

March 2012

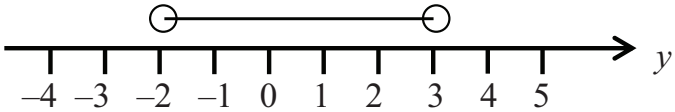
1380 4H				
Question	Working	Answer	Mark	Notes
1		41	2	M1 for $4n + 1$ seen or $4 \times 10 + 1$ or attempt to count on from 21 in 4's at least 3 times A1 cao
2	$16 \times 7 = 112$ $112 - 87$	25	2	M1 for $6 \times 14.5 (= 87)$ or $7 \times 16 (=112)$ or $6 \times 1.5 (= 9)$ or $7 \times 1.5 (= 10.5)$ A1 for 25
3	(a) 350×1.34 (b) $67 \div 1.34 = 50$ $50 - 47.50$ $47.50 \times 1.34 = 63.65$ $67 - 63.65 = 3.35$ $3.35 \div 1.34 =$	469 2.50	2 3	M1 for 350×1.34 or digits 469 A1 for 469 M1 for $67 \div 1.34$ or 50 seen M1 (dep) for "50" – 47.5(0) A1 for £2.5(0) OR M1 for $47.5(0) \times 1.34$ or 63.65 or 3.35 seen M1 (dep) for $67 - "63.65" (= 3.35)$ and $"3.35" \div 1.34$ A1 for £2.5(0)

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Question	Working	Answer	Mark	Notes
4	$3 \times 65 = 195$ $195 \times \frac{20}{100} = 39$ $195 + 39 =$	234	4	<p>M1 for $3 \times 65 (= 195)$ M1 for “195” $\times \frac{20}{100}$ oe or 39 M1 (dep M2) for adding “195” and “39” A1 cao</p> <p>OR</p> <p>M1 for $65 \times \frac{20}{100}$ oe or 13 M1 (dep M1) for adding 65 and “13” M1 (indep) for $(65 + “13”) \times 3$ A1 cao</p> <p>OR</p> <p>M2 for 78 seen M1 for 78×3 A1 cao</p> <p>(SC B3 for 208 as answer from $195 + 13$ SC B2 for 312 as answer or $195 + 13$ SC B1 for 52 from 20% of 260)</p>

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Question		Working	Answer	Mark	Notes
5	(a)	$\frac{\sqrt{6.25 + 3.75}}{2.2}$ $\frac{\sqrt{10}}{2.2}$	1.4373(98936...)	3	B3 for 1.4373(98936...) or 1.4374 (B2 for answer of $\frac{5\sqrt{10}}{11}$ or sight of $\sqrt{10}$ or 3.162...or 1.43 or 1.44 or 1.437) (B1 for sight of 2.2 or 10)
	(b)		1.44	1	B1 for 1.44 or ft from part(a) provided (a) is given to at least 3 decimal places.
6		$x = 3$ gives 36 $x = 4$ gives 76 $x = 3.1$ gives 39.(091) $x = 3.2$ gives 42.(368) $x = 3.3$ gives 45.(837) $x = 3.4$ gives 49.(504) $x = 3.5$ gives 53.(375) $x = 3.6$ gives 57.(456) $x = 3.7$ gives 61.(753) $x = 3.8$ gives 66.(272) $x = 3.9$ gives 71.(019) $x = 3.15$ gives 40.7(05875) $x = 3.16$ gives 41.0(34496) $x = 3.17$ gives 41.3(65013) $x = 3.18$ gives 41.6(97432) $x = 3.19$ gives 42.0(31759)	3.2	4	B2 for a trial $3.1 \leq x \leq 3.2$ (B1 for trial $3 \leq x \leq 4$) B1 for a different trial $3.15 \leq x < 3.2$ B1 (dep on at least one previous B1) for 3.2 Accept trials correct to the nearest whole number (rounded or truncated) if the value of x is to 1 dp but to 1dp (rounded or truncated) if the value of x is to 2 dp NB: no working scores no marks, even if the answer is correct.

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Question	Working	Answer	Mark	Notes
7	$16^2 - 8^2 = 192$ $\sqrt{192} = 13.85640646$	13.86	3	M1 for showing the intention to square and subtract or sight of $16^2 - 8^2$ or 192 M1 for $\sqrt{(256 - 64)}$ or $\sqrt{192}$ or $8\sqrt{3}$ A1 for answer in the range 13.85 to 13.86 OR M2 for $16\cos 30$ or $16\sin 60$ (M1 for $\cos 30 = \frac{QR}{16}$ or $\sin 60 = \frac{QR}{16}$) A1 for answer in the range 13.85 to 13.86

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Question	Working	Answer	Mark	Notes	
8	(a)	x^{5+4}	x^9	1	B1 for x^9 or x^{5+4}
	(b)	y^{7-2}	y^5	1	B1 for y^5 or y^{7-2}
	(c)	$6a + 15 + 5a - 10$	$11a + 5$	2	M1 for correct expansion of one bracket, eg $3 \times 2a + 3 \times 5$ or sight of $6a + 15$ or $5a - 10$ or $11a$ or $+5$ seen as part of their answer A1 for $11a + 5$ oe
	(d)	$y^2 + 5y + 7y + 35$	$y^2 + 12y + 35$	2	M1 for 3 out of 4 terms with correct signs or all 4 terms correct ignoring signs A1 for $y^2 + 12y + 35$ oe
	(e)	$p^2 - 6p + 8$	$(p - 4)(p - 2)$	2	M1 for $(p \pm 4)(p \pm 2)$ or $(p + a)(p + b)$ with $a, b \neq 0$, $a + b = -6$ or $ab = 8$ or $p(p - 2) - 4(p - 2)$ or $p(p - 4) - 2(p - 4)$ A1 for $(p - 4)(p - 2)$ (accept others letters)
9	(a)	$1 - (0.15 + 0.25 + 0.20 + 0.16)$	0.24	2	M1 for $1 - (0.15 + 0.25 + 0.20 + 0.16)$ or $1 - "0.76"$ A1 for 0.24 oe
	(b)	300×0.25	75	2	M1 for 300×0.25 A1 cao

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Question	Working	Answer	Mark	Notes
10	$5 \times 2 = 10$ $15 \times 8 = 120$ $25 \times 9 = 225$ $35 \times 7 = 245$ $45 \times 4 = \underline{180}$ 780 $780 \div 30 = 26$	26	4	M1 for finding fx consistently within intervals including the end points (allow 1 error) M1 (dep) for use of all correct mid-interval values M1 (dep on first M1) for $\sum fx \div \sum f$ A1 cao
11	(a)  (b) $-3 < x \leq 4$ (c) $4t > 9 + 5$ $4t > 14$	 $t > 3.5$	1 2 2	B1 for correct diagram (must have open circles) B2 for $-3 < x \leq 4$ or > -3 and ≤ 4 (B1 for $-3 < x$ or $x > -3$ or $x \leq 4$ or $4 \geq x$ or > -3 or ≤ 4 or $-3 \leq x < 4$) NB Accept the use of any letter other than x and ignore attempts to list integer values M1 for $4t \square 9 + 5$ or clear intention to add 5 to both sides or clear intention to divide all 3 terms by 4 or $4t \square 14$ or $4t = 14$ or $4t < 14$ A1 for $t > 3.5$ oe (SC B1 for 3.5 oe seen if M0 scored)

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Question	Working	Answer	Mark	Notes
12	$45 \div (2 + 3 + 4)$	Ann £10 Bob £15 Cath £20	3	<p>M1 for dividing 45 by the sum of the ratios $2 + 3 + 4$ M1 for multiplying “5” by 2 or 3 or 4 A1 for Ann £10, Bob £15, Cath £20, condone missing £ signs</p> <p>OR</p> <p>M1 for realising of $\frac{2}{"9"}$ or $\frac{3}{"9"}$ or $\frac{4}{"9"}$ M1 for multiplying 45 by $\frac{2}{"9"}$ or $\frac{3}{"9"}$ or $\frac{4}{"9"}$ A1 for Ann £10, Bob £15, Cath £20, condone missing £ signs</p> <p>NB: Award M1M1A0 for 2 out of 3 answers on answer line or 10 : 15 : 20 seen as final ratio</p>
13	$\frac{1}{2} (6 + 12) \times 8$	72	2	<p>M1 for $\frac{1}{2} \times (6 + 12) \times 8$ or complete method to find the area eg $8 \times 6 + \frac{1}{2} \times 8 \times "12 - 6"$ or $12 \times 8 - \frac{1}{2} \times 8 \times "12 - 6"$ or $48 + 24$ or $96 - 24$ A1 cao</p>

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Question	Working	Answer	Mark	Notes
14	(a)			
	$\tan x = \frac{8}{12} = 0.666\dots$ $x = \tan^{-1} 0.6666\dots =$	33.7	3	<p>M1 for $\tan x = \frac{8}{12}$ or $\tan x = 0.66(6\dots)$ or $\tan x = 0.67$</p> <p>M1 for $\tan^{-1}\left(\frac{8}{12}\right)$ or $\tan^{-1} 0.66(6\dots)$ or $\tan^{-1} 0.67$</p> <p>A1 for answer in range 33.6 to 33.7</p> <p>OR</p> <p>If using Pythagoras and trigonometry, then no marks until</p> <p>M1 for $\sin x = \frac{8}{14.4\dots}$ or $\cos x = \frac{12}{14.4\dots}$</p> <p>or $\sin x = \frac{8}{14.4\dots} \times \sin 90$</p> <p>M1 for $\sin^{-1} \frac{8}{14.4\dots}$ or $\cos^{-1} \frac{12}{14.4\dots}$</p> <p>or $\sin^{-1}\left(\frac{8}{14.4\dots} \times \sin 90\right)$</p> <p>A1 for answer in range 33.6 to 33.7</p> <p>(SC B2 for 0.588...(using rad) or 37.4...(using grad))</p>

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Question	Working	Answer	Mark	Notes
14	(b)	9.44	3	<p>M1 for $\sin 32 = \frac{5}{YZ}$ or $\cos 58 = \frac{5}{YZ}$</p> <p>M1 for $(YZ =) \frac{5}{\sin 32}$ or $(YZ =) \frac{5}{\cos 58}$</p> <p>A1 for answer in range 9.43 to 9.44</p> <p>OR</p> <p>M1 for $\frac{5}{\sin 32} = \frac{YZ}{\sin 90}$ or $\frac{\sin 32}{5} = \frac{\sin 90}{YZ}$</p> <p>M1 for $(YZ =) \frac{5}{\sin 32} \times \sin 90$</p> <p>A1 for answer in range 9.43 to 9.44</p> <p>OR</p> <p>M1 for $(YZ^2 =) 5^2 + \left(\frac{5}{\tan 32}\right)^2$ or $5^2 + 8(.00\dots)^2$ seen or $89(.0\dots)$ seen</p> <p>M1 for $(YZ =) \sqrt{5^2 + \left(\frac{5}{\tan 32}\right)^2}$ or $\sqrt{5^2 + 8(.00\dots)^2}$ seen or $\sqrt{89(.0\dots)}$ seen</p> <p>A1 for answer in range 9.43 to 9.44</p> <p>(SC B2 for 9.06...(using rad) or 10.3...(using grad))</p> <p>NB: Equivalent methods using 58° should be credited accordingly</p>

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Question		Working	Answer	Mark	Notes
15	(a)		Enlargement, scale factor 2, centre (5, 6)	3	B1 for Enlargement B1 for scale factor 2 B1 for (5, 6) (NB: a combination of transformations scores no marks)
	(b)		Correct reflection	2	M1 for a reflection in a line parallel to the y axis (see overlay) A1 cao
16	(a)		12, 27, 45, 57, 60	1	B1 cao
	(b)		Correct cumulative frequency diagram	2	B1 ft for all five points plotted correctly (± 1 sq) at top end of intervals dep on sensible table (condone 1 addition error) B1 ft (dep on previous B1) for points joined by curve/line segments (SC B1 for all five points plotted not at ends but consistent within each interval and joined)
	(c)		42	2	M1 for attempt to draw line across at 30 or 30.5 on cf graph A1 for answer in the range 41 to 43 or ft from cf graph
	(d)	60 – 52	8	2	M1 for 51 or 52 or 53 seen or line drawn up to cf graph at 55 or correct reading at 55 ($\pm \frac{1}{2}$ sq) A1 for 7 or 8 or 9 or ft from graph

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Question	Working	Answer	Mark	Notes
17		Rotation, 180°, centre (-1, 1)	3	<p>B1 for rotation B1 for 180° (accept half turn) B1 for (-1, 1) (SC B1 for triangle with vertices (-3, 0) (-5, 0) (-3, -4) drawn)</p> <p>OR</p> <p>B1 for enlargement B1 for scale factor - 1 B1 for (-1, 1)</p> <p>(NB: a combination of transformations scores no marks)</p>

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Question	Working	Answer	Mark	Notes
18	$3x + 5y = 19$ $4x - 2y = -18$ $12x + 20y = 76$ $12x - 6y = -54$ Subtract $26y = 130$ $y = 5$ Substitute $3x + 25 = 19$ $3x = -6$	$x = -2$ $y = 5$	4	<p>M1 for coefficients of x or y the same followed by correct operation, condone one arithmetical error A1 for first solution M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again. A1 for second solution</p> <p>OR</p> <p>M1 for full method to rearrange and substitute to eliminate x or y, allow one arithmetical error A1 for first solution M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again. A1 for second solution</p> <p>Trial and improvement 0 marks unless both x and y correct values found</p>

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Question	Working	Answer	Mark	Notes
19	$a = 5, b = 8, c = -6$ $x = \frac{-8 \pm \sqrt{8^2 - 4 \times 5 \times -6}}{2 \times 5}$ $\frac{-8 \pm \sqrt{64 + 120}}{10} = \frac{-8 \pm \sqrt{184}}{10}$ $= 0.5564659966$ or $= -2.156465997$ OR $x^2 + \frac{8}{5}x - \frac{6}{5} = 0$ $\left(x - \frac{4}{5}\right)^2 - \left(\frac{4}{5}\right)^2 - \frac{6}{5} = 0$ $x + \frac{4}{5} = \pm \sqrt{\left(\frac{4}{5}\right)^2 + \frac{6}{5}}$ $x = -\left(\frac{4}{5}\right) \pm \sqrt{\frac{46}{25}}$	0.56, -2.16	3	M1 for substitution, $\frac{-8 \pm \sqrt{8^2 - 4 \times 5 \times -6}}{2 \times 5}$ condone one sign error in substitution M1 for $\frac{-8 + \sqrt{184}}{10}$ oe or $\frac{-8 - \sqrt{184}}{10}$ oe A1 for one answer in the range 0.556 to 0.56 and one answer in the range -2.156 to -2.16 OR M1 for $(x + 0.8)^2$ oe M1 for method leading to $-0.8 \pm \sqrt{1.84}$ oe A1 for one answer in the range 0.556 to 0.56 and one answer in the range -2.156 to -2.16

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Question	Working	Answer	Mark	Notes
20	$c^2 = 60^2 + 90^2 -$ $2 \times 60 \times 90 \times \cos 130^\circ$ $c^2 = 3600 + 8100 - 10800 \times -$ 0.6427876 $c^2 = 11700 + 6942.106$ $c^2 = 18642.106$ $c = \sqrt{18642.106} = 136.536$ Perimeter = $60 + 90 + 136.536$	286.5	4	M1 for substituting values correctly into cosine rule formula e.g. $60^2 + 90^2 - 2 \times 60 \times 90 \times \cos 130^\circ$ M1 for correct order of evaluation A1 for finding value of missing side in range 136 to 137 A1 for answer in range 286 to 287
21	$4 \div 10 = 0.4$ $8 \div 5 = 1.6$ $24 \div 5 = 4.8$ $16 \div 10 = 1.6$ $5 \div 20 = 0.25$	Bars at, for example, 0.8cm, 3.2cm, 9.6cm, 3.2 cm and 0.5 cm in height	3	B3 for fully correct histogram (B2 for 4 correct blocks B1 for 3 correct blocks) (see overlay) (If B0, SC B1 for correct key, eg $1 \text{ cm}^2 = 2.5(\text{students})$ or frequency \div class interval for at least 3 frequencies NB apply the same mark-scheme if a different frequency density is used

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Question	Working	Answer	Mark	Notes
22	<p>Upper bound</p> $\frac{163.5}{45.25} = 3.613259669$ <p>Lower bound</p> $\frac{162.5}{45.35} = 3.583241455$	<p>3.6</p> <p>because the LB and UB agree to that number of figures</p>	5	<p>B1 for either 162.5 or 163.5 or 163.4999...</p> <p>B1 for either 45.25 or 45.35 or 45.34999...</p> <p>M1 for “163.5” ÷ ”45.25” where $163 < '163.5' \leq 164$ and $45.2 \leq '45.25' < 45.3$</p> <p>or</p> <p>for “162.5” ÷ ”45.35” where $162 \leq '162.5' < 163$ and $45.3 < '45.35' \leq 45.4$</p> <p>A1 for 3.613(...) and 3.583(...)</p> <p>(Note: accept 3.61 and 3.58 from $\frac{163.5}{45.25}$ and $\frac{162.5}{45.35}$)</p> <p>A1 for 3.6 and ‘both LB and UB round to 3.6’ oe</p> <p>NB 3.6 without working scores no marks</p>

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Question	Working	Answer	Mark	Notes
23	<p>Area of sector =</p> $\frac{35}{360} \times \pi \times 80 \times 80$ $= \frac{35}{360} \times 20106.19$ $= 1954$ <p>Area of triangle</p> $= \frac{1}{2} \times 80 \times 80 \times \sin 35$ $= 3200 \times 0.573576$ $= 1835$ <p>Area of segment = 1954 – 1835</p>	119	5	<p>M1 for $\frac{35}{360}$ oe or 0.0972(2...) seen</p> <p>or $\frac{360}{35}$ oe or 10.28(5...) seen or 10.29 seen or 10.3 seen</p> <p>M1 for $\frac{35}{360} \times \pi \times 80 \times 80$ oe or sight of value in the range 1954 to 1955</p> <p>M1 for $\frac{1}{2} \times 80 \times 80 \times \sin 35$ or $80 \times \sin 17.5 \times 80 \times \cos 17.5$ or sight of value in the range 1835 to 1836</p> <p>M1 (dep on at least one M1 scored) for the intention to find area of sector $OABC$ - area of triangle OAC</p> <p>A1 for answer in the range 118 to 120 (B3 SC for Rads: 3324(.953305) or Grads: 282(.7733551))</p>
24	$5(2x+1)^2 = (4x+5)(5x-1)$ $5(4x^2 + 4x + 1) = 20x^2 + 21x - 5$ $20x^2 + 20x + 5 = 20x^2 + 21x - 5$ $20x + 5 = 21x - 5$ $x = 10$	$x = 10$	5	<p>M1 for intention to multiply each side by $4x + 5$</p> <p>M1 for attempt to expand $(2x + 1)^2$ or $5(2x + 1)^2$ or $(4x + 5)(5x - 1)$, at least 3 out of 4 terms correct</p> <p>A1 for $20x^2 + 20x + 5$ or $20x^2 + 21x - 5$ oe</p> <p>A1 for $20x^2 + 20x + 5 = 20x^2 + 21x - 5$ oe</p> <p>A1 for 10</p>

15(b)

