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Edexcel GCSE

Mathematics A 1387

Paper 5525/06

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Mark Scheme

Edexcel GCSE

Mathematics A 1387

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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 another.

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No.	**Working**	**Ans.**	**Mark**	**Notes**
1	$\frac{451-376}{376}\times 100$	19.9%	3	M1 $\frac{451-376}{376} = \frac{75}{376} = 0.199$ M1 (dep) $\frac{'451-376'}{376}\times 100$ A1 19.9 – 19.95% Alternative: M2 $\frac{451}{376}\times 100 - 100$ A1 19.9 – 19.95% SC: B1 for 119.9 – 119.95 or $\frac{451-376}{451}\times 100$ oe NB: ignore 0s for the purpose of awarding the method marks.
2	x $x^3 - 5x$ 4 44 4.1 48.4(2) 4.2 53.0(8) 4.3 58.0(0) 4.4 63.1(8) 4.5 68.6(2) 4.6 74.3(3) 5 100 4.35 60.5(6)	4.3	4	B2 for trial between 4.3 and 4.4 inclusive (B1 for trial between 4 and 5 inclusive) B1 for different trial between 4.3 and 4.4 exclusive B1 (dep on at least one previous B1) for 4.3 cao NB Trials should be evaluated to at least 1 dp truncated or rounded, apart from those which when done so would give .0 which can be rounded to the nearest integer

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No.	**Working**	**Ans.**	**Mark**	**Notes**
3(a)	$5.6^2 + 10.5^2$ $\sqrt{31.36 + 110.25} = \sqrt{141.61}$	11.9	3	M1 $5.6^2 + 10.5^2$ M1 (dep) $\sqrt{31.36 + 110.25}$ A1 cao
(b)	'11.9' + (10.5 – 5.6) = 16.8 4 × 16.8	67.2	2	M1 '11.9' + (10.5 – 5.6) or 4× '11.9'+ 4 × (10.5 – 5.6) A1 cao (SC B1 for 68.6)
4	$\frac{1}{2}\pi \times 10^2$	157 cm^2	3	M1 for sight of $\frac{1}{2}\pi \times 10^2$ or $\pi \times 10^2$ A1 157 – 157.1 B1 (indep) cm^2
5(a)	(106+1)÷2 th value	$30 < T \leq 40$	1	B1 cao
(b)	5×20 + 15 × 17 + 25 × 12 + 35 × 32 + 45 × 25 = (100+ 255+300+1120+ 1125) ÷ 106 =2900 ÷ 106	27.4	4	M1 *fx* consistent within each interval, allow 1 error. M1 use of midpoints in *fx* M1 (dep on 1st M1) $\frac{\Sigma fx}{\Sigma f}$ A1 27.3 – 27.4

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No.	**Working**	**Ans.**	**Mark**	**Notes**
6(a)	6 −2 0	6, –2, 0	2	B2 all 3 correct (B1 one or two correct)
(b)		Graph	2	B1 for 5 or 6 points plotted either correct or ft from their table. B1 Joined with a smooth curve For either B mark ft on (a) if at least B1 awarded
(c)(i) (ii)	$y = 2.5$ drawn	–0.5, 2.5	2	B1 –0.4 to –0.6 or ft graph ±0.1 B1 2.4 to 2.6 or ft ft graph ±0.1 SC If B0 then B1 $y = 2.5$ drawn at least $-1 \leq x \leq 2$; tolerance within $y=2$ and $y=3$ NB Accept coordinates that define the values.
7	$2000\times1.05^2 = 2000\times1.1025$ **or** $2000\times1.05 = 2100$ $2100\times1.05 = 2205$	£2205	3	M2 2000×1.05^2 (M1 2000×1.05^n, $n \neq 2$) A1 cao **Or** M1 $\frac{5}{100} \times 2000$ (oe) or 100 or 200 or 2100 or 2200 seen M1 (dep) $\frac{5}{100} \times$ (2000 + "100") A1 cao SC B2 for £2315.25 seen (3 yrs)

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No.	**Working**	**Ans.**	**Mark**	**Notes**
8	2×360 , $2\times2\times180$, $2\times2\times2\times90$, $2\times2\times2\times2\times45$,	$2\times2\times2\times2\times3\times3\times5$	2	M1 at least two correct steps to find 720 as a product of its prime factors or sight of factors 2, 3, 5 on a factor tree oe A1 cao accept $2^4\times3^2\times5$
9(a)		p^{16}	1	B1 cao
(b)		q^{10}	1	B1 cao
10	(100%–25%)×Normal Price=£12.75 Normal Price = £12.75÷0.75	£17	3	M1 (100%–25%)×Normal Price=£12.75 or 0.75 or 75% seen M1 £12.75÷0.75 or £12.75 × $\frac{4}{3}$ oe A1 cao Alternative: M1 25% is £4.25 or £12.75 ÷3 (=£4.25) M1 (dep) £12.75 + "£4.25" oe A1 cao
11	$\frac{2\times2.2\times10^{12}\times1.5\times10^{12}}{2.2\times10^{12}-1.5\times10^{12}}$ $=\frac{6.6\times10^{24}}{7\times10^{11}}$	9.43×10^{12}	3	M1 6.6×10^{24} or 7×10^{11} or 0.7×10^{12} or as ordinary numbers or calculator notation M1 $\frac{6.6\times10^{24}}{7\times10^{11}}$ or as ordinary number or calc notation A1 9.42×10^{12} to 9.43×10^{12} SC B1 for $9.4\ldots\times10^{n}$ where $n\neq12$ and an integer
12	$6x + 2y = 16$ $4x + 2y = 9$ $2x = 7$, $x = 3.5$ $3\times3.5 + y = 8$, $y = -2.5$	$x = 3.5$, $y = -2.5$	3	M1 full method to eliminate x or y, allow one accuracy error M1 (dep) for substitution of one variable in one of the equations, or by appropriate method after starting again A1 both cao

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No.	**Working**	**Ans.**	**Mark**	**Notes**
13(a)(i) (ii) (b)	130÷2 $RQP = 55°$ $RSP = 180° - RQP$	65 Reason 125	2 2	B1 cao B1 'angle at centre is twice the angle at the circumference' Allow "origin & O & middle" and "edge & perimeter" M1 full method for *RSP* A1 cao (SC B1 for methods that depend on QRS = 90^o and PQO = 27.5^oleading to 125^o)
14	$\tan x = \frac{4.5}{12} = 0.375$ $x = \tan^{-1} 0.375$	20.6	3	M1 $\tan$ *and* $\frac{4.5}{12}$ M1 $\tan^{-1}\left(\frac{4.5}{12}\right)$ A1 20.55 – 20.6 RAD: 0.3587 GRAD: 22.84 for M2
15	$27 = \frac{4(x+10)}{2}$ $27 = 2x + 20$	3.5	3	M1 $27 = \frac{4(x+10)}{2}$ M1 Expansion to $4x+40$ or ×2 to give $54=4(x+10)$ A1 for 3.5, accept $\frac{14}{4}$ or $\frac{7}{2}$ SC: B1 for $x=11$

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No.	**Working**	**Ans.**	**Mark**	**Notes**
16(a)	$\frac{1240+1270+1330}{3}$	1280	2	M1 $\frac{1240+1270+1330}{3}=\frac{3840}{3}$; accept $1240 + 1270 + 1330 \div 3$ oe A1 cao
(b)	$\frac{1300+1330+x}{3}=1350$ or $(1350 \times 3) - (1300 + 1330) = 4050–2630$	1420	2	M1 $\frac{1300+1330+x}{3}=1350$ **OR** $(1350 \times 3) –(1300 + 1330)$ or 4050–2630 A1 cao
17(a)		0.2 0.58, 0.22 0.2	2	B1 0.2 on jazz on 1st set B1 0.58, 0.22 0.2 repeated 3 times
(b)	0.2×0.2	0.04	2	M1 '0.2' × '0.2' A1 cao

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No.	**Working**	**Ans.**	**Mark**	**Notes**
(c)	$0.8 \times 0.2 \times 2 + 0.2 \times 0.2$ or $1 - 0.8 \times 0.8$	0.36	3	M1 $(0.58+0.22) \times$ '0.2' M1 $(0.58+0.22) \times$ '0.2' $\times 2 +$ '0.2' $\times$ '0.2' A1 0. 36 cao **OR** M2 $1 - (0.58+0.22)^2$ A1 0.36 cao Listing the outcomes for (c) CJ $0.58\times$'0.2' = 0. 116 FJ $0.22\times$'0.2' = 0.044 JC '0.2'$\times 0.58 = 0.116$ JF '0.2'$\times 0.22 = 0.044$ JJ '0.2'$\times$'0.2' = 0.04 M2 for all 5 terms added (M1 for any 2, 3 or 4 terms added)
18	$f = \frac{k}{d}$ $256 = \frac{k}{50}$ $k = 12800$ $f = \frac{'12800'}{80}$ OR $50 \times 256 = f \times 80$ $f = \frac{'12800}{80}$	160	3	M1 $f = \frac{k}{d}$ M1 $256 = \frac{k}{50}$ (also implies first M1) A1 cao **OR** M1 $50 \times 256 = f \times 80$ M1 $f = \frac{'12800}{80}$ A1 cao

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No.	**Working**	**Ans.**	**Mark**	**Notes**
19(a)	$3x(2x-7)+x(3x+4)=85$ $6x^2-21x+3x^2+4x=85$	AG	3	M1 for $3x(2x-7), x(3x+4)$ oe M1 for $6x^2-21x+3x^2+4x$ oe (at least 3 out of 4 terms correct) A1 fully correct working leading to given equation **OR** M1 $x(5x-3), 2x(2x-7)$ oe M1 $5x^2-3x+4x^2-14x$ oe(at least 3 out of 4 terms correct) A1 fully correct working leading to given equation **OR** M1 $3x(5x-3), 2x(3x+4)$ oe M1 $15x^2-9x-6x^2-8x$ oe(at least 3 out of 4 terms correct) A1 fully correct working leading to given equation.
(b) (i)	$x=\frac{-(-17)\pm\sqrt{(-17)^2-4\times9\times(-85)}}{2\times9}$ $x=\frac{17\pm\sqrt{3349}}{18}=\frac{17\pm57.87}{18}$	4.16,− 2.27	4	M1 correct substitution up to signs M1 $x=\frac{17\pm\sqrt{3349}}{18}$ A1 4.15 – 4.16, −2.27 – −2.271 T&I B1 first value, B2 second value
(ii)		1.32		B1 1.3 – 1.32

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No.	**Working**	**Ans.**	**Mark**	**Notes**
20	$BD = 3\times\tan 35 = 2.101$ $\frac{'2.101'}{9} = \sin BAD$	13.5	4	M1 $BD = 3\times\tan 35$ A1 2.10(06..) M1 $\frac{'2.101'}{9} = \sin BAD$ A1 13.49 – 13.5
21	$\frac{1}{2}\times x^2 \times \sin 60 = 36$ $x^2 = \frac{72}{\sin 60} = 83.13..$	9.12	3	M1 $\frac{1}{2}\times x^2 \times \sin 60 (=36)$ or $\frac{1}{2}\times ab \times \sin 60 (=36)$ Or $\frac{1}{2}\times x \times \sqrt{x^2 - \left(\frac{x}{2}\right)^2}$ (=36) M1 $x^2 = \frac{72}{\sin 60}$ or $ab = \frac{72}{\sin 60}$ or $x^2 = \frac{36\times 2}{\sqrt{0.75}}$ A1 9.11 – 9.12
22(a) (b)	 $(p-t)y = 2pt$ $py - ty = 2pt$ $py = ty + 2pt$ $py = t(y+2p)$	$8x^{12}y^{15}$ $t = \frac{py}{y+2p}$	2 4	B2 (B1 any two correct in a 3 term product) (SC B1 for $8x^{12} + y^{15}$) M1 eliminate fractions $(p-t)y = 2pt$ M1 $py - ty = 2pt$ M1 Collect terms in t on 1 side with all other terms on the other side $py = ty + 2pt$ A1 cao
23	$M = 8.5\times 6.45^3$	2300	3	B1 8.5 or $8.4\dot{9}$ or 6.45 or $6.44\dot{9}$ seen M1 '8.5'× '6.45'^{3} where 8<'8.5'≤8.5 and 6.4<'6.45'≤6.45 A1 2280 – 2300 before rounding

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No.	**Working**	**Ans.**	**Mark**	**Notes**
24(a)	$(x-4)^2-16+23$	$p = 4$, $q=7$	3	M1 for sight of $(x-4)^2$ A1 $p=4$, A1 $q = 7$ **or** M1 $x^2-2px+p^2(+q)$ seen A1 $p=4$, A1 $q = 7$ **Or** M1 Substitute 2 different values of x and attempt to solve for p, q A1 $p=4$, A1 $q = 7$
(b)		(4, 7)	1	B1 ft on (a)
(c)	Reflection in the y axis		1	B1

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No.	**Working**	**Ans.**	**Mark**	**Notes**
25	$DC^2 = 5^2 + 8^2;\ DC = \sqrt{89}$ $DB^2 = 5^2 + 10^2;\ DB = \sqrt{125}$ $BC^2 = 8^2 + 10^2;\ BC = \sqrt{164}$ $\cos CDB = \dfrac{89 + 125 - 164}{2 \times \sqrt{89} \times \sqrt{125}}$ $= 0.23702$	76.3	6	M1 $(DC^2 =)5^2 + 8^2$ or $DC = \sqrt{89} = 9.4(3)$ M1 $(DB^2 =)5^2 + 10^2$ or $DB = \sqrt{125} = 11.1(8)$ M1 $(BC^2) = 8^2 + 10^2$ or $BC = \sqrt{164} = 12.8(1)$ M2 $\cos CDB = \dfrac{'89' + '125' - '164'}{2 \times '\sqrt{89}' \times '\sqrt{125}'}$ A1 76.2–76.3 **OR** M1 correct sub into cosine rule on formula sheet $\sqrt{'164'}^2 = \sqrt{'89'}^2 + \sqrt{'125'}^2 - 2 \times \sqrt{'89'} \times \sqrt{'125'} \times \cos x$ M1 correct rearrangement to $\cos CDB = \dfrac{'89' + '125' - '164'}{2 \times '\sqrt{89}' \times '\sqrt{125}'}$ A1 76.2–76.3