

<b>Notes</b>	<b>Mark Scheme</b>	<b>Syllabus</b>
	<b>IGCSE EXAMINATIONS – JUNE 2003</b>	<b>0580/0</b>

### TYPES OF MARK

Most of the marks (those without prefixes, and 'B' marks) are given for accurate results, drawings or statements.

- **M** marks are given for a correct method.
- **B** marks are given for a correct statement or step.
- **A** marks are given for an accurate answer following a correct method.

### ABBREVIATIONS

a.r.t.	Anything rounding to
b.o.d.	Benefit of the doubt has been given to the candidate
c.a.o.	Correct answer <b>only</b> (i.e. no 'follow through')
e.e.o.	Each error or omission
o.e.	Or equivalent
SC	Special case
s.o.i.	Seen or implied
ww	Without working
www	Without wrong working
√	Work followed through after an error: no further error made
⊕	Work followed through and another error found



**June 2003**

INTERNATIONAL GCSE

**MARK SCHEME**

**MAXIMUM MARK: 56**

**SYLLABUS/COMPONENT: 0580/01, 0581/01**

**MATHEMATICS**

**Paper 1 (Core)**

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\* indicates that it is necessary to look in the working following a wrong answer.

1	(a) 19.55249(345) (b) 19.55	1 1 ✓	
2	(a) 3.3 to 3.7 (b) - 0.9	1 1 ✓	Allow negative values 2.6 -  (a)
3	(a) $\frac{33}{50}$ 67% 0.68 (b) $\frac{17}{25}$	1 1	Allow 0.66, 0.67, 0.68 o.e.
4	42	2*	<b>M1</b> 72 ÷ 12
5	781000	2*	<b>M1</b> for 550 000 x 1.42
6	366	2*	<b>M1</b> for "97.60" x 3.75
7	$\frac{4}{9}$	2*	<b>M1</b> for $\frac{9}{4}$ or 0.44....., $2\frac{1}{4}$ , $\frac{2}{3}$ , $\frac{2}{3}^2$
8	(a) - 30 c.a.o. (b) $v(4u - 3)$	1 1	c.a.o.
9	$\frac{1}{2}$	3*	<b>M1</b> 6 – 3x <b>M1</b> x + 3x = 6 – 4
10	(a) 0.004 (b) $4 \times 10^{-3}$	2* 1 ✓	<b>M1</b> figs 2 : 500000 or figs 4 in answer
11	a = 3, b = -1	3*	<b>M1</b> adding <b>or</b> x 2 <sup>nd</sup> equation by 3 and subtracting <b>A1 A1</b> o.e. (Rearrange <b>and</b> substitute scores M1) Working essential if only one answer is correct
12	(a) 88 c.a.o. (b) 85.5, 86.5	1 1, 1	Not 88.0 <b>B1</b> both correct and reversed
13	(a) 20 05  (b) (i) 0.4 (ii) 24	1  2* 1 ✓	Allow 20:05, 8.05 <b>pm</b> . Not 20.5 or 20h5m <b>M1</b> 30 ÷ 75 (i) × 60

14	(a) $\frac{3+4}{6} = \frac{7}{6}$	2*	M1 for first term o.e.
	(b) $\frac{6}{5} \times \frac{7}{4} = \frac{21}{10}$	2*	M1 for improper fractions
15	(a) (i) 28	2*	M1 for $\frac{1}{2} \times 8 \times 7$
	(ii) 176	2√	M1 for $4 \times (i) + 8^2$ A1√
	(b) pyramid	1	
16	(a) 90	1	
	(b) 7.71	2*	M1 $\sin 40 = PB/12$ or $\frac{12}{\sin(a)} = \frac{PB}{\sin 40}$
	(c) 113	2*	M1 $\pi \times 6^2$
17	(a) 9.59	2*	M1 $8.3^2 + 4.8^2$
	(b) 210	3*	M1 $\tan x = \frac{4.8}{8.3}$ M1 $180 + x$ at P If sin or cos used then allow √ from (a). NO marks for scale drawing
18	(a) (i) 35	1	
	(ii) 25	1√	60 – (i)
	(b) similar	1	
	(c) 11(.0)	2*	M1 $\frac{16.6}{8.3} = \frac{CX}{5.5}$ o.e. Not 11.1 or M1 for $\frac{16.6}{\sin 120} = \frac{CX}{\sin 35}$
<b>TOTAL</b>		<b>56</b>	



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**MARK SCHEME**

**MAXIMUM MARK: 70**

**SYLLABUS/COMPONENT: 0580/02, 0581/02**

**MATHEMATICS**

**Paper 2 (Extended)**

Question Number	Mark Scheme	Part Marks	Notes	Question Total
1	$0.049 < 5\% < 5/98$ o.e.	2	M1 for <i>figs</i> 51... seen after 0, SC1 for 2 correct entries	2
2 (a)	7.85 to 8(.00...)	1		2
(b)	56.25 to 57.5(0)	1		
3	194(.4)	2	M1 for $54 \times 3600/1000$ or SC1 for <i>figs</i> 194....seen	2
4	$\begin{pmatrix} -4 \\ -7 \end{pmatrix}$ c.a.o.	1 1		2
5	38	2	M1 for $665/(17 + 18)$ s.o.i. by equivalent complete method	2
6	201.25	2	allow 201 or 201.3 in ans. space if 201.25 seen M1 for $17.5 \times 11.5$ s.o.i.	2
7	$4 < x < 6$	2	SC1 for either one after 0, M1 for $8 < 2x < 12$ s.o.i.	2
8	$\begin{matrix} \pm 11 & - & \pm 1331 \\ 14 & 196 & - \\ -7 & 49 & - \end{matrix}$	3	2 for 4 or 5 correct 1 for 2 or 3 correct	3
				<b>17</b>
9 (a)	$\frac{1}{6}$ or 0.16(.....) or 0.17	1		3
(b)	art 9.5(°)	2	M1 for correct use of tan o.e.	
10	$\frac{x+11}{(x-3)(x+4)}$ o.e.	3	M1 for denom. $(x-3)(x+4)$ o.e. M1 for $2(x+4) - (x-3)$ o.e.	3
11	integer $\sqrt{(112/7)}$ rational nos. 2.6 4/17 irrational no. $\sqrt{12}$	1 1 1 1	accept $\sqrt{16}$ or 4 accept 0.235 accept 3.46	4
12 (a)	18	2	M1 for $2p + 3p + 90 = 180$ o.e. or SC1 for 36 or 54 seen www.	4
(b)	30	2	M1 for $q + 5q = 180$ o.e. or SC1 for 150 seen	
				<b>14</b>

<b>13 (a)</b>	100	1		
<b>(b)</b>	$1200 \sqrt{\quad}$	1	$\sqrt{\quad}$ for $(12 \times \text{their } a)$	
<b>(c)</b>	$10 < x < 30$ ht 30 mm $60 < x < 100$ ht 22 mm	1 1		4
<b>14 (a)</b>	$\begin{matrix} 10 & 17 & 4 \\ -6 & -9 & 0 \end{matrix}$	2	SC1 if 4 or 5 correct	
<b>(b)</b>	$\frac{1}{2} \begin{pmatrix} -2 & -4 \\ 3 & 5 \end{pmatrix} \text{oe}$	2	1 for $\frac{1}{2}$ s.o.i., 1 for $k \begin{pmatrix} -2 & -4 \\ 3 & 5 \end{pmatrix}$ s.o.i.	4
<b>15 (a)</b>	50.3	2	M1 for $\frac{(7087000 - 4714900)}{4714900}$ o.e. must be recognisable complete correct method	
<b>(b) (i)</b>	4710000 or $4.71 \times 10^6$	1		
<b>(ii)</b>	$7.087 \times 10^6$	1	accept $7.09 \times 10^6$ , ignore superfluous zeros	4
<b>16 (a)</b>	24.7	2	M1 for $80 \times \sin 18^\circ$ seen	
<b>(b)</b>	46.2	2	M1 for $3(4 + 11.4)$ o.e. (no MRs) $3 \times 3.8$ does not imply 11.4	4
				<b>16</b>
<b>17 (a)</b>	Correct shear $\pm 1\text{mm}$	2	M1 for shear with either axis invariant	
<b>(b) (i)</b>	Correct stretch $\pm 1\text{mm}$	2	M1 for stretch with either axis invariant	
<b>(ii)</b>	$\begin{pmatrix} 1 & 0 \\ 0 & 3 \end{pmatrix} \text{cao}$	1		5
<b>18 (a)</b>	1:1000	1		
<b>(b) (i)</b>	accurate perp bisector of AD, with two pairs of arcs	2	SC1 if accurate but no arcs SC1 if accurate arcs but no line	
<b>(ii)</b>	accurate bisector of $\angle BCD$ , with two pairs of arcs T marked in correct position	2 1	SC1 if accurate but no arcs SC1 if accurate arcs but no line Indep.	6
				<b>11</b>

<b>19 (a)</b>	correct demonstration	2	M1 for $20x + 80y$ seen	
<b>(b)</b>	$x + 2y = 120$ o.e. fully simplified	2	M1 for $25x + 50y = 3000$ seen condone inequality signs for method mark. Ignore \$	
<b>(c)</b>	straight line thr. (120,0) and (0,60) 60 cars, 30 trucks	1√ 1	√ from <i>their b</i> . Line must be complete, and be on given grid also allow 80,20; 100,10; 120,0 or points on the correct section of the line ( $60 \leq x \leq 120$ )	6
				<b>6</b>
<b>20 (a)</b>	art 0.1, 0.3, 0.6, 1, 1.7 and 3	3	SC2 for 4 or 5 correct SC1 for 2 or 3 correct	
<b>(b)</b>	correct curve drawn	2	P1 for correct or √ 6 or 7 points correctly plotted $\pm 1\text{mm}$	
<b>(c)</b>	$1.6 \leq x < 1.65$	1		6
				<b>6</b>

**TOTAL MARKS 70**

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**MARK SCHEME**

**MAXIMUM MARK: 104**

**SYLLABUS/COMPONENT: 0580/03, 0581/03**

**MATHEMATICS**

**Paper 3 (Core)**

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1	(a)	7	1	
	(b)	42	1	
	(c) (i)	9	1	
	(ii)	8	2	M1 for evidence of idea of mid-value
	(iii)	8.3	3	M1 for $4 \times 5 + 7 \times 6 + \dots + 3 \times 12$ or 415 M1 (dep) for $\div 50$
	(d)	5cm	2	M1 for 1cm to 2 students o.e.
	(e)	$36^\circ$	2	M1 for $\frac{5}{50} \times 360$
	(f)	\$7.5(0)	2	M1 $\div 3$
	(g)	22	2	M1 for $\frac{11}{50} (x 100)$ SC1 for $\frac{19}{50} (x 100) = 38\%$
	(h) (i)	$\frac{6}{50}$	1	} Accept equivalent fractions, decimals or percentages
	(ii)	$\frac{14}{50}$	1	
	(iii)	1	1	
				<b>19</b>
2	(a)	120, .....24, 20	1, 1, 1	
	(b)	7 correctly plotted points f.t. correct curve	P3 C1	Deduct 1 for each error ( $\pm 1\text{mm}$ ) Must be a reasonable hyperbola
	(c)	1.6 to 1.8	1	Accept f.t.
	(d)	120, .....0	2	
	(e)	Straight line through 4 points	L2	L1 if short or not ruled SC1 for $\surd$ if all straight lines
	(f)	(1.2 – 1.4, 92 – 96) (4.6 – 4.8, 24 – 26)	1 1	} Accept f.t.
	(g)	-20	2	SC1 for 20 <u>or</u> M1 for rise/run seen (numerical attempt)
				<b>16</b>

3	(a) (i)	175 cents	1		
	(ii)	25 <i>b</i> cents	1		
	(iii)	\$1.75	1 or $\sqrt{\phantom{x}}$		
	(iv)	$\$ \frac{b}{4}$ (allow $\frac{25b}{100}$ ) (0.25 <i>b</i> )	1 or $\sqrt{\phantom{x}}$	If involves <i>b</i>	
	(b) (i)	$\frac{T}{n}$	1		
	(ii)	The cost of one bar	1		
	(c) (i)	4.5(0)	1		
	(ii)	4.2(0)	2	M1 for (36 – 6.60)/7	
	(iii)	$\frac{y}{x}$	1		
	(iv)	$\frac{y-7}{x-1}$	2	B1 for <i>y</i> – 7 or <i>x</i> – 1 seen	
				<b>12</b>	
4	(a) (i)	<i>P</i> with vertices (4, 11), (2, 11), (2, 12)	2	SC1 if translated by $\begin{pmatrix} 3 \\ 4 \end{pmatrix}$ , $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$ etc.	
	(ii)	<i>Q</i> with vertices (9, 7), (11, 7), (11, 8)	2	SC1 if reflected in <i>y</i> = 8 or $\sqrt{\phantom{x}}$ from <i>P</i>	
	(iii)	<i>R</i> with vertices (7, 7), (7, 5), (6, 5)	2	SC1 if 90° clockwise from <i>A</i> or $\sqrt{\phantom{x}}$ from <i>Q</i>	
	(iv)	<i>S</i> with vertices (7, 7), (3, 7), (3, 9)	2	SC1 if different scale factor about <i>A</i> or enlargement of triangle <i>T</i> s.f. 2 about <i>B</i> or <i>C</i>	
	(b) (i)	Translation $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$	1  1		
	(ii)	Enlargement Scale factor 1/2 centre <i>A</i>	1 1 1		
	(c) (i)	90° (anti-clockwise)	1	Accept 270° clockwise	
	(ii)	(3, 3)	2	B1 for 1 correct	
					<b>16</b>

5	(a) (i)	Accurate and with arcs	2	B1 without arcs or inaccurate
	(ii)	Accurate quarter-circle $r = 5$	2	SC1 for $r > 4.8$ or $< 5.2$ with compass or correct $r$ but freehand
	(b)	Correct region shaded	1 or $\sqrt{\quad}$	If convinced
	(c) (i)	45° correct	1	$\pm 2^\circ$
		12cm correct	1	$\pm 1\text{mm}$
	(ii)	Reasonable tangent	1	Must be ruled $\pm 5^\circ$
(iii)	6.8 to 7.2	1	Accept f.t. $\pm 0.1$	
				<b>9</b>
6	(a)	$3 \times 1 \times 1.5 + 9 \times 1$ o.e.	2	M1 for appropriate strategy M1 (dep.) for correct numbers used
	(b)	3780	3	M1 for volume is area $\times$ length, $13.5 \times 2.8$ or $37.8$ B1 for 280 seen
	(c) (i)	1.92	2	M1 for $2 \times 1.2 \times 0.8$
		1 920 000 f.t.	2	M1 for (their) (i) $\times 10^6$ or $200 \times 120 \times 80$
	(iii)	507 f.t.	2	M1 for (c) (ii) $\div$ (b) or $507 \cdot \dots$ or 508
	(d)	One vertical line drawn	1	Within $\pm 0.2\text{cm}$ of the centre
	(e)	(order) 1 or no symmetry	1	
7	(a) (i)	$84^\circ$	1	
	(ii)	$22^\circ$	1	
	(b)	11	1	Accept $10.8 \rightarrow 11$ , $10\text{min } 48\text{sec} \rightarrow 11\text{min}$
	(c)	$16^\circ$	1	
	(d) (i)	32, (16), 8, 4	3	B1 for each
		Halving o.e.	1	
	(e)	$20^\circ$	1	Allow answer $>20$ and $<22$

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8	(a)	3 new lines from the vertex to the base	2	
	(b)	$6, 7, n + 2$	3	B1 for each
	(c)	15, 21, 55	3	B1 for each
	(d)	12	2	SC1 for 10 or 11
				10

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**MARK SCHEME**

**MAXIMUM MARK: 130**

**SYLLABUS/COMPONENT: 0580/04, 0581/04**

**MATHEMATICS**

**Paper 4 (Extended)**

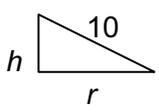
Marks in brackets are totals for questions or part questions.

1	(a)	<b>(\$) 3490</b>		B1 (1)	
	(b)	$16n + 1570 = 4018$ <b><math>n = 153</math></b>	o.e. c.a.o.	M1 A1 (2)	ww2
	(c)	$x + y = 319$ $10x + 16y = 3784$ Correct method  <b><math>x = 220</math></b> <b><math>y = 99</math></b>	o.e. o.e. s.o.i.	B1 B1 M1  A1 A1 (5)	e.g. $1^{\text{st}} \times 10$ <b>and</b> subtraction. Condone <b>arith.</b> error (available on wrong eqtns provided coefficients not equal.) or 220 \$10 tickets or 99 \$16 tickets (ww Correct answer $\Rightarrow$ M1)
	(d)	$0.85 \times \$16$ <b>(\$13.6(0))</b>	o.e. c.a.o.	M1 A1 (2)	[\$16 – 0,15 $\times$ \$16] ww2
	(e)	$\frac{100}{125} \times \$10$ <b>(\$8)</b>	o.e.	M1 A1 (2)	ww2
		<b>TOTAL</b>		<b>12</b>	
2	(a)	$120^2 = 77^2 + 55^2 - 2.55.77 \cos x$ $\cos x = \frac{77^2 + 55^2 - 120^2}{2.55.77}$  or $-\frac{5446}{8470} = \cos x = -0.64(29752)$ s.o.i. (-0.643)  <b><math>x = 130(.0)</math></b>		M1 M1  A1 A1 (4)	Implied by next line  Implied by correct answer which rounds to $130^\circ$ Scale drawing $\Rightarrow$ M0. ww $\Rightarrow$ <b>SC2</b>
	(b)	$\sin y = \frac{55 \sin 45^\circ}{60}$  $\sin y = 0.648 (1812)$ s.o.i.  <b><math>y = 40.4</math></b>		M2  A1 A1 (4)	If not scored, allow M1 for correct <b>implicit</b> eqtn  Implied by answer $40^\circ$ after some working Accept <b>more</b> accuracy but not less. www4 ( $40.39^\circ - 40.41^\circ$ ; $40^\circ$ ww $\Rightarrow$ <b>SC2</b> )
	(c)	(i) <b><math>225^\circ</math></b>  (ii)* <b><math>275^\circ</math></b>		B2  B2 $\checkmark$ (4)	Correct method seen <b>OR</b> answer $222-224^\circ$ , allow Sc1 $\checkmark 405^\circ$ – their x (provided $< 360^\circ$ ). Answer $291-293^\circ$ , allow <b>SC1</b>
		<b>TOTAL</b>		<b>12</b>	

3	(a)		B1 B1 B1 (3)	Accept percentages or fractions but not ratios
	(b)	<p>(i) <math>0.4 \times 0.65</math> <u>ONLY</u> <b>0.26</b> c.a.o.</p> <p>(ii)* <u>Either</u> <math>0.4 \times 0.35\sqrt{\phantom{x}}</math> <u>or</u> <math>0.6\sqrt{\phantom{x}} \times 0.45</math></p> <p><math>0.4 \times 0.35\sqrt{\phantom{x}} + 0.6\sqrt{\phantom{x}} \times 0.45</math> <u>ONLY</u> <b>0.41</b> c.a.o.</p> <p>(iii)* <u>Either</u> <math>1 - (.6\sqrt{\phantom{x}} \times .55\sqrt{\phantom{x}})</math> <u>or</u> <math>.26 + .14\sqrt{\phantom{x}} + .27\sqrt{\phantom{x}}</math> <b>0.67</b> c.a.o.</p>	M1 A1 M1 M1 A1 M1 A1 (7)	www2 Accepting their $\sqrt{\phantom{x}}$ values for M marks www3 www2
	(c)	<p>(i) <b>18</b> c.a.o.</p> <p>(ii) <math>12 \div (\text{his } 18 + 6)</math> o.e. <b>30</b> c.a.o.</p>	B1 M1 A1 (3)	<b>SC1</b> for 34.3 after 18 in (c) (i)
	(d)	<p>(i) <b>22.5</b></p> <p>(ii)* Realises probability "STOP. STOP"</p> <p><b>0.33</b></p>	B1 M1 dep. A1 $\sqrt{\phantom{x}}$ (3)	Accept 22min 30sec Implied by correct answer after correct work. Dep. On 18 and 22.5 (approx.) $\sqrt{1 - \text{their (b) (iii)}}$ or $(\text{their } 0.6) \times (\text{their } 0.55)$
		<b>TOTAL</b>	<b>16</b>	
4	(a)	<p>Scales correct 9 points correctly plotted (1mm)</p> <p>Reasonable curve through 9 points</p>	S1 P3 C1 $\sqrt{\phantom{x}}$ (5)	$-4 \leq x \leq 4$ and $-8 \leq y \leq 8$ Allow P2 for 7 or 8 correct, P1 for 5 or 6 correct $\sqrt{\phantom{x}}$ provided shape maintained, curvature OK and <u>not</u> ruled
	(b)	$-3.6 \leq x \leq -3.3, x = 0, 3.3 \leq x \leq 3.6$	B2 (2)	Allow B1 for 1 correct non-zero solution; condone $(-3.5, 0)$ (answers must be in range <u>and</u> correct for their graph)
	(c)	Line from $(-4, -3)$ to $(4, 5)$ , and ruled	B2 (2)	If B0, allow B1 for gradient 1 <u>or</u> intercept 1 on single line
	(d)	<p><math>g(1) = 2</math> <math>fg(1) = -8</math> <math>g^{-1}(4) = 3</math> <math>3.75 \leq x \leq 3.9</math></p>	B1 B1 B1 B1 (4)	Not $(1, 2)$ Lost if y-coordinate given. Answer must be OK for their graph

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	(e)	Tangent drawn at $x = 3$ on curve Vert./Horiz. using scale  Answer in range 5-10 and OK for theirs	B1 M1  A1 (3)	Not chord or daylight Dep. on reasonable approx to tangent used at $x = 3$ (N.B. Gradient = 4.5 + y-value of tangent at $x = 4$ )
		<b>TOTAL</b>	<b>16</b>	
5	(a)	$\frac{1}{2} 10 \cdot 10 \cdot \sin 60^\circ$ o.e.  <b>43.3 cm<sup>2</sup> or 25 <math>\sqrt{3}</math></b>	M1  A1 (2)	Any <b>complete</b> method including $\sqrt{15.5.5.5}$  ww2
	(b)	$2\pi r = 10$ s.o.i. <b><math>r = 1.59</math> (15494cm)</b>	M1 A1 (2)	Accept $\pi D = 10$ ww2
	(c)	(i) <b>Tetrahedron or Triangular Pyramid</b> 4 (his (a))  * <b>173(.2cm<sup>2</sup>) or 100 <math>\sqrt{3}</math></b>  (ii) <b>Cylinder</b> Uses $\pi$ (any $r$ ) <sup>2</sup> × 10 <u>ONLY</u>  Uses $\pi$ (his (b)) <sup>2</sup> × 10  <b>Correct or <math>\sqrt{}</math> in range 79.35- 79.65cm<sup>3</sup></b>  (iii) <b>Cone</b>   Appreciates hypotenuse = 10  $h = \sqrt{10^2 - (\text{his}(b))^2}$  <b>9.87(25362cm)</b>	B1  M1  $\sqrt{}$ A1 (3) B1 M1  M1 dep. A1 (4)  B1  M1  A1 (4)	If not his (a) then correct $\Delta$ area method needed $\sqrt{4}$ (a) to 3s.f.  Accept circular (based) prism <u>Not</u> $2\pi r^2 10$ or any other modifications Implies M2  Accept circular/round (based) pyramid  e.g. right-angled $\Delta$ drawn or cos $x = \frac{\dots}{10}$
		<b>TOTAL</b>	<b>15</b>	
6	(a)	<b><math>2x(x + 4)(x + 1)</math> (cm<sup>3</sup>) <math>2x^3 + 10x^2 + 8x</math> (cm<sup>3</sup>)</b>	B1 B1 (2)	Must see this. Ignore further <u>correct</u> work.

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	(b)	$2x - 2, x + 2, x$ Internal volume = $2x^3 + 2x^2 - 4x$ Wood = his (a) – his(Int. Vol.) <b>Correctly</b> simplifies to $8x^2 + 12x$	B3 B1 M1 A1 (6)	B1 each correct answer, any order <u>but in this form</u> (Both could be wrong) <b>No errors</b>
	(c)	(i) $8x^2 + 12x = 1980$ $2x^2 + 3x - 495 = 0$ } $\frac{p \pm \sqrt{q}}{r}$ form $\Rightarrow p = -3$ and $r = 4$ or $2 \times 2$ $\Downarrow$ $\Rightarrow q = 3^2 - 4 \cdot 2 - 495$ $\Rightarrow x = 15$ www $\Rightarrow x = -16.5$ or $-\frac{33}{2}$ www	B1 (1) B1 B1 B1 (4)	No error seen. Needs = 0 Alt. method B2 $(x - 15)(2x + 33)$ or <b>SC1</b> for sign error(s) in brackets Or $q = 3969$ or $\sqrt{q} = 63$ . Allow for $p \mp \frac{\sqrt{q}}{r}$ If factorising method used, answers only score if correct <u>and</u> from correct bracket
		(ii) Uses +ve answer * <b>30 by 19 by 16</b>	B1 $\sqrt{B1}$ (2)	Rejects –ve solution explicitly or implicitly $\sqrt{2}(\text{his}), (\text{his}) + 4, (\text{his}) + 1$
		<b>TOTAL</b>	<b>15</b>	
7	(a)	(i) $\overrightarrow{OS} = 3\mathbf{a}$ www (ii) $\overrightarrow{AB} = \mathbf{b} - \mathbf{a}$ www (iii) $\overrightarrow{CD} = \mathbf{a}$ www (iv) $\overrightarrow{OR} = 2\mathbf{a} + 2\mathbf{b}$ www (v) $\overrightarrow{CF} = 2\mathbf{a} - 2\mathbf{b}$ www	B1 B1 B1 B2 B2 (7)	If B0, allow <b>SC1</b> for correct but unsimplified seen If B0, allow <b>SC1</b> for correct but unsimplified seen
	(b)	(i) $ \mathbf{b}  = 5$ (ii) $ \mathbf{a} - \mathbf{b}  = 5$ www	B1 B1 (2)	

	(c)	(i) <b>Enlargement</b> , S.F. 3, Centre 0	B2	Allow <b>SC1</b> for Enlargement or (S.F. 3 <u>and</u> Centre 0)
		(ii) <b>Reflection</b> In line <b>CF</b> o.e.	M1 A1 (4)	} <b>SC1</b> for 'Mirrored in CF' o.e.
	(d)	(i) <b>6</b> c.a.o.	B1	
		(ii) <b>60°</b>	B1 (2)	
		<b>TOTAL</b>	<b>15</b>	
<b>8</b>	(a)	(i) <b>\$60-80</b> (ii) Midpoints <b>10, 30, 50, 70, 90</b> <b>+ 120</b> $\Sigma fx$ attempted (12880) $\Sigma fx \div 200$ Final answer <b>\$64.40</b> c.a.o.	B1 M1 M1* M1 A1 (5)	Needs at least 4 correct s.o.i. Dep. on previous M1 or their midpoints $\pm 0.5$ Dep. on M1* Needs 2 d.p., www4 (64.4 $\Rightarrow$ M3 AO)
	(b)	(i) ( $\leq$ )20, ( $\leq$ )40, ( $\leq$ )60, ( $\leq$ )80, ( $\leq$ )100, ( $\leq$ )140 10, 42, 90, 144, 180, 200 (ii) Scales correct and labelled or used to 140 and 200 6 plots correct (20, 10) $\rightarrow$ (140, 200) Graph from (0, 0), line or curve	B1 B1 S1 P2 C1 (6)	<u>Not</u> for $\frac{20-40}{42}$ type Vert. 20cm $\equiv$ 200 and Horiz. $\equiv$ 14cm 140. Reversed axes SO P1 for 4 or 5 correct. 1mm accuracy Through all 6 points. Dep. on P1
	(c)	(i) Median <b>(\$63-64</b> (ii) U.Q. <b>(\$82-84</b> (iii) IQR <b>(\$38-41</b> (iv) Using \$75 reading on Cum. Freq. Graph – 67 or 68 or 69 or 70 or 71 or 72	B1 B1 B1 M1 A1 (5)	<u>All</u> answers in (c) must <u>also</u> be correct for their graph (1mm) e.g. answer 130 implies this Must be integer answer and OK for their graph
		<b>TOTAL</b>	<b>16</b>	
<b>9</b>	(a)	Diagram 1 $\Rightarrow$ <b>25%</b> c.a.o. Diagram 2 $\Rightarrow$ <b>12½%</b> o.e. Diagram 3 $\Rightarrow$ <b>37½%</b> o.e. Diagram 4 $\Rightarrow$ <b>60%</b> o.e.	B1 B2 B2 B2 (7)	<u>For whole section reversed (a)</u> or (b), treat as MR-1 per section For Diagrams 2-4 <b>accept</b> non% equivalents Also in each case if 2 not scored, allow <b>SC1</b> if correct idea seen (e.g. $\frac{1}{2}h \div 4h$ for Diagram 2)

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(b)	Diagram 5 $\Rightarrow$ <b>1/9</b> o.e. <b>fraction</b> Diagram 6 $\Rightarrow$ <b>1/25</b> o.e.  Diagram 7 $\Rightarrow$ <b>5/9</b> o.e.	B1 B2  B3 (6)	In Diagrams 6 and 7, accept non-fraction equivalents. If B0, allow <b>SC1</b> for $(\pi)5^2$ seen If B0, allow <b>SC1</b> for $(k\pi)2^2$ and <b>SC1</b> for $(k\pi)3^2$ seen ( $k=1$ or $x/360$ ) N.B. $4\pi$ <u>must</u> be from $\pi^2$ and not $2\pi^2$
	<b>TOTAL</b>	<b>13</b>	
	<b>FINAL TOTAL</b>	<b>130</b>	

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