

5540H/3H - MARK SCHEME
PRE-STANDARDISATION VERSION

2008 May 3H

5540H/3H					
Question		Working	Answer	Mark	Notes
1	(a)	$\frac{24}{8} \times 300$	900	2	M1 for $\frac{24}{8}$ oe or $\frac{300}{8}$ oe or $300 + 300 + 300$ A1 for 900
	(b)	$\frac{12}{8} \times 120$	180	2	M1 for use of $\frac{12}{8}$ or 1.5 or $120 + 60$ or " $120 \div 8$ " $\times 12$ A1 for 180

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2	$\begin{array}{r} 540 \\ \underline{24} \\ 2160 \\ \underline{10800} \\ \underline{12960} \end{array}$ <table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">5</td> <td style="text-align: center;">4</td> <td style="text-align: center;">0</td> <td></td> </tr> <tr> <td style="text-align: right;">1</td> <td style="border: 1px solid black; padding: 5px;">1 0</td> <td style="border: 1px solid black; padding: 5px;">8</td> <td style="border: 1px solid black; padding: 5px;">0</td> <td style="text-align: left;">2</td> </tr> <tr> <td style="text-align: right;">2</td> <td style="border: 1px solid black; padding: 5px;">2 0</td> <td style="border: 1px solid black; padding: 5px;">1 6</td> <td style="border: 1px solid black; padding: 5px;">0</td> <td style="text-align: left;">4</td> </tr> <tr> <td></td> <td style="text-align: center;">9</td> <td style="text-align: center;">6</td> <td style="text-align: center;">0</td> <td></td> </tr> </table> <table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">500</td> <td style="text-align: center;">40</td> <td style="text-align: center;">0</td> <td></td> </tr> <tr> <td style="text-align: right;">20</td> <td style="border: 1px solid black; padding: 5px;">10000</td> <td style="border: 1px solid black; padding: 5px;">800</td> <td style="border: 1px solid black; padding: 5px;">0</td> <td></td> </tr> <tr> <td style="text-align: right;">4</td> <td style="border: 1px solid black; padding: 5px;">2000</td> <td style="border: 1px solid black; padding: 5px;">160</td> <td style="border: 1px solid black; padding: 5px;">0</td> <td></td> </tr> </table> <p>10000 + 2000 + 800 160 = 12960</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">3</td> <td style="text-align: center;">0.1</td> <td style="text-align: center;">0.05</td> <td></td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">60</td> <td style="border: 1px solid black; padding: 5px;">2</td> <td style="border: 1px solid black; padding: 5px;">1</td> <td style="text-align: left;">20</td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">12</td> <td style="border: 1px solid black; padding: 5px;">0.4</td> <td style="border: 1px solid black; padding: 5px;">0.2</td> <td style="text-align: left;">4</td> </tr> </table> <p>100 + 20 + 8 + 1.6 = 129.6</p>		5	4	0		1	1 0	8	0	2	2	2 0	1 6	0	4		9	6	0			500	40	0		20	10000	800	0		4	2000	160	0			3	0.1	0.05			60	2	1	20		12	0.4	0.2	4	129.6(0)	3	<p>M1 for a complete method with relative place value correct. Condone 1 multiplication error, addition not necessary.</p> <p>OR</p> <p>M1 for a complete grid. Condone 1 multiplication error, addition not necessary.</p> <p>OR</p> <p>M1 for sight of a complete partitioning method, condone 1 multiplication error. Final addition not necessary.</p> <p>A1 for 129.6(0) cao A1 (dep on M1, but not previous A1) for correct placement of decimal point.</p>
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1	1 0	8	0	2																																																		
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3		$\begin{array}{r l} 2 & 378 \\ 3 & 1456 \\ 4 & 12455 \\ 5 & 023 \end{array}$ $2 3 = 23$	3	M1 for using 2, 3, 4 and 5 as stem A1 for ordered stem and leaf diagram B1 for key, e.g. 2 3 represents/means/= 23 (years)
4	(a) (b) (c)	1632 16.32 3.4	1 1 1	B1 for 1632 or 1632.0 B1 for 16.32 cao B1 for 3.4 cao
5	(a) (b)	S (2, 1, 3)	1 1	B1 for S cao B1 for (2, 1, 3) cao
6	(a) (b)	$(18 - 6) \div 4$ $4n + 6$	2 2	M1 for $18 - 6$ or 12 or $3 \times 4 + 6$ A1 for 3 cao B2 for $4n + 6$ (B1 for $4n + a$ or $bn + \#6$)
7		$\frac{1}{2}(3 \times 4) \times 2$ $+ (3 \times 7) + (4 \times 7) + (5 \times 7) =$ $12 + 21 + 28 + 35$	4	M1 for $\frac{1}{2}(3 \times 4)$ or 3×7 or 5×7 or 4×7 M1 for attempt to add 5 faces A1 for 96 B1 (indep) for cm^2

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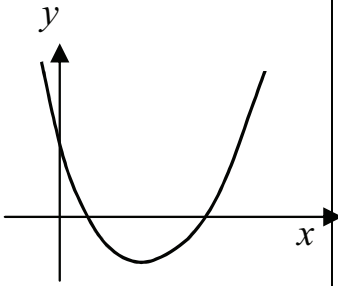
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8	$\frac{300 \times 10}{0.5} = \frac{3000}{0.5}$	6000	3	M1 for any two of 300, 10 or 0.5 A1 for $\frac{3000}{0.5}$ or 300×20 or 600×10 A1 6000
9	$1-h$ $(0.1 + 0.2 + 0.3)$	0.4	2	M1 for $1 - (0.1 + 0.2 + 0.3)$ or 0.6 seen A1 for 0.4
10	(a) (b) (c) $4 \times 3a - 4 \times 7$ (d) $4n + 6 + 3n + 3$ (e) (f)	$20pq$ d^4 $12a - 28$ $7n + 9$ t^3 m^2	1 1 2 2 1 1	B1 for $20pq$ oe B1 for d^4 cao M1 for $4 \times 3a$ or 4×7 A1 for $12a - 28$ cao M1 for $4n + 6$ or $3n + 3$ A1 for $7n + 9$ B1 for t^3 (accept t^{1+2} oe) B1 for m^2 (accept m^{5-3} oe)
11		Correct drawing	2	M1 for constructing arcs from each of the ends of the given line A1 for a correct triangle with arcs within guidelines SC: B1 for a correct triangle drawn within guidelines if M0 scored

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Question	Working	Answer	Mark	Notes
12		-2, -1, 0, 1, 2	2	B2 for -2, -1, 0, 1, 2 cao (B1 for 4 correct and not more than one incorrect value or all 5 correct and not more than one extra incorrect value)
13	(a)	$\frac{1}{4}$	1	B1 for $\frac{1}{4}$ or 0.25 or 4^{-1}
	(b)	$1\frac{1}{20}$	3	M1 for attempt to convert to fraction with common denominator, e.g. two fractions denominator 20 A1 correct conversion: $\frac{16}{20}$ and $\frac{15}{20}$ oe, or $\frac{56}{20}$ or $\frac{35}{20}$ oe A1 for $\frac{21}{20}$ or $1\frac{1}{20}$
				OR
				attempts to convert to decimals: must be exact M1 for 0.8 – 0.75 (or 2.8 – 1.75) A2 for 1.05 (A1 for 0.05)
	(c)	Reason	1	B1 for '1/3 = 0.3 recurring, which is not equal to 0.3' oe

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14	(a)	Triangle A	Triangle with vertices (-1,5), (-1,3), (3,3)	2	B2 for triangle with vertices (-1, 5), (-1, 3), (3, 3) (B1 for triangle with correct orientation)
	(b)	Triangle B	Triangle with vertices (1,-2), (5,-2), (5,-4)	1	B1 for triangle with vertices (1, -2), (5, -2), (5, -4)
	(c)	Triangle C	Triangle with vertices (1,1.5), (2,4), (1,4)	2	B2 for triangle with vertices (1, 1.5), (2, 4), (1, 4) (B1 for any two of the vertices (1, 1.5), (2, 4), (1, 4))
15	(a)		$3x^2 - 5xy$	2	B2 for $3x^2 - 5xy$ (B1 for $3x^2$ seen)
	(b)		$(x-6)(x+6)$	1	B1 for $(x-6)(x+6)$
16	(a)	Complete box plot	Median	2	B1 line drawn at 30
	(b)	Complete table	Highest mark 10	1	B1 whisker drawn to 55 B1 for 10 cao
17	(a)		64000	1	B1 for 64000
	(b)		3.9×10^{-3}	1	B1 for 3.9×10^{-3}
	(c)		2.5×10^6	1	B1 for 2.5×10^6

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18	(a)(i) (ii) (b)(i) (ii)	2×70 $180 - 70$ or $\frac{1}{2} \times 220$ Reason	2 2	B1 for 140 cao B1 for 'angle at centre is twice angle at circumference' B1 for 110 cao B1 for 'opposites angles in a cyclic quadrilateral sum to 180 degrees' or (if using $BOD=220^\circ$) 'angle at centre is twice angle at circumference'
19	e.g. adding equations leads to $3x = 9$ substitute $x = 3$ into eqn(1) leads to $3y = -6$	$x = 3$ $y = -2$	3	M1 for adding equations or for coefficients of x the same followed by subtracting the equations, 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)
20	(a) (b)	$7, -2, 2$ 	2 2	B2 all three correct (B1 for any one or two correct) B1 ft points plotted correctly ± 2 mm B1 for smooth curve drawn through their points provided B1 awarded in (a).

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21	(a)		0.2 and 0.4, 0.4	2	B1 for 0.2 on LH branch B1 for 0.4 on both RH branches
	(b)	0.8×0.6	0.48	2	M1 for 0.8×0.6 A1 for 0.48 oe
	(c)	$0.8 \times 0.4 + 0.2 \times 0.6$	0.44	3	M1 for $0.8 \times '0.4'$ or 0.2×0.6 M1 for $0.8 \times '0.4' + 0.2 \times 0.6$ A1 for 0.44 oe
22		$a(b-5) = 2-7b$ $ab-5a = 2-7b$ $ab+7b = 2+5a$ $b(a+7) = 2+5a$	$b = \frac{2+5a}{a+7}$	4	M1 for $a \times (b-5)$ M1 for $ab \pm 7b = 2 \pm '5a'$ M1 for $b(a \pm 7) = 2 \pm '5a'$ A1 for $b = \frac{2+5a}{a+7}$ cao
23	(a)	$\frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$	$\frac{\sqrt{3}}{3}$	1	B1 for $\frac{\sqrt{3}}{3}$ cao
	(b)	$2 \times 1 + 2 \times \sqrt{3} + 1 \times \sqrt{3}$ $+ \sqrt{3} \times \sqrt{3}$	$5 + 3\sqrt{3}$	2	M1 for $2 \times 1 + 2 \times \sqrt{3} + 1 \times \sqrt{3} + \sqrt{3} \times \sqrt{3}$ or three of 2, $2\sqrt{3}$, $\sqrt{3}$, 3 A1 for $5 + 3\sqrt{3}$ cao [SC: B1 for $a + 3\sqrt{3}$ or $5 + b\sqrt{3}$ if M0 scored]

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24	(a)	$\left(\frac{8}{4}\right)^2 \times 80$	320	2	M1 for $\left(\frac{8}{4}\right)^2$ or $\left(\frac{4}{8}\right)^2$ A1 for 320 cao
	(b)	$\left(\frac{4}{8}\right)^3 \times 600$	75	2	M1 for $\frac{1}{\left(\frac{8}{4}\right)} \times 600$ A1 for 75 cao
25	(a)(i)		$\frac{1}{2} \mathbf{a}$	2	B1 for $\frac{1}{2} \mathbf{a}$ oe
	(ii)		$\frac{1}{2} \mathbf{a} - \frac{1}{2} \mathbf{c}$	2	B1 for $\frac{1}{2} \mathbf{a} - \frac{1}{2} \mathbf{c}$ oe
	(b)	$\overrightarrow{CA} = \mathbf{a} - \mathbf{c}$ $\overrightarrow{MN} = \frac{1}{2}(\mathbf{a} - \mathbf{c})$	$\overrightarrow{MN} = \frac{1}{2}\overrightarrow{CA}$	2	B1 for $\overrightarrow{CA} = \mathbf{a} - \mathbf{c}$ oe B1 for $\overrightarrow{MN} = \frac{1}{2}\overrightarrow{CA}$ oe
26		$\pi x^2(2x) = \frac{1}{3}\pi(x)^2 h$	6x	3	M1 for $\pi x^2(2x) =$ “volume of cone” or $\frac{1}{3}\pi x^2 h =$ “volume of cylinder” M1 (dep) for a case of attempt to isolate h A1 for $(h =) 6x$ cao
27	(i)		(4, 3)	2	B1 for (4, 3) B1 for (2, 6)
	(ii)		(2, 6)		

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28	$\frac{\cancel{(x-2)}(x+3)}{\cancel{(x-2)}(x-5)}$	$\frac{(x+3)}{(x-5)}$	3	B3 for $\frac{(x+3)}{(x-5)}$ (otherwise award B1 for $(x-2)(x+3)$ and/or B1 for $(x-2)(x-5)$ seen)