x + 3}$ $0 = x + 6$ $x = -6$ $y = -6 - 3 = -9$ Ans: $(-6, -9)$	Scale 5C (0, 2, 3, 5) <i>Low Partial Credit</i> <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 <i>High Partial Credit</i> <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)	$3 + 3 = 6$	Scale 5B (0, 2, 5) Accept correct answer without work <i>Partial Credit</i> <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 <i>Full Credit –1</i> <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).