Questions		Working	Answer	Mark	Notes
1	**(a)**	15.6/5.28=2.954545	2.9545……	**2**	B2 for 2.9545…… or better (B1 for 5.28 seen or 2.95 or 2.954(5))
	(b)		2.95	**1**	B1 ft for 2.95
2		$60 \div 3 = 20$ $20 - 11$	9	**2**	M1 for $\div 3$ or 20 seen or $3(x+11)$ A1 cao
3	**(i)** **(ii)**	$180 - 90 - 38$	52° Alternate angles on parallel lines and either angles in a triangle or angles on a straight line.	**3**	M1 for $180 - (90 + 38)$ A1 for $x = 52°$ OR B1 for angle $QTU = 38°$ B1 for $x = 52°$ B1 for mention of alternate angles on parallel lines
4		$0.3 + 0.25$ $1 - 0.55$	0.45 oe	**2**	M1 for $1 - (0.3 + 0.25)$ A1 for 0.45 oe [SC:B1 for 0.72]
5	**(i)**	0 | 6 8 8 9 1 | 2 2 4 5 5 6 6 8 8 2 | 1 1 1 2 5 3 | 2 4	Diagram	**2**	B2 for fully correct (B1 for 2 errors in leaves or omitted key or unordered)
	(ii)		16	**2**	B1 for putting in order A1 cao
6		$4.20 \div 3 \times 7$	9.80	**3**	M1 for $4.20 \div 3$ or sight of 1.4 M1 for "1.40" $\times$ 7 A1 for 9.8 or equivalent

Questions	Working	Answer	Mark	Notes
7	$8.80 \times \dfrac{17.5}{100} = 1.54$ $8.80 + 1.54 = 10.34$ $650 \times$ "10.34"	£ 6 721	4	M1 for $8.80 \times \dfrac{17.5}{100}$ or 1.54 seen or 8.80 x 1.175 (oe) Award M1 for 10%, 5% and $2\dfrac{1}{2}$ % correctly calculated) M1 for 8.80 + "1.54" (dep on previous M1) M1 (indep) for $650 \times$ "10.34" or digits 6721 seen A1 cao OR M1 for 650×8.8 or 5720 seen M1 for "5720" $\times \dfrac{17.5}{100}$ or 1001 seen (Award M1 for 10%, 5% and $2\dfrac{1}{2}$ % correctly calculated) M1 for "5720"+"1001" (dep on both previous M marks) [or M2 for "5720" $\times 1.175$ (oe)] A1 cao
8	3.25×1000000	3250000	2	M1 for 3.25×1000000 or $3.25 \times 100 \times 100 \times 100$ A1 cao

Questions	Working	Answer	Mark	Notes
9	$4y + 12 = 6$ or $y + 3 = \dfrac{6}{4}$ $4y = -6$ $\qquad\qquad y = \dfrac{6}{4} - 3$	-1.5	**3**	B1 for $4y + 12$ or $y + 3 = \dfrac{6}{4}$ M1 for a correct rearrangement of their 3 terms to isolate $4y$ or y A1 for -1.5 oe
10 **(a)** **(b)**		Reason Question Response	**1** **2**	B1 Pass at $0.6 >$ Fail at 0.4 B1 Improved question B1 Response boxes
11		Rhombus	**4**	B1 for arcs to locate D B1 for AD drawn B1 for arcs to locate C B1 for complete rhombus, within guidelines [SC:B1 for one correctly drawn 2nd side, if no marks awarded]
12	$\dfrac{180 \times 1000}{60 \times 60} = 50$	50	**3**	M2 for $180 \times 1000 \div 60 \div 60$ or $50 \times 60 \times 60 \div 1000$ or for a correct method to obtain two comparable values eg $50 \times 60 \times 60$ **and** 180×1000 A1 for final proof (M1 for $180 \div 60 \div 60$ or $50 \times 60 \times 60$ or 180000 seen or for 180×1000)
13	$2.5 \rightarrow 40.6 \ (25)$ $2.6 \rightarrow 43.5 \ (76)$ $2.7 \rightarrow 46.6 \ (83)$ $2.8 \rightarrow 49.9 \ (50)$ $2.9 \rightarrow 59.3 \ (89)$ $2.85 \rightarrow 51.6 \ (49)$	2.8	**4**	B2 for a trial between 2 and 3 exclusive (B1 for a trial at 2 or 3) B1 for a trial between 2.8 and 2.9 exclusive B1 (dep on at least one previous B1) for 2.8 NB trials should be evaluated to at least 1 dp truncated or rounded

Questions		Working	Answer	Mark	Notes
14	(a)	$48 \div (5 + 4 + 3)$ "4" $\times$ 3	12	3	M1 for $48 \div (5 + 4 + 3)$ M1 (dep) for "4" $\times$ 3 or "4"$\times$5 or "4"$\times$4 A1 cao [SC: B2 for 20:16:12 only]
	(b)	$1.24 \times \dfrac{95}{100} = 0.1178$ $1.24 + 0.1178 = 1.3578$	1.36 or 1.4	4	M1 for $1.24 \times \dfrac{95}{100}$ or 0.11(78) seen M1 (dep) for $1.24 +$" 0.11(78)" A1 for 1.4 or better B1 (indep) for rounding their answer correctly to 1 or 2dp OR M1 for $1.24 \times \dfrac{100 + 9.5}{100}$ M1 (dep) for $1.24 \times$"1.095" or $0.0124 \times$"109.5" A1 for 1.4 or better B1 (indep) for rounding their answer correctly to 1 or 2dp
15	(a)		Angle between tangent and radius.	1	B1
	(b)	$26^2 = 24^2 + r^2$ $\sqrt{26^2 - 24^2} = \sqrt{100}$	10	4	M1 for $26^2 = 24^2 + r^2$ M1 for $\sqrt{676 - 576}$ A1 cao B1 for OQ ="10"
	(c)	$\pi \times 10^2$	314	2	M1 for $\pi \times$ "10"^{2} A1 for 314 – 315 inclusive

Questions	Working	Answer	Mark	Notes
16 **(a)**	$(1 \times 10) + (3 \times 20) + (5 \times 25) +$ $(7 \times 40) + (9 \times 15) + (11 \times 10) = 720$ "720" ÷ 120 = 6	6	**4**	M1 for use of fx with x consistent within intervals (including end points) M1 (dep) for use of midpoints M1 (dep on 1st M1) for use of $\sum fx / \sum f$ A1 cao
(b)		(10), 30, 55, 95, 110, 120	**1**	B1 for all correct
(c)		graph	**2**	B1 ft for 5 or 6 points plotted correctly $\pm\dfrac{1}{2}$ square (1mm) at the end of interval; dep on a sensible table (condone 1 addition error) B1 (dep) for points joined by a 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) M1 for reading from a cf graph at 5
(d)		39 – 44	**2**	A1 ft $\dfrac{1}{2}$ square (1mm) Or B2 for 39 – 44
17 **(a)**	$\tan x = 2.4/4.5$ $x = \tan^{-1}(2.4/4.5) = 28.1$	28.1	**3**	M1 for $\tan x = \dfrac{2.4}{4.5}$ or $\tan \dfrac{2.4}{4.5}$ M1 for $\tan^{-1}(2.4/4.5)$ A1 for 28.0 – 28.1
(b)	90 + "28.1"	118	**1**	B1 (indep) ft for 90 + "28.1" rounded to 3 or 4 sf

Questions	Working	Answer	Mark	Notes
18 (a) (b) (c)		a^9 $12x^3y^4$ $(p-4q)(p+4q)$	1 2 2	B1 for a^9, accept a^{4+5} B2 cao (B1 for two of $12, x^3, y^4$) B2 for $(p-4q)(p+4q)$ (B1 for $(p\pm 4q)(p\pm 4q)$)
19	Eqn[1] × 2 then add eqn [2] leads to $7x = 14$ Eqn[2] × 3 then subtract from eqn [1] leads to $-14y = -21$	$x = 2$ $y = 1.5$	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 M's not awarded)
20	$D = 5t + \pi t + 5w$ $D - 5w = 5t + \pi t$ $D - 5w = (5 + \pi)t$ OR $D = t(5 + \pi) + 5w$ $\dfrac{D}{5+\pi} = t + \dfrac{5w}{5+\pi}$	$t = \dfrac{D-5w}{5+\pi}$ $t = \dfrac{D}{5+\pi} - \dfrac{5w}{5+\pi}$	3	M1 for subtracting $5w$ from both sides M1 for factorising to get $(5 + x)t$ A1 for $t = \dfrac{D-5w}{5+\pi}$ oe [SC:M1 M1 A0 for $\dfrac{D-Sw}{8.14}$ oe]
21	Area $\triangle ABC = \dfrac{1}{2} \times 15 \times 9 \times \sin 110$	63.4	3	M1 for $\dfrac{1}{2} \times 15 \times 9 \times \sin 110$ M1 (dep) for $67.5 \times 0.939(69\ldots)$ or $126.85\ldots$ A1 63.4 to 63.5 [SC:B2 for 126.9 or better]

Questions	Working	Answer	Mark	Notes
22	$P = \dfrac{2}{6} \times \dfrac{3}{6} + \dfrac{1}{6} \times \dfrac{2}{6}$	$\dfrac{8}{36}$ oe	**3**	M1 for $\dfrac{2}{6} \times \dfrac{3}{6}$ or $\dfrac{1}{6} \times \dfrac{2}{6}$ or for clearly identifying in $P(R) \times P(R) + P(Y) \times P(Y)$ M1 for $P = \dfrac{"2"}{6} \times \dfrac{"3"}{6} + \dfrac{"1"}{6} \times \dfrac{"2"}{6}$ A1 for $\dfrac{8}{36}$ oe
23	$600 \times 1.055^{15} = 1339.48$	1339 to 1340	**3**	M1 for 5.5 seen M1 for 600×1.055^{15} A1 for 1339 to 1340 (SC:B1 for 739 to 740)
24 **(a)**	Graph translated 3 units to the left passing through the points $(-6, -3)$, $(-3, 0)$, $(0, 3)$, $(-1, 1)$, $(-5, -1)$		**2**	M1 for moving 3 horizontal A1 for translation left passing through 3 correct points
(b)	Graph reflected in x axis and translated 1 unit in the positive y-direction; passing through points $(3, -2)$, $(0, 1)$, $(-3, 4)$, $(2, 0)$, $(-2, 2)$		**2**	B1 for a reflection in x-axis B1 for translations of $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$ passing through 3 correct points

Questions	Working	Answer	Mark	Notes
25	Upper bound of 30 is 30.5 Lower bound of 9.8 is 9.75 $2 \times \pi \times \sqrt{\dfrac{30.5}{9.75}}$	11.1	4	B1 for 30.5 or 29.5 seen B1 for 9.85 or 9.75 seen M1 for $2\pi \sqrt{\dfrac{30.5}{9.75}}$ A1 cao
26 (a) (b)	$\dfrac{x(x-4)}{(x-2)(x-4)}$	$32x^{15}y^5$ $\dfrac{x}{x-2}$	2 3	B2 cao (B1 for two of 32, x^{15}, y^5) B1 for $x(x-4)$ B1 for $(x-4)(x-2)$ B1 cao