

Edexcel GCSE

Mathematics 2540

Paper 5540H/3H

Summer 2008

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Mark Scheme (Results)

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 $300 + 300 + 300$ or 37.5 seen A1 for 900 (SC: B1 for sight of two of 3, 360 or 15)
	(b)	$\frac{12}{8} \times 120$	180	2	M1 for use of $\frac{12}{8}$ or 1.5 oe, eg $120 + \frac{120}{2}$ , or ' $120 \div 8$ ' $\times 12$ A1 for 180 (SC: B1 for sight of two of 450, 1.5 or 7.5)

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2	$\begin{array}{r} 540 \\ \underline{24} \\ 2160 \\ \underline{10800} \\ 12960 \end{array}$ <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;"><b>5</b></td> <td style="text-align: center;"><b>4</b></td> <td style="text-align: center;"><b>0</b></td> <td></td> </tr> <tr> <td style="text-align: right;"><b>1</b></td> <td style="text-align: center;">1 0</td> <td style="text-align: center;">8</td> <td style="text-align: center;">0</td> <td style="text-align: left;"><b>2</b></td> </tr> <tr> <td style="text-align: right;"><b>2</b></td> <td style="text-align: center;">2 0</td> <td style="text-align: center;">1 6</td> <td style="text-align: center;">0</td> <td style="text-align: left;"><b>4</b></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 border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;"><b>500</b></td> <td style="text-align: center;"><b>40</b></td> <td style="text-align: center;"><b>0</b></td> <td></td> </tr> <tr> <td style="text-align: right;"><b>20</b></td> <td style="text-align: center;">10000</td> <td style="text-align: center;">800</td> <td style="text-align: center;">0</td> <td></td> </tr> <tr> <td style="text-align: right;"><b>4</b></td> <td style="text-align: center;">2000</td> <td style="text-align: center;">160</td> <td style="text-align: center;">0</td> <td></td> </tr> </table> <p style="text-align: center;">10000 + 2000 + 800 160 = 12960</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;"><b>5</b></td> <td style="text-align: center;"><b>0.4</b></td> <td></td> </tr> <tr> <td style="text-align: right;"><b>20</b></td> <td style="text-align: center;">100</td> <td style="text-align: center;">8</td> <td></td> </tr> <tr> <td style="text-align: right;"><b>4</b></td> <td style="text-align: center;">20</td> <td style="text-align: center;">1.6</td> <td></td> </tr> </table> <p style="text-align: center;">100 + 20 + 8 + 1.6 = 129.6</p>		<b>5</b>	<b>4</b>	<b>0</b>		<b>1</b>	1 0	8	0	<b>2</b>	<b>2</b>	2 0	1 6	0	<b>4</b>		9	6	0			<b>500</b>	<b>40</b>	<b>0</b>		<b>20</b>	10000	800	0		<b>4</b>	2000	160	0			<b>5</b>	<b>0.4</b>		<b>20</b>	100	8		<b>4</b>	20	1.6		129.6(0)	3	<p>M1 for a complete method with relative place value correct. Condone 1 multiplication error, addition not necessary.</p> <p><b>OR</b></p> <p>M1 for a complete grid. Condone 1 multiplication error, addition not necessary.</p> <p><b>OR</b></p> <p>M1 for sight of a complete partitioning method, condone 1 multiplication error. Final addition not necessary.</p> <p>A2 for 129.6(0) (p)  A1 (dep on M1) for correct placement of decimal point after final addition or for digits 1296(0) seen (SC: B1 for addition of 24 lots of 5.4)</p>
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5540H/3H					
Question		Working	Answer	Mark	Notes
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 A1 for consistent key, e.g. $2   3 = 23$ (years)  <b>OR</b>  M1 for using 20, 30, 40 and 50 as stem A1 for ordered stem and leaf diagram A1 for consistent key, e.g. $20   3 = 23$ (years) (NB: Condone use of comma between leaves)
4	(a)		1632	1	B1 for 1632 or 1632.0
	(b)		16.32	1	B1 for 16.32 cao
	(c)		3.4	1	B1 for 3.4 cao
5	(a)		S	1	B1 for S cao
	(b)		(2, 1, 3)	1	B1 for (2, 1, 3) cao

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Question		Working	Answer	Mark	Notes
6	(a)	$(18 - 6) \div 4$	3	2	M1 for $18 - 6$ or $12$ or $3 \times 4 + 6$ or $4n+6=18$ or 10, 14, 18 seen A1 for 3 cao
	(b)		$4n + 6$	2	B2 for $4n + 6$ or (cost = ) $4n + 6$ (B1 for $4n + a$ or $bn + 6$ , where $a$ and $b$ are numbers ( $b \neq 0$ ) or $n = 4n + 6$ or $4n + 6 = 18$ or £ $4n + 6$ or $4x + 6$ )
7		$\frac{1}{2}(3 \times 4) \times 2$ $+ (3 \times 7) + (4 \times 7) + (5 \times 7) =$ $12 + 21 + 28 + 35$	$96 \text{ cm}^2$	4	M1 for $\frac{1}{2}(3 \times 4)$ or $3 \times 7$ or $5 \times 7$ or $4 \times 7$ M1 for attempt to add 5 faces which are areas A1 for 96 B1 (indep) for $\text{cm}^2$  (NB: 0 marks for calculating volume)

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Question	Working	Answer	Mark	Notes
8	$\frac{300 \times 10}{0.5} = \frac{3000}{0.5}$	5890 – 6040	3	M1 for any two of 300, 10 or 0.5 M1 for $\frac{3000}{0.5}$ or $300 \times 20$ or $600 \times 10$ or $\frac{3020}{0.5}$ or $302 \times 20$ or $604 \times 10$ A1 5890 – 6040  (SC: B2 for answer of 1500 or 1510)
9	1 - (0.1 + 0.2 + 0.3)	0.4	2	M1 for $1 - (0.1 + 0.2 + 0.3)$ oe or 0.6 oe seen A1 for 0.4 oe
10	(a)	$20pq$	1	B1 for $20pq$ oe
	(b)	$d^4$	1	B1 for $d^4$ cao
	(c)	$4 \times 3a - 4 \times 7$	2	M1 for $4 \times 3a$ or $4 \times 7$ or $12a$ or 28 A1 for $12a - 28$ cao
	(d)	$4n + 6 + 3n + 3$	2	M1 for $4n + 6$ or $3n + 3$ A1 for $7n + 9$
	(e)	$t^3$	1	B1 for $t^3$ (accept $t^{1+2}$ oe)
	(f)	$m^2$	1	B1 for $m^2$ (accept $m^{5-3}$ oe)

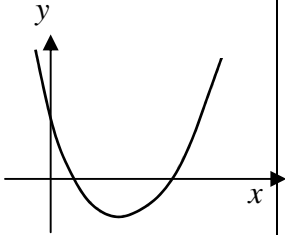
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Question	Working	Answer	Mark	Notes
11		Correct construction	2	M1 for constructing intersecting arcs of equal radius A1 for a correct triangle with appropriate arcs  (SC: B1 for a correct triangle drawn within guidelines if M0 scored)  (NB: guidelines allow for 2mm tolerance)
12		-2, -1, 0, 1, 2	2	B2 for -2, -1, 0, 1, 2 cao (B1 for 4 correct (only) or 4 correct and one incorrect or 5 correct and one incorrect)
13	(a)  (b) $(2-1) + \left(\frac{4}{5} - \frac{3}{4}\right) = 1 + \left(\frac{16}{20} - \frac{15}{20}\right)$ or $\frac{14}{5} - \frac{7}{4} = \frac{56}{20} - \frac{35}{20} = \frac{21}{20}$ or 2.8-1.75	$\frac{1}{4}$  $1\frac{1}{20}$	1  3	B1 for $\frac{1}{4}$ or 0.25 or $4^{-1}$  M1 for attempt to convert to fractions 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 $1\frac{1}{20}$  <b>OR</b>  M1 for 0.8 – 0.75 (or 2.8 – 1.75) A2 for 1.05 (A1 for 0.05)
	(c)	Reason	1	B1 for correct reason, e.g. '1/3 = 0.3 recurring (accept 0.33)' or '0.3 = 3/10'

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Question		Working	Answer	Mark	Notes
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 or triangle rotated $\pm 90^\circ$ centre (-1,1) )
	(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), (1, 4), (2, 4) ( B1 for triangle with correct orientation or for any two of the vertices (1, 1.5), (2, 4), (1, 4) (SC: B1 for triangle with vertices (1, 1.5), (1, k), (2, k)
15	(a)		$3x^2 - 5xy$	2	B2 for $3x^2 - 5xy$ (B1 for $3x^2$ or $5xy$ seen)
	(b)		$(x-6)(x+6)$	1	B1 for $(x-6)(x+6)$ oe
16	(a)	Complete box plot	Median Highest mark	2	B1 line drawn at 30 and no other lines drawn within box B1 whisker drawn to 55
	(b)	Complete table	10	1	B1 for 10
17	(a)		64000	1	B1 for 64000
	(b)		$3.9 \times 10^{-3}$	1	B1 for $3.9 \times 10^{-3}$
	(c)		$2.5 \times 10^6$	1	B1 for $2.5 \times 10^6$



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Question	Working	Answer	Mark	Notes
18	(a)(i) (ii)	$2 \times 70$	140 Reason	2 B1 for 140 cao B1 for 'angle at centre is twice angle at circumference'
	(b)(i) (ii)	$180 - 70$ or $\frac{1}{2} \times 220$	110 Reason	2 B1 for 110 cao B1 for 'opposites angles in a cyclic quadrilateral sum to 180 degrees' or '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  OR  M1 for $2(9 + 3y) + 3y = 0$ , condone one arithmetic error M1 (dep) for substituting found value in one equation A1 cao  (SC: B1 for one correct answer only if Ms not awarded)

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Question		Working	Answer	Mark	Notes
20	(a)		7, -2, 2	2	B2 all three correct (B1 for any one or two correct)
	(b)			2	B2 fully correct graph  OR  B1 fit for 7 points plotted correctly $\pm 2$ mm B1 for smooth curve drawn through their points provided B1 awarded in (a).

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Question		Working	Answer	Mark	Notes
21	(a)		0.2 and 0.4, 0.4	2	B1 for 0.2 oe on LH branch B1 for 0.4 oe on both RH branches
	(b)	$0.8 \times 0.6$	0.48	2	M1 for $0.8 \times 0.6$ oe 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 $0.2 \times 0.6$ oe M1 for $0.8 \times 0.4 + 0.2 \times 0.6$ oe A1 for 0.44 oe  OR  M1 for $0.2 \times 0.4$ oe M1 for $1 - (0.8 \times 0.6 + 0.2 \times 0.4)$ oe 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 $a(b-5)$ or $ab-5a$ or $ab-5$ M1 for isolating $ab$ and $7b$ on one side to get $ab+7b$ oe M1 for correctly factorising $b$ from ' $ab+7b$ ' (term in $ab$ must be present) A1 for $b = \frac{2+5a}{a+7}$ or $b = \frac{-2-5a}{-a-7}$

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Question		Working	Answer	Mark	Notes
23	(a)	$\frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$	$\frac{\sqrt{3}}{3}$	1	B1 for $\frac{\sqrt{3}}{3}$ or $\frac{k\sqrt{3}}{3k}$ or $\frac{\sqrt{3k^2}}{3k}$ , where $k$ is an integer not equal to 0 (accept $\frac{1\sqrt{3}}{3}$ , $\frac{\sqrt{1}\sqrt{3}}{3}$ or $\frac{3^{0.5}}{3}$ )
	(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, $2\sqrt{3}$ , $\sqrt{3}$ , $\sqrt{9}$ (or 3 or $\sqrt{3^2}$ or $(\sqrt{3})^2$ ) A1 for $5 + 3\sqrt{3}$ cao (SC: B1 for $a + 3\sqrt{3}$ or $5 + b\sqrt{3}$ if M0 scored, where $a$ and $b$ are integers not equal to 0)
24	(a)	$\left(\frac{8}{4}\right)^2 \times 80$	320	2	M1 for $\left(\frac{8}{4}\right)^2$ or $\left(\frac{4}{8}\right)^2$ oe or $8^2:4^2$ or $4^2:8^2$ or 1:4 or 4:1 A1 for 320 cao
	(b)	$\left(\frac{4}{8}\right)^3 \times 600$	75	2	M1 for $600 \times \left(\frac{4}{8}\right)^3$ or $600 \times \left(\frac{8}{4}\right)^3$ oe A1 for 75 cao

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25	(a)(i)	$\frac{1}{2} \mathbf{a}$	2	B1 for $\frac{1}{2} \mathbf{a}$ oe
	(ii)	$\frac{1}{2} \mathbf{a} - \frac{1}{2} \mathbf{c}$		B1 for $\frac{1}{2} \mathbf{a} - \frac{1}{2} \mathbf{c}$ oe
	(b)	$\overline{CA} = \mathbf{a} - \mathbf{c}$ $\overline{MN} = \frac{1}{2}(\mathbf{a} - \mathbf{c})$	2	B1 for $(\overline{CA} =) \mathbf{a} - \mathbf{c}$ or $\overline{CB} + \overline{BA}$ oe B1 (dep) for correct proof, e.g. ' $\overline{CA} = 2\overline{MN}$ ' or ' $\overline{CA}$ is a multiple of $\overline{MN}$ '  (NB: condone absence/misuse of vector notation)
26		$\pi x^2(2x) = \frac{1}{3} \pi (x)^2 h$	3	M1 for a correct volume formula in terms of $x$ , e.g. $\pi x^2(2x)$ or $\frac{1}{3} \pi x^2 h$  A1 for $\pi(2x) = \frac{1}{3} \pi h$ or $3\pi x^2(2x) = \pi x^2 h$ or $x^2(2x) = \frac{1}{3} x^2 h$ (or better)  A1 for $6x$ cao
27	(a)	(4, 3)	2	B1 for (4, 3)
	(b)	(2, 6)		B1 for (2, 6)

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Question	Working	Answer	Mark	Notes
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 $(x-2)(x-5)$ , which may not appear in the context of a fraction )