GCSE

Edexcel GCSE

Mathematics A 1387

Paper 5525/06

Summer 2005

Mark Scheme (Results)

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NOTES ON MARKING PRINCIPLES

1   **Types of mark**
   - M marks: method marks
   - A marks: accuracy marks
   - B marks: unconditional accuracy marks (independent of M marks)

2   **Abbreviations**
   cao – correct answer only
   ft – follow through
   isw – ignore subsequent working
   SC: special case
   oe – or equivalent (and appropriate)
   dep – dependent
   indep - independent

3   **No working**
   If no working is shown then correct answers normally score full marks
   If no working is shown then incorrect (even though nearly correct) answers score no marks.

4   **With working**
   If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
   If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
   Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
   If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
   If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.
   If there is no answer on the answer line then check the working for an obvious answer.

5   **Follow through marks**
   Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
   Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

6   **Ignoring subsequent work**
       It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. incorrect cancelling of a fraction that would otherwise be correct
       It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.
       Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

7   **Probability**
       Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
       Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
       If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
       If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

8   **Linear equations**
       Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

9   **Parts of questions**
       Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in anoth

No		Working	Answer	Mark	Notes
1	(a)	$v - u = 5t$	$\dfrac{v-u}{5}$	2	M1 for isolating $\pm 5t$ or $\pm t$ or for dividing through by 5 A1 oe
	(b)	$x - 3 = 5x - 25$ $22 = 4x$	$5\dfrac{1}{2}$	3	M1 for $x - 3 = 5(x - 5)$ or $\dfrac{x}{5} - \dfrac{3}{5} = x - 5$ M1 for isolating terms in x correctly from $ax + b = cx + d$ A1 cao accept $5\dfrac{1}{2}$, $\dfrac{11}{2}$, 5.5
2	(a)	$36 \div (7+3+2)$ "3" $\times$ 7	21	3	M1 for $36 \div (7+3+2)$ M1 (dep) for "3" $\times$ 7 or 3 or 2 A1 cao
	(b)	$51.5 \times \dfrac{8.5}{100} = 4.3775$ $51.5 - 4.3775 = 47.1225$	47 or 47.1 or 47.12	4	M1 for $51.5 \times \dfrac{8.5}{100}$ or 4.37(75) seen M1 (dep) for $51.5 -$ "4.37(75)" A1 for 47 or better B1 (indep) for rounding their answer correctly to the nearest whole number or 1 or 2 d.p OR M1 for $51.5 \times \dfrac{100 - 8.5}{100}$ M1 for $51.5 \times$ "0.915" or $0.515 \times$ "91.5" A1 for 47 or better B1 (indep) for rounding their answer correct to the nearest whole number or 1 or 2 d.p

No		Working	Answer	Mark	Notes
3		3→15 4→48 3.1→17.3(91) 3.2→19.9(68) 3.3→22.7(37) 3.4→25.7(04) 3.5→28.8(75) 3.4→25.7(04) 3.3→22.7(37) 3.35→24.1(95375)	3.3	4	B2 for trial between 3.3 and 3.4 inclusive (B1 for trial between 3 and 4 inclusive) B1 for different trial between 3.3 and 3.4 exclusive B1 (dep on at least one previous B1) for 3.3 NB trials should be evaluated to at least 1 dp truncated or rounded
4	(a)		Angle in a semicircle	1	B1 oe
	(b)	$12^2 + 16^2 = 400$ $\sqrt{400} = 20$	20	3	M1 for $12^2 + 16^2$ M1 for $\sqrt{144 + 256}$ A1 cao
	(c)	$\pi \times 10^2$	314	3	M1 for $\pi \times \left(\dfrac{"20"}{2}\right)^2$ M1 (indep) for correct order of evaluation of $\pi \times r^2$ for any r A1 for 314 – 315 inclusive

No		Working	Answer	Mark	Notes
5	(a)	$(1 \times 10)+(3 \times 15)+(5 \times 30)+(7 \times 35)+$ $(9 \times 25)+(11 \times 5) = 730$ "730" $\div 120 = 6.08333$	6.08	4	M1 for use of fx with x consistent within intervals (including end points) M1 (dep) for use of midpoints M1 (dep on 1st M1) for use of $\dfrac{\sum fx}{\sum f}$ A1 6.08 to 6.085
	(b)		(10),25,55,90, 115,120	1	B1 for all correct
	(c)		graph	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)
	(d)		$72 - 74$	2	M1 (ft dep on graph being cf) for reading from graph at 7 A1 ft ± 1 full (2 mm) square Or B2 for $72 - 74$

5

No		Working	Answer	Mark	Notes
6	(a)		a^7	1	B1 accept a^{4+3}
	(b)		$15x^3y^4$	2	B2 cao (B1 for two of 15, x^3, y^4 in a product)
	(c)		$x - 1$	1	B1 cao
	(d)		$(a + 3b)(a - 3b)$	2	B2 for $(a + 3b)(a - 3b)$ (B1 for $(a \pm 3b)(a \pm 3b)$
7		$80\% = 220$ $220 \div 80 \times 100$	275	3	M1 for recognising that 80% is equivalent to 220 M1 for $220 \div 80 \times 100$ oe A1 cao
8			$x = 3$ $y = 0.5$	3	M1 for coefficients of x or y the same followed by correct operation, 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
9			1.4×10^{10}	2	B2 for 1.4×10^{10} or 1.44×10^{10} (B1 for 14.4×10^9 or 14400,000,000 or 14000,000,000 or 14×10^9)

No		Working	Answer	Mark	Notes
10	(a)	$\tan x = \dfrac{1.9}{3.2}$ $x = \tan^{-1}\left(\dfrac{1.9}{3.2}\right) = 30.7$	30.7	3	M1 for $\tan x = \dfrac{1.9}{3.2}$ or $\tan \dfrac{1.9}{3.2}$ M1 for $\tan^{-1}\left(\dfrac{1.9}{3.2}\right)$ A1 for 30.6 – 30.7
	(b)	90 + "30.7"	121	1	B1 (indep) ft for 90 + "30.7" rounded to 3 or 4 s.f
11	(a)	$SF = \dfrac{12}{9}$ $\dfrac{12}{9} \times 6 = 8$	2	2	M1 for $\dfrac{12}{9}$ or $\dfrac{9}{12}$ or 1.33… seen or 0.75 seen or 8 seen or $\dfrac{6}{9}$ or $\dfrac{9}{6}$ or 0.66… or 1.5 or $\dfrac{1}{3}$ or 3 oe seen A1 cao
	(b)	$SF = \dfrac{9}{12}$, $\dfrac{9}{12} \times 7 = 5.25$	5.25	2	M1 for $\dfrac{BE}{7} = \dfrac{9}{12}$ oe A1 cao

No		Working	Answer	Mark	Notes
12	(a)	$84 = 6.7\pi + 2 \times 6.7 + 2a$ $2a + 13.4 = 62.95\ldots$ or $2a + 34.44 = 84$	24.8	3	M1 for substituting correctly, π may be left M1 for correct rearrangement as far as $\pm 2a$ A1 for $24.7 - 24.8$
	(b)	$P = \pi r + 2r + 2a$ $P - 2a = \pi r + 2r$ $P - 2a = (\pi + 2)r$	$\dfrac{P - 2a}{\pi + 2}$	3	M1 subtracting $2a$ from each side M1 for factorising to get $(\pi + 2)r$ A1 for $\dfrac{P - 2a}{\pi + 2}$ oe S.C $\dfrac{p - 2a}{5.14}$ oe is M1 M1 A0
13		Area $\Delta ABC = \frac{1}{2} \times 14 \times 8 \times \sin 106 \ (= 53.8)$	53.8	3	M1 for $\frac{1}{2} \times 14 \times 8 \times \sin 106$ M1 (dep) for $56 \times 0.961(26..)$ or $107.6\ldots$ A1 $53.8 - 53.9$ SC 107.6 is B2
14	(a)		4.5	1	B1 cao
	(b)	$500 \times 1.045^{20} = 1205.857\ldots$	1205.86	2	M1 for 500×1.045^{20} A1 for $1205.85 - 1206$ (SC:B1 for $705.85 - 706$ no working)
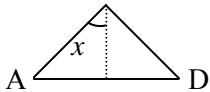
No		Working	Answer	Mark	Notes
15	(a)	$6x^2 + 11x - 10 + 6x - 4 = 25$ $6x^2 + 17x - 39 = 0$		3	M1 for an expression for the area involving either $(3x - 2)(2x + 5) + 2(3x - 2)$ or $3x(3x - 2) + (3x - 2)(7 - x)$ or $3x(2x + 5) - 2(7 - x)$ or $(3x - 2)^2 + 2(3x - 2) + (3x - 2)(7 - x)$ where in each case at least one of 2 or 3 product terms must be correct M1 (indep) for one correct expansion involving x^2 A1 for simplification to final answer

No	Working	Answer	Mark	Notes
15 (b)(i)	$x = \dfrac{-17 \pm \sqrt{17^2 - 4 \times 6 \times (-39)}}{2 \times 6}$ $= \dfrac{-17 \pm \sqrt{289 + 936}}{12}$ $x = +\dfrac{18}{12}$ or -4.33 $x^2 + \dfrac{17}{6}x - \dfrac{39}{6} = 0$ $\left(x + \dfrac{17}{12}\right)^2 - \left(\dfrac{17}{12}\right)^2 - \dfrac{39}{6} = 0$ $\left(x + \dfrac{17}{12}\right)^2 = \left(\dfrac{17}{12}\right)^2 + \dfrac{39}{6}$	$1.5, \ -\dfrac{13}{3}$	4	M1 for $x = \dfrac{-17 \pm \sqrt{17^2 - 4 \times 6 \times (-39)}}{2 \times 6}$ up to signs in b & c M1 for $x = \dfrac{-17 \pm \sqrt{1225}}{12}$ A1 $x = 1.5$ or -4.33, or better OR M2 for $(3x + 13)(2x - 3)$ (M1 for $(3x \pm a)(2x \pm b)$ with $ab = \pm 39$ A1 $x = 1.5$ or -4.33, or better OR M1 for $\left(x + \dfrac{17}{12}\right)^2$ seen M1 $\left(x + \dfrac{17}{12}\right)^2 = \left(\dfrac{17}{12}\right)^2 + \dfrac{39}{6}$ A1 $x = 1.5$ or -4.33, or better SC:M1 for answer "1.5" with no working or T & I
(ii)		8		B1 cao length = 8

No	Working	Answer	Mark	Notes
16 (a)	$P(\text{win}) = \dfrac{2}{5} \times \dfrac{3}{5} + \dfrac{2}{5} \times \dfrac{1}{5} (= \dfrac{8}{25})$	$\dfrac{8}{25}$	3	M1 for $\dfrac{2}{5} \times \dfrac{3}{5}$ or $\dfrac{2}{5} \times \dfrac{1}{5}$ or for clearly identifying in P(R) $\times$ P(R) + P(B) $\times$ P(B) M1 for $P(\text{win}) = $ " $\dfrac{2}{5}$ " $\times$ " $\dfrac{3}{5}$ " $+$ " $\dfrac{2}{5}$ " $\times$ " $\dfrac{1}{5}$ " A1 for $\dfrac{8}{25}$, oe
(b)	$\dfrac{8}{25} \times 100 \ (=32)$ $100 \times 20 -$ "32" $\times 50$	£4	2	M1 for $($ " $\dfrac{8}{25}$ " $\times 100) \times 50$ or $\times 0.5$ A1 cao

No	Working	Answer	Mark	Notes
17	Lower bound of 1200 is 1150 Upper bound of 60 is 65 $1150 \div 65$	17	4	B1 for 1150 or 1250 seen B1 for 65 or 55 seen M1 (Lower bound of load) $\div$ (Upper bound of weight) Where $1150 \leq$ LB load < 1200 and $\qquad 60 <$ UB Weight ≤ 65 A1 for 17 requires fully correct working OR B1 for 1150 or 1250 seen B1 for 65 or 55 seen M1 (upper bound of load) $\div$ (lower bound of weight) Where $1200 <$ UB load ≤ 1250 and $55 \leq$ LB weight < 60 A1 for 22 requires fully correct working OR M2 $1200 \div 55$ A1 21.8 A1 21 requires fully correct working OR M2 $1200 \div 65$ A1 18.4(6) A1 18 requires fully correct working
18 (a)	$3^4 x^4 y^8$	$81x^4 y^8$	2	B2 for $81x^4 y^8$ (B1 for 2 of 81, x^4, y^8)
(b)	$\dfrac{x(x-3)}{(x-5)(x-3)}$	$\dfrac{x}{x-5}$	3	B1 for $x(x-3)$ B1 for $(x-5)(x-3)$ B1 cao

No		Working	Answer	Mark	Notes
19	(a)	$6^2 - 2^2 = 32$	5.66	2	M1 for $6^2 - 2^2 \ (= 32)$ A1 5.65 – 5.66
	(b)	V V A _____ D x $DVA = 2 \times \sin^{-1}(\frac{2}{6})$ OR $\cos DVA = \dfrac{6^2 + 6^2 - 16}{2 \times 6 \times 6}$ $= \dfrac{56}{72}$ $DVA = \cos^{-1}\left(\dfrac{56}{72}\right) = 38.94$	38.9	3	M1 $\sin x = \dfrac{2}{6}$ oe M1 for $DVA = 2 \times \sin^{-1}(\frac{2}{6})$ A1 38.9 – 38.95 OR M1 for $(\cos DVA =) \dfrac{6^2 + 6^2 - 4^2}{2 \times 6 \times 6}$ M1 for $DVA = \cos^{-1}\left(\dfrac{56}{72}\right)$ A1 38.9 – 38.95

No		Working	Answer	Mark	Notes
19	(c)	$AC^2 = 2^2 + 2^2 - 2 \times 2 \times 2 \times \cos 120°$ $AC = \sqrt{12}$ **OR** $AN = 2 \times \sin 60 = \sqrt{3}$ **OR** $VN = \sqrt{"32"+1} = \sqrt{33}$ $\cos AVC = \dfrac{6^2 + 6^2 - 12}{2 \times 6 \times 6}$ $\cos AVC = \dfrac{60}{72}$ **OR** $AVC = 2 \times \sin^{-1}\dfrac{\sqrt{3}}{6}$, using AN **OR** $AVC = 2 \times \cos^{-1}\dfrac{\sqrt{33}}{6}$, using VN	33.6	4	M1 for any valid method for AC or AN or VN where N is the midpoint of AC A1 for $AC^2 = 12$ or $AC = \sqrt{12}$ $(= 3.46...)$ or $AN = \sqrt{3}$ $(=1.73...)$ or $VN = \sqrt{33}$ $(=5.74...)$ M1 (indep) for correct method to find angle AVC A1 $33.55 - 33.6$

No		Working	Answer	Mark	Notes
20	(a)	Graph translated 1 unit to the right passing through the points (-1,0), (1,2) and (2,0)		2	M1 for translation of $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$ or $\begin{pmatrix} -1 \\ 0 \end{pmatrix}$ A1 for right through the 3 points, $\pm \dfrac{1}{4}$ sq
	(b)	Graph stretched 2 units parallel to y-axis; passing through the points (-2,0), (0,4) and (1,0)		2	M1 for graph stretched parallel to the y-axis by scale factor 2 A1 through all 3 points; $\pm \dfrac{1}{4}$ sq not on grid at $x = 2$