

GCSE Mathematics Mark Scheme P-4 November 2008

5540H/4H				
Question	Working	Answer	Mark	Notes
1 (a)	$180 \div 2$	90g	2	M1 $180 \div 2$ OR $180 \div 6 \times 3$ oe A1 cao
(b)	160×2.5	400ml	2	M1 160×2.5 OR $160 \div 6 \times 15$ OR $160 \div 2 \times 5$ oe A1 cao SC: B1 an answer of 399 to 405 inclusive
2 (a)	$\sqrt{\frac{21.6 \times 15.8}{3.8}} =$	9.476841579	2	M1 for 89.81052 or 341.28 or 4.86151... or $\frac{8532}{95}$ or $\frac{8532}{25}$ A1 for 9.47684..... SC : B1 for 9.476841579... truncated or rounded to at least 1 decimal place
(b)	$\sqrt{89.81052632}$	9.48	1	B1 ft from (a) with at least 4 significant figures
3	$240 \times \frac{117.5}{100}$ or $240 + 24 + 12 + 6$	£282	3	B1 for 117.5 or 1.175 M1 for $240 \times \frac{117.5}{100}$ oe A1 cao OR M1 for $240 \times \frac{17.5}{100}$ OR $24 + 12 + 6$ oe OR 42 M1(dep) for $240 + \text{"42"}$ OR $240 + 24 + 12 + 6$ A1 cao

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4 (a) (b)	$4t = 18$	$4x - 12$ 4.5	1 2	B1 cao M1 for subtracting 1 from both sides seen or implied or division of all 3 terms by 4 A1 4.5 oe
5	5, 13, 29, 53, 85, 125	(85)	2	M1 for correct evaluation of at least 3 odd cases OR sequence of 5, (8), 13, (20), 29... seen OR the expression with $n = 9$ or 11 or 19 or 21 or ... substituted but not evaluated A1 for 85 or 125 or 365 or 445 or ... identified
6	$\pi \times 6^2$ $12^2 - \pi \times 6^2$	30.9	4	M1 for 12^2 or 144 seen M1 for $\pi \times 6^2$ or 113(...) seen M1 (dep on both previous M1's) for " 12^2 "- " $\pi \times 6^2$ " A1 30.88 – 31 inclusive
7 (a)(i) (ii) (b)	$180 - 70 - 75$	110 Corresponding angles 35	2 2	B1 cao B1 (dep on B1 in (i)) for corresponding angles or F angles M1 $180 - (180-110) - 75$ or $110 - 75$ A1 cao
8 (a) (b) (c) (d)		3 plotted correctly Positive LOBF $62 - 67$	1 1 1 1	B1 to 1 square B1 Positive (correlation) B1 within guidelines; line goes from between (2,18) and (2,32) to between (16,78) and (16,90) B1 for 62 – 67 inclusive or ft from a single straight line graph with positive gradient ± 1 square

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9	$3000 \times \frac{4}{100} + 3000 = 3120$ $3120 \times \frac{4}{100} + 3120 = 3244.80$ <p>or $3000 \times \left(\frac{104}{100}\right)^2$</p>	3244.80	3	<p>M1 for $3000 \times \frac{4}{100}$ or 120 or 240 or 3240 or 3120 or 1.04×3000 or 2880 or 2760</p> <p>M1(dep) for $(3000 + '120') \times \frac{4}{100}$ or 124.8(0) or "3120" $\times 1.04$</p> <p>A1 £3244.8(0)</p> <p>OR</p> <p>M2 $3000 \times \left(\frac{104}{100}\right)^2$ or $3000 \times \left(\frac{104}{100}\right)^3$</p> <p>A1 £3244.8(0)</p> <p>NB : If correct answer seen then ignore subsequent years</p>
10		30	2	<p>M1 finds the middle value or answer an indication of 0, 29, 29.5, 30.5, 31, 31.5, 32 or 10th value oe</p> <p>A1 cao</p>

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11	(a)	x	-1	0	1	2	3	4	5	3, -6, -5	2	B2 cao all 3 (B1 any 1 or 2 correct)
		y	3	-2	-5	-6	-5	-2	3			
	(b)											
	(c)	Draw $y = -3$							0.3, 3.7	2	B1 for 0.2 – 0.4 or ft from graph ± 1 square B1 for 3.6 – 3.8 or ft from graph ± 1 square (SC: If no marks earned then B1 for line $y = -3$ drawn) NB: If line at $y = -3$ will intersect graph more than twice award B1 for one correct value, B2 for all correct values given.	
12	(a)								Within guide	2	B2 for line at least 2cm long within inner guideline B1 for line at least 2cm long completely or partially outside inner guidelines but within outer guidelines or line within inner guidelines of length less than 2cm or at least 3 relevant points within inner guidelines or 2 pairs of relevant intersecting arcs within inner guidelines. NB : Ignore any additional lines or drawings	
	(b)								Within guide	2	B2 for fully correct shape within or touching guidelines (B1 two correct parallel lines within or touching guidelines allow or two correct semicircles at ends within or touching guidelines allow or correct shape outside guidelines) NB : Accept dotted lines. Ignore any additional lines or drawings eg. Full circles drawn at ends	

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13	24 48 72 36 72	72	2	M1 lists at least 1 multiple of 24 and 1 multiple of 36 (not including 24, 36) A1 cao OR M1 for 2,2,2,3 (prime factors of 24) OR 2,2,3,3 (prime factors of 36) (may be seen in factor tree or in repeated division) A1 cao
14 (a)		$13x + 17$	2	M1 for $3 \times x + 3 \times 4$ OR $5 \times 2x + 5 \times 1$ A1 cao
(b)		t^{10}	1	B1 cao
(c)		p^3	1	B1 cao
(d)		x^{12}	1	B1 cao
15	$1 - (0.15+0.05+0.20+0.25)$	0.35	2	M1 $1 - (0.15+0.05+0.20+0.25)$ oe A1 for 0.35 oe
16	$BC^2 = 20^2 + 10^2 = 500$	22.4cm	4	M1 for $(BC^2 =) 20^2 + 10^2$ or $400 + 100$ or 500 or $20^2 + 10^2 - 2 \times 20 \times 10 \times \cos 90$ oe M1 for $\sqrt{"400+100"}$ or $\sqrt{"500"}$ where it is clear that the 20 and 10 have been squared (could be implied by either 400 or 100 seen) A1 for any answer in 22.36 – 22.4 inclusive B1 (indep)cm

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17	$(0 \times 0) + 1 \times 8 + 2 \times 12 + 3 \times 6 + 4 \times 4 + 5 \times 2$ $= 76$ $76 \div ((0) + 8 + 12 + 6 + 4 + 2)$	2.375	3	M1 for 1×8 and 2×12 and 3×6 and 4×4 and 5×2 condone one error or sight of 76. M1(dep on 1st M1) for $\sum fx \div \sum f$ A1 for 2.375 or 2.37 or 2.38 or 2.4
18	$65\% \text{ of orig value} = \text{£}5460$ $1\% \text{ of orig value} = \frac{\text{£}5460}{65}$ $\text{Orig value} = \frac{\text{£}5460}{65} \times 100$	£8400	3	M1 $65\% \text{ (of orig value)} = \text{£}5460$ or $(100\% - 35\%) \times \text{orig price} = 5460$ or 0.65 or 65% seen M1 $\frac{\text{£}5460}{65} \times 100$ or $\frac{5460}{0.65}$ A1 £8400

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Question	Working	Answer	Mark	Notes
19 (a)	$x(2x+1) + x \times 5$ $2x^2 + 6x$	As given	3	M1 $x(2x+1)$ and $x \times 5$ OR $x(x+5)$ and $x(x+1)$ condone missing brackets. M1 $2x^2 + x + 5x$ OR $x^2 + 5x + x^2 + x$ (can imply first M1) A1 $2x^2 + 6x = 95$ AG
(b)	$x = \frac{-6 \pm \sqrt{6^2 - 4 \times 2 \times (-95)}}{4}$ $x = \frac{-6 \pm \sqrt{796}}{4}$ <p>or</p> $x^2 + 3x - 47.5 = 0$ $(x+1.5)^2 - 1.5^2 - 47.5 = 0$ $x = -1.5 \pm \sqrt{49.75}$	5.55, -8.55	3	M1 for correct substitution in formula of 2, 6 and ± 95 M1 for reduction to $\frac{-6 \pm \sqrt{796}}{4}$ A1 5.55 to 5.555 inclusive and -8.55 to -8.555 inclusive OR M1 $(x+1.5)^2 - 1.5^2 - 47.5 = 0$ M1 $x = -1.5 \pm \sqrt{49.75}$ A1 5.55 to 5.555 and -8.55 to -8.555 [SC: B1 for one answer correct with or without working]

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20	(a)	Add on 2	1	B1 'even numbers go up in twos' or 'even numbers are 2 apart' oe
	(b)	$2n + 4$	1	B1 $2n + 4$ oe
	(c)	$2n + 2n + 2 + 2n + 4 = 6n + 6$ $= 6(n + 1)$	3	M1 for $2n$ (+) $2n + 2$ (+) ' $2n + 4$ ' or any 3 consecutive even numbers written as expressions; any variable may be used A1 for " $6n + 6$ " A1 for " $6(n + 1)$ " or stating there is a factor of 6 oe SC : B1 for $n + n + 2 + n + 4$
21		21.8	3	M1 $\tan(QPR) = \frac{4}{10}$ M1 $\tan^{-1} \frac{4}{10}$ or $\tan^{-1} 0.4$ A1 $21.8^\circ - 21.81^\circ$ inclusive OR [$QP = \sqrt{4^2 + 10^2}$ (=10.77...)] M1 $\sin(QPR) = \frac{4}{\sqrt{4^2 + 10^2}}$ or $\cos(QPR) = \frac{10}{\sqrt{4^2 + 10^2}}$ M1 $\sin^{-1} \frac{4}{\sqrt{4^2 + 10^2}}$ or $\cos^{-1} \frac{10}{\sqrt{4^2 + 10^2}}$ A1 $21.8^\circ - 21.81^\circ$ inclusive SC: B2 for 24.2(237.....) or 0.380(5....)

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Question	Working	Answer	Mark	Notes
22	$D = kS^2$ $900 = k \times 20^2$ $k = \frac{900}{400}$ $D = \frac{900}{400} \times 25^2 = 1406.25$	1406.25	4	M1 $D = kS^2$ M1 $900 = k \times 20^2$ (can imply first M1) A1 $k = \frac{900}{20^2}$ (= 2.25) A1 for 1406.25 or $\frac{5625}{4}$
23	(i) (ii) $\frac{24.45^2}{2 \times 9.75}$ $= \frac{597.8025}{19.5}$ $= 30.6565 \dots$	9.75 30.7	3	B1 cao M1 for $\frac{V_{UB}^2}{2 \times g_{LB}}$ where $24.4 < V_{UB} \leq 24.45$ and $9.75 \leq g < 9.8$ or $\frac{V_{UB}^2}{2 \times '9.75'}$ (= 30.6565...) A1 for 30.7 or 30.66 or 30.657 or 30.6565 or 30.65654 or better coming from 30.6565384...

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24 (a)	$V_c = \pi \times 3^2 \times 30$ $V_h = \frac{2}{3} \times \pi \times 3^3$ $V_c + V_h = 288\pi$	905	3	M1 $V_c = \pi \times 3^2 \times 30 (= 848.2\dots)$ or $V_h = \frac{2}{3} \times \pi \times 3^3 (=56.54\dots)$ M1 (dep) $V_c + V_h$ (may be implied) A1 904 – 905 inclusive
(b)	$\frac{4}{3} \times \pi \times R^3 = 500$ $R^3 = \frac{500 \times 3}{4 \times \pi}$	4.92	3	M1 for $\frac{4}{3} \times \pi \times R^3 = 500$ M1 for correct process to reach $R^3 = \frac{500 \times 3}{4 \times \pi}$ oe (= 119.3...) or $\sqrt[3]{\frac{500 \times 3}{4 \times \pi}}$ (implies 1 st M1) A1 4.915-4.925
25	$\frac{399}{399 + 602 + 252 + 198} \times 70$ $=19.24$	19	3	M1 for $\frac{399}{399 + 602 + 252 + 198}$ or $\frac{399}{1451}$ or " $\frac{70}{1451}$ " or " $\frac{1451}{70}$ " or " $\frac{1451}{399}$ " M1 " $\frac{399}{1451}$ " $\times 70$ or $\frac{70}{"1451"}$ $\times 399$ or $399 \div \frac{"1451"}{70}$ (=19.2487...) A1 for 19

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26 (a)	$4\mathbf{a} + 3\mathbf{b} - (2\mathbf{a} + \mathbf{b})$	$2\mathbf{a} + 2\mathbf{b}$	2	M1 ($\vec{OX} + \vec{XY} = \vec{OY}$) or $4\mathbf{a} + 3\mathbf{b} - (2\mathbf{a} + \mathbf{b})$ oe or an intention to do $\vec{XO} + \vec{OY}$ eg. $-2\mathbf{a} + \mathbf{b} + 4\mathbf{a} + 3\mathbf{b}$ A1 cao
(b)	$\vec{YZ} = 3\mathbf{a} + 3\mathbf{b}$ or $\vec{XZ} = 5\mathbf{a} + 5\mathbf{b}$ $\vec{OZ} = \vec{OX} + \vec{XZ} = 2\mathbf{a} + \mathbf{b} + 5\mathbf{a} + 5\mathbf{b}$	$7\mathbf{a} + 6\mathbf{b}$	3	M1 for $\vec{OZ} = \vec{OX} + \vec{XZ}$ oe or $\vec{OZ} = \vec{OY} + \vec{YZ}$ oe (may be given in terms of \mathbf{a} and \mathbf{b}) M1(indep) for $(YZ =) \frac{3}{2} ("2\mathbf{a} + 2\mathbf{b}") (=3\mathbf{a} + 3\mathbf{b})$ or $(XZ =) \frac{5}{2} ("2\mathbf{a} + 2\mathbf{b}") (=5\mathbf{a} + 5\mathbf{b})$ A1 cao SC : B2 for $7\mathbf{a} + 9\mathbf{b}$ or $7\mathbf{a} + 11\mathbf{b}$
27	$1 = a \times b^{0.5}, 8 = a \times b^2$ $\frac{a \times b^2}{a \times b^{0.5}} = \frac{8}{1}$ $b^{\frac{3}{2}} = 8, b = 4, a = \frac{1}{2}$ $c = \frac{1}{2} \times 4^{\frac{1}{2}}$	$k = \frac{1}{4}$	4	M1 for $1 = a \times b^{0.5}, 8 = a \times b^2$ M1 for correct method to eliminate either a or b could be implied by $\frac{a \times b^2}{a \times b^{0.5}} = \frac{8}{1}$ or $\frac{b^2}{b^{0.5}} = 8$ or $8 = a(\frac{1}{a^2})^2$ oe A1 for $b = 4, a = \frac{1}{2}$ A1 for $k = \frac{1}{4}$ oe