## UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

**International General Certificate of Secondary Education** 

## MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

## 0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/04

Paper 4 (Extended), maximum raw mark 120

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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Page 2	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – October/November 2010	0607	04

				1		
1	(a)		5h 21 min seen 5.35 h seen	M1 M1		Subtracting times (321 M1) Converting minutes part to hours (may be
			340 ÷ 5.35 seen	M1		later) $(340 \div 321 \text{ M1})$ $340 \div \text{their time}$ $(\times 60 \text{ M1})$
			63.551 or $63\frac{59}{107}$	B1	[4]	(* 60 WI)
	(b)	(i)	54.0 (54.01 – 54.02)	B2	[2]	If B0, M1 for 0.85 × 63.55 oe
	(0)	` '	·			
		(ii)	19 18 ft	B3 ft	[3]	minutes added to 13 00 If B0, M1 for 340 $\div$ their (i) (6.29) or 5.35 $\div$ 0.85 or 321 $\div$ 0.85 $\div$ 60 M1 (dep) for changing decimal part to minutes
						[9]
2	(a)	(i)	93 312	B1	[1]	Accept 93 300 or 93 310
		(ii)	$9.3312 \times 10^4$ ft	B1 ft	[1]	ft their (i) B1 for 9.331, 9.33 or 9.3 all $\times 10^4$
	<b>(b)</b>		$9.69(0)$ to $9.691 \times 10^{-3}$	B2	[2]	B1 for 0.00969(0) to 0.009691 implied by 9.69 <sup>-03</sup>
						SC1 for $9.7 \times 10^{-3}$ or $9.69 \times 10^{3}$
	(c)		4.57 or 4.573	B1	[1]	
	(d)		4.72 or 4.722 to 4.723	B2	[2]	or graph clearly sketched showing intersection
						[7]
3	(a)		Sketch of U-shaped parabola intersecting <i>x</i> -axis twice or full correct use of formula with $a = 1$ , $b = 2$ and $c = -4$ $\left(\frac{-2 \pm \sqrt{20}}{2}\right)$ or correct	M1		If M1 A0, SC1 for -3.2 or -3.236 and 1.2 or 1.236 If M0, SC2 for -3.24 and 1.24
			· - /			
			use of completing the square –3.24, 1.24	A1 A1	[3]	or SC1 for -3.2 or - 3.236 <b>and</b> 1.2 or 1.236
	(b)		$-3.24 \le x \le 1.24$ ft	B1 ft B1 ft	[2]	ft only if two solutions to part (a) Condone < used and allow in words, if clear  [5]
4	(a)		Line joining 5 on each axis approx Horizontal line roughly through 1 Line through origin at more than 45° to <i>x</i> -axis	B1 B1 B1	[3]	All may be freehand
	<b>(b)</b>		R in correct region oe	B1dep		dep on B3
					[1]	[4]

Page 3	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – October/November 2010	0607	04

				1		
5	(a)		5	B1		
			2 3	B1 B1		
			2.875 (allow 2.87, 2.88 or 2.9)	B1		
			4	B1	[5]	
	<b>(b)</b>		2	B2	[2]	If B0, M1 for attempting to find a fraction with denominator 72
	(c)	(i)	$\frac{1}{8}$ cao	B2	[2]	If B0, B1 for $\frac{9}{72}$ o.e.
		(ii)	45 ft	B1 <b>ft</b>	[1]	ft their (i) if answer is integer accept $\frac{45}{360}$ [10]
6	(a)		1.15	В3	[3]	If B0, M1 for $20t + 8(3t - 1)$ and M1 (dep) for this equal to 42.6
	(b)	(i)	$\frac{15}{y} + \frac{9}{y+2} = 8$	M2		Allow M1 for l.h.s.
			15(y+2) + 9y = 8y(y+2)  or	M1		Could still be all over $y(y+2)$ and not expanded or partly or fully expanded
			$15y + 30 + 9y = 8y^2 + 16y$			
			$8y^{2} - 8y - 30 = 0$ $\therefore 4y^{2} - 4y - 15 = 0$	E1	[4]	Correctly established. Need to see 1 correct line and final answer
		(ii)	(2y-5)(2y+3)	B2	[2]	Allow SC1 for any other $(2y \pm 5)(2y \pm 3)$
		(iii)	2.5(0) ft	B1 <b>ft</b>	[1]	ft a positive root from (ii) if the only one from two possible roots.
						[10]
7	(a)		Real numbers oe	B1	[1]	
	<b>(b)</b>		3, 90	B1 B1	[2]	Allow either way round
	(c)	(i)	Stretch Factor 2 <i>x</i> -axis invariant	B1 B1 B1	[3]	Independent
		(ii)	Translation $\begin{pmatrix} -60\\0 \end{pmatrix}$	B1 B1	[2]	Must be translation Independent – Allow description in words [8]
8	(a)	(i)	Triangle at (-4, 4), (-1, 4), (-1, 5)	B2	[2]	If B0, SC1 for any translation
		(ii)	Triangle at $(-1, -2)$ , $(-1, -5)$ , $(-2, -5)$	B2	[2]	If B0, SC1 if two vertices correct
	(b)		Enlargement, (factor) 2, (centre) (4, 0)	B1 B1		Each B is independent
	(c)		Translation $\begin{pmatrix} 6 \\ -3 \end{pmatrix}$	B1 B1	[2]	B's independent  Must be translation but allow description in words
						[9]

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper	
	IGCSE – October/November 2010		04	

(b) All 8 points correctly placed (c) 3, 11, 17, 19 ft (d) 3 ft (e) B only shaded (i.e. parts in A and C not shaded)  10 (a) (i) One pair of angles equal with reason Second pair of angles equal with reason Angles of triangles equal with reason (ii) 18 (b) (i) 50 (b) (i) 98  (iii) 5.14 (2) (iv) 4  11 (a) 3 points correct 2mm accuracy (b) Negative (c) (i) y = −0.565x + 58.5  (ii) 30 or 31 cao  All 8 points correct points marked C₁ and C₂ (ii) 56.4, 123.6  (b) (i) Two accurate points marked C₁ and C₂ (ii) 56.4, 123.6  (iii) 67.2 ft  B1 ft [1] ft their Venn diagram (n) their Venn diagram (n							
(c) 3, 11, 17, 19 ft graph (d) 3 ft graph (d) 3 ft graph (d) 3 ft graph (e) Bonly shaded (i.e. parts in A and C not shaded)  (e) Bonly shaded (i.e. parts in A and C not shaded)  (i) One pair of angles equal with reason Second pair of angles equal with reason Angles of triangles equal with reason Angles of triangles equal with reason (ii) 18 graph (d) 18 graph (d) 18 graph (d) 18 graph (d) 19	9	(a)		2, 3, 5, 7, 11, 13, 17, 19	B1	[1]	
(d) 3 ft B only shaded (i.e. parts in A and C not shaded)  (e) B only shaded (i.e. parts in A and C not shaded)  (f) One pair of angles equal with reason Second pair of angles equal with reason Angles of triangles equal  (ii) 18 B2 [2] If B0, M1 for $2^2$ or $0.5^2$ seen  (iii) 50 B1 [1]  (iii) 98 B2 [2] If B0, M1 for $180 - (32 + their (i))$ or for angle $0$ or $0$ angle $0$		<b>(b)</b>		All 8 points correctly placed	В3	[3]	
(e) $B$ only shaded (i.e. parts in $A$ and $C$ not shaded)  [7]  10 (a) (i) One pair of angles equal with reason Second pair of angles equal with reason Angles of triangles equal  (ii) $B$ Reasons can only be angles in same segment oc and vertically opposite oc, the second only used once  (iii) $B$ Racept anything suggesting angles same Each R is independent  (ii) $B$ B2 [2]  (ii) $B$ B2 [2]  (iii) $B$ B3 [1]  (iii) $B$ B2 [2]  (iii) $B$ B3 [1]  11 (a) $B$ P1 for $B$		(c)		3, 11, 17, 19 ft	B1 <b>ft</b>	[1]	ft their Venn diagram
10 (a) (i)   One pair of angles equal with reason Scoond pair of angles equal with reason Angles of triangles equal with reason Angles of triangles equal   R1   S1   Reasons can only be angles in same segment of any suggesting angles same Each R is independent   R1   S2   S2   S2   S3   S4   S4   S4   S4   S4   S4   S4		(d)		3 ft	B1 <b>ft</b>	[1]	ft their Venn diagram
The content of the		(e)		· · ·	B1	[1]	
10 (a) (i) One pair of angles equal with reason Second pair of angles equal with reason Angles of triangles equal   R1   R1   R2   R2   R3   R4   R4   R5   R5   R5   R5   R5   R5				not shaded)			[7]
Second pair of angles equal with reason Angles of triangles equal  (ii) 18 (iii) 28 (iii) 30 (iv) 4  11 (a) 3 points correct 2mm accuracy (b) (i) $y = -0.565x + 58.5$ (ii) 30 or 31 cao  (iii) 30 or 31 cao  Second only used once Each R is independent  R1 [3] Accept anything suggesting angles same Each R is independent  R1 [3] Accept anything suggesting angles same Each R is independent  R1 [3] Accept anything suggesting angles same Each R is independent  R1 [3] Accept anything suggesting angles same Each R is independent  R1 [3] Accept anything suggesting angles same Each R is independent  R1 [3] Accept anything suggesting angles same Each R is independent  R1 [3] Accept anything suggesting angles same Each R is independent  R1 [3] Accept anything suggesting angles same Each R is independent  R1 [3] Accept anything suggesting angles same Each R is independent  R1 [3] Accept anything suggesting angles same Each R is independent  R1 [3] Accept anything suggesting angles same Each R is independent  R1 [3] Accept anything suggesting angles same Each R is independent  R1 [3] Accept anything suggesting angles same Each R is independent  R1 [4] BBO, M1 for 180 – (32 + their (i)) or for angle PQY = 58 seen (may be on diagram)  If BO, M1 for cos50 = RY ÷ 8 oe  [11]  [11] Allow description e.g. cold goes down as hot goes up  Accept anything suggesting angles same Each R is independent  [12] P1 for 2 correct  Allow description e.g. cold goes down as hot goes up  Must be in form $mx + c$ , allow $-0.57$ or $-0.5652$ to $-0.5651$ for $m$ and 58 or $58.48$ for $c$ [13] Must be integer If BO, M1 for using their linear regression equation with $x = 50$ [14]  [15] P1 for 2 correct  Must be in form $mx + c$ , allow $-0.57$ or $-0.5652$ to $-0.5651$ for $m$ and $58$ or $-0.5652$ for $-0.5652$ for $-0.5652$ for $-0.$	10	(a)	(i)	One pair of angles equal with reason	D 1		
Angles of triangles equal   R1   [3]   Accept anything suggesting angles same   Each R is independent	10	(a)	(1)				
Each R is independent   Each R is independent					D 1	Г21	*
(ii) 50				Angles of triangles equal	KI	[3]	
(ii) 98  (iii) 98  B2 [2] If B0, M1 for $180 - (32 + \text{their (i)})$ or for angle QPR = 32 seen or for angle PQY = 58 seen (may be on diagram)  (iii) 5.14 (2)  (iv) 4  B1 [1]  11 (a) 3 points correct 2mm accuracy  (b) Negative  (c) (i) $y = -0.565x + 58.5$ B1 B1 [2] Must be in form $mx + c$ , allow $-0.57$ or $-0.5652$ to $-0.5651$ for $m$ and $58$ or $58.48$ for $c$ (ii) 30 or 31 cao  B2 [2] Must be integer If B0, M1 for using their linear regression equation with $x = 50$ [7]  12 (a) 0.8333  B3 [3] SC2 for $\frac{5}{6}$ , 0.83, 0.833, 0.8333 isw if angle given  If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe (can be implicit)  (b) (i) Two accurate points marked $C_1$ and $C_2$ B1 B1 [2] (iii) 67.2 ft  B1 ft [1] ft the difference between their answers in (ii)			(ii)	18	B2	[2]	If B0, M1 for $2^2$ or $0.5^2$ seen
(iii) 5.14 (2)  (iv) 4  B2 [2] If B0, M1 for $\cos 50 = RY \div 8$ oe  (iv) 4  B1 [1]  11 (a) 3 points correct 2mm accuracy  (b) Negative  (c) (i) $y = -0.565x + 58.5$ B1 B1 [2]  (ii) 30 or 31 cao  B2 [2] Must be in form $mx + c$ , allow $-0.57$ or $-0.5652$ to $-0.5651$ for $m$ and $58$ or $58.48$ for $c$ (iii) 30 or 31 cao  B2 [2] Must be integer If B0, M1 for using their linear regression equation with $x = 50$ [7]  12 (a) 0.8333  B3 [3] SC2 for $\frac{5}{6}$ , 0.83, 0.833, 0.8333 isw if angle given If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe (can be implicit)  (b) (i) Two accurate points marked $C_1$ and $C_2$ B1 B1 [2] (cii) $\frac{1}{6}$ for		<b>(b)</b>	(i)	50	B1	[1]	
seen (may be on diagram)  (iii) $5.14$ (2)  (iv) $4$ B1 [1]  11 (a) 3 points correct 2mm accuracy  (b) Negative  (c) (i) $y = -0.565x + 58.5$ B1 B1 [2] $Must$ be in form $mx + c$ , allow $-0.57$ or $-0.5652$ to $-0.5651$ for $m$ and $58$ or $58.48$ for $c$ (ii) $30$ or $31$ cao  B2 [2] $Must$ be in form $mx + c$ , allow $-0.57$ or $-0.5652$ to $-0.5651$ for $m$ and $58$ or $58.48$ for $c$ (iii) $30$ or $31$ cao  B2 [2] $Must$ be integer If B0, M1 for using their linear regression equation with $x = 50$ [7]  12 (a) $0.8333$ B3 [3] $SC2$ for $\frac{5}{6}$ , $0.83$ , $0.833$ , $0.8333$ isw if angle given If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe (can be implicit)  (b) (i) Two accurate points marked $C_1$ and $C_2$ B1 B1 [2] (iii) $56.4$ , $123.6$ B1 B1 [2] $10.10$ ft the difference between their answers in (ii)			(ii)	98	B2	[2]	
(iii) 5.14 (2)  (iv) 4  B1 [1]  [11]  11 (a) 3 points correct 2mm accuracy (b) Negative  (c) (i) $y = -0.565x + 58.5$ B1 B1 [2]  (ii) 30 or 31 cao  B2 [2] If B0, M1 for cos50 = $RY \div 8$ oe  [11]  [11]  [11]  [12]  [13]  [14]  [15]  [15]  [16]  [17]  [17]  [18]  [18]  [19]  [19]  [10]  [10]  [11]  [11]  [11]  [11]  [12]  [13]  [14]  [15]  [15]  [16]  [16]  [17]  [17]  [18]  [18]  [19]  [10]  [11]  [12]  [13]  [14]  [15]  [16]  [16]  [17]  [17]  [18]  [18]  [19]  [19]  [10]  [10]  [11]  [11]  [11]  [11]  [12]  [13]  [14]  [15]  [15]  [16]  [16]  [16]  [17]  [17]  [18]  [18]  [19]  [19]  [10]  [10]  [10]  [11]  [11]  [11]  [11]  [11]  [12]  [13]  [14]  [15]  [15]  [16]  [16]  [17]  [17]  [18]  [18]  [19]  [19]  [10]  [10]  [11]  [11]  [11]  [11]  [11]  [11]  [11]  [12]  [13]  [14]  [15]  [15]  [16]  [16]  [16]  [17]  [17]  [18]  [18]  [19]  [19]  [10]  [10]  [11]  [11]  [11]  [11]  [11]  [11]  [11]  [12]  [13]  [14]  [15]  [15]  [16]  [16]  [16]  [17]  [17]  [18]  [18]  [19]  [19]  [10]  [10]  [10]  [11]  [11]  [11]  [11]  [11]  [11]  [12]  [12]  [13]  [14]  [15]  [16]  [16]  [17]  [17]  [18]  [18]  [19]  [19]  [10]  [10]  [10]  [11]  [12]  [13]  [14]  [15]  [15]  [16]  [16]  [17]  [17]  [18							- · ·
(iv)       4       B1       [1]         11 (a)       3 points correct 2mm accuracy       P2       [2]       P1 for 2 correct         (b)       Negative       B1       [1]       Allow description e.g. cold goes down as hot goes up         (c)       (i) $y = -0.565x + 58.5$ B1 B1       [2]       Must be in form $mx + c$ , allow $-0.57$ or $-0.5652$ to $-0.5651$ for $m$ and $58$ or $58.48$ for $c$ (ii)       30 or 31 cao       B2       [2]       Must be integer If B0, M1 for using their linear regression equation with $x = 50$ [7]         12 (a) $0.8333$ B3       [3]       SC2 for $\frac{5}{6}$ , $0.83$ , $0.833$ , $0.8333$ , $0.8333$ isw if angle given         (b)       (i)       Two accurate points marked $C_1$ and $C_2$ B1 B1       [2]       2 mm accuracy         (ii)       56.4, 123.6       B1 B1       [2]       1 ft the difference between their answers in (ii)			(iii)	5 14 (2 )	B2	[2]	
11 (a)   3 points correct 2mm accuracy   P2   [2]   P1 for 2 correct			` ′	` '			II BO, WIT TO COSSO - KT - 6 OC
(b) Negative $B1 = [1]$ Allow description e.g. cold goes down as hot goes up $[1]$ Must be in form $mx + c$ , allow $-0.57$ or $-0.5652$ to $-0.5651$ for $m$ and $58$ or $58.48$ for $c$ Must be integer If B0, M1 for using their linear regression equation with $x = 50$ [7]  12 (a) $0.8333$ $B3 = [3]$ SC2 for $\frac{5}{6}$ , $0.83$ , $0.833$ , $0.833$ , isw if angle given If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe (can be implicit)  (b) (i) Two accurate points marked $C_1$ and $C_2$ B1 B1 [2] (iii) $56.4$ , $123.6$ B1 ft [1] ft the difference between their answers in (ii)			(11)	•	D1	[1]	[11]
(c) (i) $y = -0.565x + 58.5$ B1 B1 [2] Must be in form $mx + c$ , allow $-0.57$ or $-0.5652$ to $-0.5651$ for $m$ and $58$ or $58.48$ for $c$ (ii) 30 or 31 cao  B2 [2] Must be integer If B0, M1 for using their linear regression equation with $x = 50$ [7]  12 (a) 0.8333  B3 [3] SC2 for $\frac{5}{6}$ , 0.83, 0.833, 0.8333 isw if angle given  If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe (can be implicit)  (b) (i) Two accurate points marked $C_1$ and $C_2$ B1 B1 [2] (a) $C_2$ B1 B1 [2] $C_2$ mm accuracy  (ii) $C_2$ ft B1 ft [1] ft the difference between their answers in (ii)	11	(a)		3 points correct 2mm accuracy	P2	[2]	P1 for 2 correct
(ii) $30 \text{ or } 31 \text{ cao}$ B2 [2] Must be integer If B0, M1 for using their linear regression equation with $x = 50$ [7]   12 (a) $0.8333$ B3 [3] $SC2 \text{ for } \frac{5}{6}, 0.83, 0.833, 0.8333$ isw if angle given If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe (can be implicit)  (b) (i) Two accurate points marked $C_1$ and $C_2$ B1 B1 [2] (can be implicit)  (ii) $56.4, 123.6$ B1 B1 [2] (iii) $67.2$ ft  B1 B1 [1] If the difference between their answers in (iii)		(b)		Negative	B1	[1]	
(ii) 30 or 31 cao  B2 [2] Must be integer If B0, M1 for using their linear regression equation with $x = 50$ [7]  12 (a) 0.8333  B3 [3] SC2 for $\frac{5}{6}$ , 0.83, 0.833, 0.8333 isw if angle given  If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe (can be implicit)  (b) (i) Two accurate points marked $C_1$ and $C_2$ B1 B1 [2] 2 mm accuracy  (ii) 56.4, 123.6  (iii) 67.2 ft  B1 ft [1] ft the difference between their answers in (ii)		(c)	(i)	y = -0.565x + 58.5	B1 B1	[2]	
(ii) $30 \text{ or } 31 \text{ cao}$ $B2  [2]  \text{Must be integer}  \text{If B0, M1 for using their linear regression equation with } x = 50$ $[7]$ $12  \textbf{(a)}  0.8333  B3  [3]  \text{SC2 for } \frac{5}{6}, 0.83, 0.833, 0.8333 \text{ isw if angle given}  \text{If B0 and SC0, M1 for } \frac{\sin C}{10} = \frac{\sin 30}{6} \text{ oe (can be implicit)}$ $\textbf{(b)}  \textbf{(i)}  \text{Two accurate points marked } C_1 \text{ and } C_2  \text{B1 B1 [2]}  \text{2 mm accuracy}$ $\textbf{(ii)}  56.4, 123.6  B1 \text{ B1 [2]}$ $\textbf{(iii)}  67.2  \text{ft}  B1 \text{ ft the difference between their answers in (ii)}$							
If B0, M1 for using their linear regression equation with $x = 50$ [7]  12 (a)  0.8333  B3 [3] SC2 for $\frac{5}{6}$ , 0.83, 0.833, 0.8333 isw if angle given  If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe (can be implicit)  (b) (i) Two accurate points marked $C_1$ and $C_2$ (ii) 56.4, 123.6  B1 B1 [2]  (iii) 67.2 ft  B1 ft [1] ft the difference between their answers in (ii)			(ii)	30 or 31 cao	B2	[2]	
12 (a) 0.8333 B3 [3] SC2 for $\frac{5}{6}$ , 0.83, 0.833, 0.8333 isw if angle given  If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe (can be implicit)  (b) (i) Two accurate points marked $C_1$ and $C_2$ B1 B1 [2] 2 mm accuracy  (ii) 56.4, 123.6 B1 ft [1] ft the difference between their answers in (ii)			()			L-J	If B0, M1 for using their linear regression
12 (a) 0.8333 B3 [3] SC2 for $\frac{5}{6}$ , 0.83, 0.833, 0.8333 isw if angle given  If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe (can be implicit)  (b) (i) Two accurate points marked $C_1$ and $C_2$ B1 B1 [2] 2 mm accuracy  (ii) 56.4, 123.6 B1 B1 [2] B1 ft [1] ft the difference between their answers in (ii)							•
angle given  If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe (can be implicit)  (b) (i) Two accurate points marked $C_1$ and $C_2$ (ii) 56.4, 123.6  (iii) 67.2 ft  B1 B1 [2]  B1 ft [1] ft the difference between their answers in (ii)							_
(b) (i) Two accurate points marked $C_1$ and $C_2$ (ii) 56.4, 123.6 (iii) 67.2 ft If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe (can be implicit) 2 mm accuracy B1 B1 [2] B1 ft [1] ft the difference between their answers in (ii)	12	(a)		0.8333	В3	[3]	SC2 for $\frac{5}{6}$ , 0.83, 0.833, 0.8333 isw if
(b) (i) Two accurate points marked $C_1$ and $C_2$ B1 B1 [2] 2 mm accuracy (ii) 56.4, 123.6 (iii) 67.2 ft B1 ft [1] ft the difference between their answers in (ii)							
(b) (i) Two accurate points marked $C_1$ and $C_2$ B1 B1 [2] 2 mm accuracy (ii) 56.4, 123.6 (iii) 67.2 ft B1 ft [1] ft the difference between their answers in (ii)							If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe
(ii) 56.4, 123.6 (iii) 67.2 ft  B1 B1 [2] B1 ft the difference between their answers in (ii)							
(iii) 67.2 ft B1ft [1] ft the difference between their answers in (ii)		<b>(b)</b>	(i)	Two accurate points marked $C_1$ and $C_2$	B1 B1	[2]	2 mm accuracy
			(ii)	56.4, 123.6	B1 B1	[2]	
			(iii)	67.2 ft	B1 <b>ft</b>	[1]	ft the difference between their answers in (ii) [8]

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13 (a)		982 (981.7 – 981.9)	B2	[2]	If B0, M1 for $0.5 \times \pi \times 25^2$
(b)		295 000 (294 500 – 294 600) ft	B2 ft	[2]	ft their (a) × 300 If B0, M1 for their (a) × 300
(c)	(i)	106.3 (106.2 – 106.3)	В3	[3]	Allow 106
					If B0, M1 for $\cos = \frac{15}{25}$ oe
					then M1 dep for × 2
	(ii)	299.9 to 300.4 ft	B2 ft	[2]	ft their (i) If B0, M1 for $0.5 \times 25^2 \times \sin(\text{their}(i))$ or for $0.5 \times 2 \times 20 \times 15$ oe
	(iii)	577.8 to 580 ft	B2 ft	[2]	ft their (i) If B0, M1 for their (i) $\div$ 360 $\times$ $\pi$ $\times$ 25 <sup>2</sup>
	(iv)	277 – 280.1 ft	B1 <b>ft</b>	[1]	ft their (iii) – their (ii)
	<b>(v)</b>	83.1 to 84.03 ft	B2 ft	[2]	ft their (ii) $\times$ 0.3 oe If B0, M1 for their (ii) $\times$ 0.3 oe
					[14]
14 (a)		One curve reasonable shape, roughly approaching $y = 1$ both ends One max in negative $x$ region One minimum just to right of $y$ -axis or on it	B1 B1 B1	[3]	
(b)		(-5.19, 1.24) (-5.193 to -5.192, 1.238 to 1.239)	B2	[2]	Allow –5.2 and 1.2
(c)		0.161 to 1.24 (0.1614 to 0.1615 and 1.238 to 1.239)	В3	[3]	Allow 0.16 and 1.24 If B0, B1 for top value their y-coord of <b>(b)</b> and M1 (indep) for evidence of finding minimum point
(d)		y = 1	B1	[1]	
(e)		-1.62(4)	B2	[2]	If B0, M1 for line with $c = 1$ and positive gradient added to sketch (may be freehand)  [11]