

No	Working	Answer	Mark	Notes
1				
(a)	$v - u = 5t$	$\frac{v - u}{5}$	2	M1 for isolating $\pm 5t$ or $\pm t$ or for dividing through by 5 A1 oe
(b)	$x - 3 = 5x - 25$ $22 = 4x$	$5\frac{1}{2}$	3	M1 for $x - 3 = 5(x - 5)$ or $\frac{x - 3}{5} = x - 5$ M1 for isolating terms in x correctly from $ax + b = cx + d$ A1 cao accept $5\frac{1}{2}, \frac{11}{2}, 5.5$
2				
(a)	$36 \div (7+3+2)$ "3" $\times 7$	21	3	M1 for $36 \div (7+3+2)$ M1 (dep) for "3" $\times 7$ or 3 or 2 A1 cao
(b)	$51.5 \times \frac{8.5}{100} = 4.3775$ $51.5 - 4.3775 = 47.1225$	47 or 47.1 or 47.12	4	M1 for $51.5 \times \frac{8.5}{100}$ or 4.37(75) seen M1 (dep) for $51.5 - "4.37(75)"$ A1 for 47 or better B1 (indep) for rounding their answer correctly to the nearest whole number or 1 or 2 d.p OR M1 for $51.5 \times \frac{100 - 8.5}{100}$ M1 for $51.5 \times "0.915"$ or $0.515 \times "91.5"$ A1 for 47 or better B1 (indep) for rounding their answer correct to the nearest whole number or 1 or 2 d.p

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3	3→15 4→48 3.1→17.3(91) 3.2→19.9(68) 3.3→22.7(37) 3.4→25.7(04) 3.5→28.8(75) 3.4→25.7(04) 3.3→22.7(37) 3.35→24.1(95375)	3.3	4	B2 for trial between 3.3 and 3.4 inclusive (B1 for trial between 3 and 4 inclusive) B1 for different trial between 3.3 and 3.4 exclusive B1 (dep on at least one previous B1) for 3.3 NB trials should be evaluated to at least 1 dp truncated or rounded
4	(a)	Angle in a semicircle	1	B1 oe
	(b)	20	3	M1 for $12^2 + 16^2$ M1 for $\sqrt{144 + 256}$ A1 cao
	(c)	314	3	M1 for $\pi \times \left(\frac{20}{2}\right)^2$ M1 (indep) for correct order of evaluation of $\pi \times r^2$ for any r A1 for 314 – 315 inclusive

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5 (a)	$(1 \times 10) + (3 \times 15) + (5 \times 30) + (7 \times 35) +$ $(9 \times 25) + (11 \times 5) = 730$ “730” $\div 120 = 6.08333$	6.08	4	M1 for use of fx with x consistent within intervals (including end points) M1 (dep) for use of midpoints M1 (dep on 1 st M1) for use of $\frac{\sum fx}{\sum f}$ A1 6.08 to 6.085
(b)		(10), 25, 55, 90, 115, 120	1	B1 for all correct
(c)		graph	2	B1 ft for 5 or 6 points plotted correctly ± 1 full (2mm) square at the end of interval dep on sensible table (condone 1 addition error) B1(dep) for points joined by curve or line segments provided no gradient is negative – ignore any part of graph outside range of their points. (SC: B1 if 5 or 6 points plotted not at end but consistent within each interval and joined)
(d)		72 – 74	2	M1 (ft dep on graph being cf) for reading from graph at 7 A1 ft ± 1 full (2 mm) square Or B2 for 72 – 74

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6		a^7	1	B1 accept a^{4+3}
(a)		$15x^3y^4$	2	B2 cao (B1 for two of $15, x^3, y^4$ in a product)
(b)		$x - 1$	1	B1 cao
(c)		$(a + 3b)(a - 3b)$	2	B2 for $(a + 3b)(a - 3b)$ (B1 for $(a \pm 3b)(a \pm 3b)$)
(d)				
7	$80\% = 220$ $220 \div 80 \times 100$	275	3	M1 for recognising that 80% is equivalent to 220 M1 for $220 \div 80 \times 100$ oe A1 cao
8		$x = 3$ $y = 0.5$	3	M1 for coefficients of x or y the same followed by correct operation, condone one arithmetical error M1 (dep) for substituting found value in one equation A1 cao SC: B1 for one correct answer only if Ms not awarded
9		1.4×10^{10}	2	B2 for 1.4×10^{10} or 1.44×10^{10} (B1 for 14.4×10^9 or $14400,000,000$ or $14000,000,000$ or 14×10^9)

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10 (a)	$\tan x = \frac{1.9}{3.2}$ $x = \tan^{-1}\left(\frac{1.9}{3.2}\right) = 30.7$	30.7	3	M1 for $\tan x = \frac{1.9}{3.2}$ or $\tan \frac{1.9}{3.2}$ M1 for $\tan^{-1}\left(\frac{1.9}{3.2}\right)$ A1 for 30.6 – 30.7
(b)	90 + “30.7”	121	1	B1 (indep) ft for 90 + “30.7” rounded to 3 or 4 s.f
11 (a)	$\text{SF} = \frac{12}{9}$ $\frac{12}{9} \times 6 = 8$	2	2	M1 for $\frac{12}{9}$ or $\frac{9}{12}$ or 1.33... seen or 0.75 seen or 8 seen or $\frac{6}{9}$ or $\frac{9}{6}$ or 0.66... or 1.5 or $\frac{1}{3}$ or 3 oe seen A1 cao
(b)	$\text{SF} = \frac{9}{12}, \frac{9}{12} \times 7 = 5.25$	5.25	2	M1 for $\frac{BE}{7} = \frac{9}{12}$ oe A1 cao

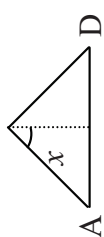
No	Working	Answer	Mark	Notes
12				
(a)	$84 = 6.7\pi + 2 \times 6.7 + 2a$ $2a + 13.4 = 62.95 \dots$ or $2a + 34.44 = 84$	24.8	3	M1 for substituting correctly, π may be left M1 for correct rearrangement as far as $\pm 2a$ A1 for 24.7 – 24.8
(b)	$P = \pi r + 2r + 2a$ $P - 2a = \pi r + 2r$ $P - 2a = (\pi + 2)r$	$\frac{P - 2a}{\pi + 2}$	3	M1 subtracting $2a$ from each side M1 for factorising to get $(\pi + 2)r$ A1 for $\frac{P - 2a}{\pi + 2}$ oe S.C $\frac{P - 2a}{5.14}$ oe is M1 M1 A0
13				
	Area $\triangle ABC = \frac{1}{2} \times 14 \times 8 \times \sin 106 (= 53.8)$	53.8	3	M1 for $\frac{1}{2} \times 14 \times 8 \times \sin 106$ M1 (dep) for $56 \times 0.961(26..)$ or 107.6... A1 53.8 – 53.9 SC 107.6 is B2
14				
(a)		4.5	1	B1 cao
(b)	$500 \times 1.045^{20} = 1205.857 \dots$	1205.86	2	M1 for 500×1.045^{20} A1 for 1205.85 – 1206 (SC:B1 for 705.85 – 706 no working)

No	Working	Answer	Mark	Notes
15 (a)	$6x^2 + 11x - 10 + 6x - 4 = 25$ $6x^2 + 17x - 39 = 0$		3	M1 for an expression for the area involving either $(3x - 2)(2x + 5) + 2(3x - 2)$ or $3x(3x - 2) + (3x - 2)(7 - x)$ or $3x(2x + 5) - 2(7 - x)$ or $(3x - 2)^2 + 2(3x - 2) + (3x - 2)(7 - x)$ where in each case at least one of 2 or 3 product terms must be correct M1 (indep) for one correct expansion involving x^2 A1 for simplification to final answer

No	Working	Answer	Mark	Notes
15 (b)(i)	$x = \frac{-17 \pm \sqrt{17^2 - 4 \times 6 \times (-39)}}{2 \times 6}$ $= \frac{-17 \pm \sqrt{289 + 936}}{12}$ $x = +\frac{18}{12} \text{ or } -4.33$	$1.5, -\frac{13}{3}$	4	<p>M1 for $x = \frac{-17 \pm \sqrt{17^2 - 4 \times 6 \times (-39)}}{2 \times 6}$ up to signs in b & c</p> <p>M1 for $x = \frac{-17 \pm \sqrt{1225}}{12}$</p> <p>A1 $x = 1.5$ or -4.33, or better</p> <p>OR</p> <p>M2 for $(3x + 13)(2x - 3)$</p> <p>(M1 for $(3x \pm a)(2x \pm b)$ with $ab = \pm 39$)</p> <p>A1 $x = 1.5$ or -4.33, or better</p> <p>OR</p> <p>M1 for $\left(x + \frac{17}{12}\right)^2$ <i>seen</i></p>
(ii)	$x^2 + \frac{17}{6}x - \frac{39}{6} = 0$ $\left(x + \frac{17}{12}\right)^2 - \left(\frac{17}{12}\right)^2 - \frac{39}{6} = 0$ $\left(x + \frac{17}{12}\right)^2 = \left(\frac{17}{12}\right)^2 + \frac{39}{6}$	8		<p>M1 $\left(x + \frac{17}{12}\right)^2 = \left(\frac{17}{12}\right)^2 + \frac{39}{6}$</p> <p>A1 $x = 1.5$ or -4.33, or better</p> <p>SC:M1 for answer "1.5" with no working or T & I</p> <p>B1 cao length = 8</p>

No	Working	Answer	Mark	Notes
16 (a)	$P(\text{win}) = \frac{2}{5} \times \frac{3}{5} + \frac{2}{5} \times \frac{1}{5} \times \frac{8}{5} (= \frac{8}{25})$	$\frac{8}{25}$	3	M1 for $\frac{2}{5} \times \frac{3}{5}$ or $\frac{2}{5} \times \frac{1}{5} \times \frac{8}{5}$ or for clearly identifying in P(R) $\times P(R) + P(B) \times P(B)$ M1 for $P(\text{win}) = \frac{2}{5} \times \frac{3}{5} + \frac{2}{5} \times \frac{1}{5}$
(b)	$\frac{8}{25} \times 100 (=32)$ $100 \times 20 - "32" \times 50$	£4	2	A1 for $\frac{8}{25}$, oe " 8 " M1 for $(\frac{8}{25} \times 100) \times 50$ or $\times 0.5$ A1 cao

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17	Lower bound of 1200 is 1150 Upper bound of 60 is 65 $1150 \div 65$	17	4	B1 for 1150 or 1250 seen B1 for 65 or 55 seen M1 (Lower bound of load) \div (Upper bound of weight) Where $1150 \leq \text{LB load} < 1200$ and $60 < \text{UB Weight} \leq 65$ A1 for 17 requires fully correct working OR B1 for 1150 or 1250 seen B1 for 65 or 55 seen M1 (upper bound of load) \div (lower bound of weight) Where $1200 < \text{UB load} \leq 1250$ and $55 \leq \text{LB weight} < 60$ A1 for 22 requires fully correct working OR M2 $1200 \div 55$ A1 21.8 A1 21 requires fully correct working OR M2 $1200 \div 65$ A1 18.4(6) A1 18 requires fully correct working
18 (a)	$3^4 x^4 y^8$	$81x^4 y^8$	2	B2 for $81x^4 y^8$ (B1 for 2 of $81, x^4, y^8$)
(b)	$\frac{x(x-3)}{(x-5)(x-3)}$	$\frac{x}{x-5}$	3	B1 for $x(x-3)$ B1 for $(x-5)(x-3)$ B1 cao

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19 (a)	$6^2 - 2^2 = 32$ V	5.66	2	M1 for $6^2 - 2^2 (= 32)$ A1 5.65 – 5.66
(b)	$6^2 - 2^2 = 32$ V  $DVA = 2 \times \sin^{-1}\left(\frac{2}{6}\right)$ OR $\cos DVA = \frac{6^2 + 6^2 - 16}{2 \times 6 \times 6}$ $= \frac{56}{72}$ $DVA = \cos^{-1}\left(\frac{56}{72}\right) = 38.94$	38.9	3	M1 for $DVA = 2 \times \sin^{-1}\left(\frac{2}{6}\right)$ A1 38.9 – 38.95 OR M1 for $(\cos DVA =) \frac{6^2 + 6^2 - 4^2}{2 \times 6 \times 6}$ M1 for $DVA = \cos^{-1}\left(\frac{56}{72}\right)$ A1 38.9 – 38.95

No	Working	Answer	Mark	Notes
19 (c)	$AC^2 = 2^2 + 2^2 - 2 \times 2 \times 2 \times \cos 120^\circ$ $AC = \sqrt{12}$ OR $AN = 2 \times \sin 60 = \sqrt{3}$ OR $VN = \sqrt{3^2 + 1} = \sqrt{33}$ $\cos AVC = \frac{6^2 + 6^2 - 12}{2 \times 6 \times 6}$ $\cos AVC = \frac{60}{72}$ OR $AVC = 2 \times \sin^{-1} \frac{\sqrt{3}}{6}$, using AN OR $AVC = 2 \times \cos^{-1} \frac{\sqrt{33}}{6}$, using VN	33.6	4	M1 for any valid method for AC or AN or VN where N is the midpoint of AC A1 for $AC^2 = 12$ or $AC = \sqrt{12}$ (= 3.46...) or $AN = \sqrt{3}$ (= 1.73...) or $VN = \sqrt{33}$ (= 5.74...) M1 (indep) for correct method to find angle AVC A1 33.55 – 33.6

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20 (a)	Graph translated 1 unit to the right passing through the points (-1,0), (1,2) and (2,0)		2	M1 for translation of $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$ or $\begin{pmatrix} -1 \\ 0 \end{pmatrix}$
(b)	Graph stretched 2 units parallel to y-axis; passing through the points (-2,0), (0,4) and (1,0)		2	A1 for right through the 3 points, $\pm \frac{1}{4}$ sq M1 for graph stretched parallel to the y-axis by scale factor 2 A1 through all 3 points; $\pm \frac{1}{4}$ sq not on grid at $x = 2$