GCSE Mathematics Mark Scheme P-3 November 2008

5540H/3H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		$3bc$	1	B1 for $3bc$ (accept $3cb$ or $bc3$ or $cb3$ or $3\times b\times c$ oe, but $7bc - 4bc$ gets no marks)
	(b)		$2x + 5y$	2	B2 for $2x+5y$ (accept $x2+y5$ or $2\times x + 5\times y$ or $x\times 2 + y\times 5$) [B1 for $2x$ or $5y$ seen; accept $2\times x$, $x2$, $5\times y$, $y5$, etc.]
	(c)		m^3	1	B1 cao
	(d)		$6np$	1	B1 for $6np$ oe (accept $6pn$, $np6$, $pn6$ but NOT $6\times p\times n$)

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2	(a)	$12 \div 3 \times 2$ (=8) 8×40 Alternative 3 tins = $40 \times 2 = 80$ 12 tins = 80×4	3.20	3	M2 for $40 \times 12 \div 3 \times 2$ or better (inc. adding 8 lots of 40p) (M1 for using 2 of the 3 operations or 8 seen) A1 cao OR M1 for 3 tins = 40×2 M1 (dep) for "80" $\times$ 4 A1 cao [SC: B2 for sight of digits 320 if M0 scored] [SC: B1 for 480 or 4.80 if M0 scored]
	(b)	$\frac{15}{100} \times 20 = 3$ OR 10% = $20 \div 10 = 2$ 5% = $2 \div 2 = 1$ 15% = 2 + 1 = 3 20 – 3 Alternative 20×0.85	17	3	M1 for $\frac{15}{100} \times 20$ oe or a correct method to work out 10% and 5% of 20 or 2 and 1 seen A1 for 3 cao A1 ft for 20 − "3" dependant upon M1 scored [SC: B2 for 3 on answer line with no working] **Alternative** B1 cao for 85 or 0.85 seen M1 for $\frac{"100-15"}{100}$ or "1 – 0.15" $\times$ 20 A1 ft for a correct solution of $\frac{"100-15"}{100}$ or "1 – 0.15" $\times$ 20 OR 17 (dep on M1 scored)

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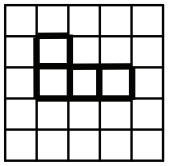
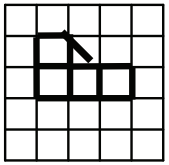
3			(B), D, C, A, F, E	3	B3 all correct (B2 for 3 or 4 correct B1 for 1 or 2 correct)
4			 OR 	2	B2 For either answer (B1 for an "L" shape with one dimension correct) Internal lines need not be drawn. All 3-D drawings get B0
5		$\frac{14}{35}+\frac{5}{35}$ <u>Alternative</u> 0.4+0.143	$\frac{19}{35}$ oe	2	M1 for correct common denominator of two fractions with at least one numerator correct A1 for $\frac{19}{35}$ oe (for example $\frac{38}{70}$) <u>Alternative</u> M1 for 0.4 and 0.14(2857…) (correct to 2dp.) A1 for 0.54 or better

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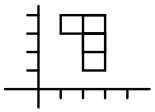
6		Splits up shape e.g. into rectangle and triangle 12×5 (=60) $\frac{1}{2} \times 5 \times 4$	70	4	M1 for splitting up shape by drawing straight lines or for two or more attempts to find the area of parts of the shape M1 (dep) for a correct method to find area of one part, e.g. 12×5 or 60 M1 for a correct method to find area of another part(s), e.g. $\frac{1}{2} \times$ "5" $\times$ "4" or 10 A1 cao
7	(a)			2	B2 correct reflection (B1 correct reflection in the line $x = k$, $k \neq 0$) [Ignore any attempt to reflect B]
	(b)		Rotation 90° about the centre (0,0)	3	B1 for rotation B1 for 90° (or 270 clockwise or ¼ turn anticlockwise or ¾ turn clockwise) B1 for (0,0) or *O* or origin NB: a combination of transformations gets B0
8	(a)		No time period Non-exhaustive response boxes Labels too vague	2	B2 for TWO aspects from: "no time period", "response boxes not exhaustive (restricted range of responses)", "Labels on response boxes are too vague" (B1 for ONE aspect only)
	(b)	How many times did you go to the cinema last month? 0 | 1-2 | 3-5 | >5	Includes time period and proper response boxes	2	B1 for inclusion of time period (this may be implied by the labels to the response boxes) B1 for at least 3 correctly labelled response boxes (non-overlapping) [NB: response boxes need not be exhaustive]

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9	(a)		$5(m + 2)$	1	B1 for $5(m+2)$ or $5(2+m)$. Accept $(5–0)(m+2)$ or $(3+2)(m+2)$
	(b)		$y(y – 3)$	1	B1 for $y(y–3)$ or $(y–3)y$ or $(y–0)(y–3)$ or $(y–3)(y+0)$
10		$48 \div 8 = 6$ $6 \times 5 – 6 \times 3 = 12$	12	3	M1 for $48 \div$ '5+3' M1 (dep) for "6" × 5 (or 30 seen) or "6" × 3 (or 18 seen) or "6" × 2 A1 cao [SC: B2 for 30 or 18 on the answer line with no working]
11		$360 \div 10 = 36$ $180 – 36$ $180 \times (10 - 2) \div 10$	144	3	M1 for $360 \div 10$ or 36 seen M1 (dep) for $180 –$ "36" A1 cao OR M1 for $180 \times (10 - 2)$ oe or 1440 seen M1 (dep) for "1440" $\div 10$ A1 cao
12		$x + 30 + 2x + 3x = 180$ $6x + 30 = 180$ $6x = 150$	25	3	M1 for $x + 30 + 2x + 3x$ or $6x + 30$ seen or $180 – 30$ or 150 seen M1 for $6x + 30 = 180$ or better or $\frac{"180 – 30"}{6}$ A1 cao

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13	(a)		–1, 0, 1, 2, 3, 4	2	B2 cao (B1 for at least 5 correct and not more than one incorrect integer)
	(b)	$6x < 9+3$	$x < 2$	2	M1 for correctly separating x and non x terms or for dividing both sides by 6 [condone use of =, >, ≤, or ≥] A1 for $x < 2$, accept $x < \frac{12}{6}$ [SC: B1 for $x = 2$ with no working. But 2 on the answer line with no working gets no marks]
14			Overlay	2	M1 for correct intersecting arcs A1 for correct angle bisector, within guidelines [SC:B1 if no marks, for line within guidelines]
15	(a)	e.g. 2 ⌊ 84 2 ⌊ 42 3 ⌊ 21 ⌊ 7 84 2 42 2 21 3 7	$2 \times 2 \times 3 \times 7$	3	M2 for a full systematic method of at least 3 divisions by prime numbers oe factor trees, condone one calculation error. (M1 for 84 written as either 2×42 or 3×28 or 7×12 oe or equivalent division or a full process with 2 calculation errors) A1 for $2 \times 2 \times 3 \times 7$ (accept $2^2 \times 3 \times 7$ but not 2, 2, 3, 7) [Note: $1 \times 2 \times 2 \times 3 \times 7$ gets M2A0]
	(b)		7	2	M1 for listing factors of 35 and 84 (at least 3 correct for each, condoning one error. This could be in factor trees or factor pairs, etc) A1 cao

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16	(a)	$v^2 = 6^2 + 2 \times 2.5 \times 9$	9	3	M1 for correct substitution giving $6^2 + 2 \times 2.5 \times 9$ or better M1 (dep) for $\sqrt{"81"}$ A1 cao accept ± 9 [SC: B1 for answer of 81 if M0 scored]
	(b)	$v^2 - u^2 = 2as$ OR $\frac{v^2}{2a} = \frac{u^2}{2a} + s$	$\frac{v^2 - u^2}{2a}$ oe	2	B2 for $\frac{v^2 - u^2}{2a}$ oe (B1 for $v^2 - u^2 = 2as$ oe or $\frac{v^2}{2a} = \frac{u^2}{2a} + s$ oe) Examples: $s = \frac{v^2 - u^2}{2} \div a$ gets B2 $\quad$ $s = \frac{v^2 + u^2}{2a}$ gets B1 $s = v^2 - u^2 - 2a$ without the intermediate $2as = v^2 - u^2$ gets B0
17	(a)		3.9×10^4	1	B1 cao
	(b)		0.00721	1	B1 cao

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18	(a)		(18), 40, 75, 90, 98, 100	1	B1 for all correct
	(b)			2	B1 ft for 5 or 6 points plotted correctly ± 1 full (2mm) square at the end of interval dep on sensible table (condone 1 addition error) B1 (dep) for points joined by curve or line segments provided no gradient is negative – ignore any part of graph outside range of their points (SC:B1 if 5 or 6 points plotted not at end but consistent within each interval and joined)
	(c)		approx 46	1	B1 (ft dep on graph being cf) for reading from graph at 50 ± 1 full (2mm) square
19			$\frac{ab}{2}$, πbc, $ab + cd$	3	B1 for $\frac{ab}{2}$; B1 for πbc; B1 for $ab + cd$ (-B1 for each additional expression ticked (>3) to a minimum of 0)
20	a(i)		90	2	B1 cao
	(ii)		angle in a semi-circle = 90°		B1 for angle in a semi-circle (= 90°) or angle at the centre is twice the angle at the circumference or angle subtended by a diameter = 90^o.
	b(i)	130 ÷ 2	65	2	B1 cao
	(ii)		angle at centre is twice the angle at the circumference		B1 for angle at the centre is twice the angle at the circumference.

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21	(a)		$\frac{5}{8}$ $\frac{5}{8}, \frac{3}{8}, \frac{5}{8}$	2	B1 for $\frac{5}{8}$ correct for 1st counter B1 for $\frac{5}{8}, \frac{3}{8}, \frac{5}{8}$ correct for 2nd counter
	(b)	$\frac{3}{8} \times \frac{3}{8}$	$\frac{9}{64}$ oe	2	M1 for $\frac{3}{8} \times \frac{3}{8}$ A1 for $\frac{9}{64}$ oe
22	(a)		$3x(2x + 3y)$	2	B2 for fully correct (accept $(3x – 0)(2x + 3y)$ (B1 for $x(6x + 9y)$ or $3(2x^2 + 3xy)$ or $3x$(a linear expression in x and y)
	(b)	$2x^2 – 4x + 5x – 10$	$2x^2 + x – 10$	2	B2 for $2x^2 + x – 10$ (B1 for 3 out of 4 terms correct, with correct signs, or the 4 terms $2x^2$, $4x$, $5x$ and 10 seen, ignoring signs)
23	(a)		25 16	2	M1 for correct use of frequency density to find a unit of area (for example $1\text{cm}^2 = 2.5$ or 1 small square = 0.1) or the area of one block. A1 cao
	(b)		Correct black (1cm high between 40 and 60)	1	B1 for correct black

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24		$x = 0.213131313\ldots$ $10x = 2.13131313\ldots$ $1000x = 213.131313\ldots$ $990x = 211$	$\frac{211}{990}$	3	M1 for 0.2131313…. or 0.2 + 0.0131313…. (dots MUST be included) M1 for two correct recurring decimals that, when subtracted, leave a terminating decimal A1 for $\frac{211}{990}$
25	(a) (b)		7 $3\sqrt{5}$	1 1	B1 for 7 (accept –7 or ±7) B1 cao
26		*AD*=*CD* equal sides *AB*=*CB* equal sides *BD* is common *ADB* is congruent to *CDB* (SSS)		3	B2 for two of *AD*=*CD*, *AB*=*CB*, *BD* is common OR for BD common and all other sides equal in length (it must be clear that the 'other sides' relate to the two triangles) (B1 for one of these. Note: All sides are of the same length alone is ambiguous and gains B0) B1 for proof of congruence (SSS or SAS or ASA) dependent upon THREE identities (with reasons)
27	a(i) (ii) (b)		$\frac{\sqrt{3}}{2}$ $-\frac{\sqrt{3}}{2}$	2 2	B1 cao B1 cao B2 cao [B1 for sine curve,starting from the origin with amplitude 4, OR B1 cuts *x* axis at 90, 180, 270, 360 and starts from 0]

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28		$y^2 = (3x + 1)^2$ $x^2 + 9x^2 + 6x + 1 = 5$ $10x^2 + 6x + 1 = 5$ $10x^2 + 6x - 4 = 0$ $2(5x^2 + 3x - 2) = 0$ $2(5x - 2)(x + 1) = 0$	$x = 0.4$ $y = 2.2$ $x = -1$ $y = -2$	6	M1 for $(3x + 1)^2$ seen or implied by sight of $9x^2 + 1$ A1 for $x^2 + 9x^2 + 6x + 1 = 5$ or equivalent expanded form M1 (dep) for correct attempt to solve a 3-term quadratic equation (condone omission of = 0) A1 for $x = 0.4$, $x = -1$ M1 (dep on previous Ms) for sub one value of x into either equation A1 for $y = 2.2$, $y = -2$ (correctly paired with x values) [SC: B1 for one correct pair of solutions if M0 scored]