

Edexcel GCSE

Mathematics B 1388

Paper 5538/19

June 2007

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Confidential (Online) Mark Scheme

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

Remember: if you are having difficulty making a decision on how you should mark a candidate response contact your Team Leader for advice, or send the item to review.

GCSE MATHEMATICS 5538/19
FINAL VERSION 18/06/2007
MARK SCHEME - JUNE 2007

Paper 5538/19				
No	Working	Answer	Mark	Notes
1		273	2	M1 for $728 \div 8$ or $728 \div "3+5"$ or 91 A1 cao SC B1 for 455 or for $273 : 455$
2		$3n - 1$	2	B2 for $3n - 1$ oe (B1 for $3n + k$ where $k \neq -1$ but k could be 0)
3	3 24 3.7 46.9(53) 4 60 3.8 51.0(72) 3.1 26.6(91) 3.9 55.4(19) 3.2 29.5(68) 3.21 29.8(66...) 3.3 32.6(37) 3.22 30.1(66...) 3.4 35.9(04) 3.23 30.4(68...) 3.5 39.3(75) 3.24 30.7(72...) 3.6 43.0(56) 3.25 31.0(78...)	3.2	4	B2 for trial between 3.2 and 3.3 inclusive (B1 for trial between 3 and 4 inclusive) B1 for different trial between 3.21 and 3.25 inclusive B1 (dep on at least one previous B1) cao for 3.2 as final answer NB: embedded answers: -B1; award Bs for evaluations rounded or truncated to at least 1 dp or for 31
4	2 is the only even prime number and the product of 2 odd numbers is odd	Yes	2	B2 for 'yes' and '2 is the only even prime number and the product of two odd numbers is odd' oe (B1 for 'yes' and either '2 is the only even prime number' oe or 'the product of two odd numbers is odd' oe)
5	$2000 \times (1.055)^3$ Interest = $2348.48 - 2000 =$	£348.48	3	M1 for $5.5/100 \times 2000$ (oe) or 330 or 2330 or 110 or 2110 M1 (dep) for $5.5/100 \times (2000 + "110" + "116.05")$ or 122.4... A1 cao (accept only 348.48 or 348.49) OR M2 for $2000 \times (1.055)^3$ or 2348.48(...) or 2348.49 seen (M1 for $2000 \times (1.055)^n$, $n \neq 3$) A1 for 348.48 or 348.49 [SC: B2 for $2348.48 - 2348.49$]

GCSE MATHEMATICS 5538/19
FINAL VERSION 18/06/2007
MARK SCHEME - JUNE 2007

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6	$5 \div (20.3576)$	0.49558... 0.49558(9.....)	3	B3 for 0.49558... (B2 for 0.24560(8...)) or $\frac{6250}{25447}$ or evidence of a fully correct method) (B1 for 20.357(6) or 0.10983(9...) or 3.3173(3...) or 0.17069(2...))
7	$65 \times 12 = 780$ $75 \times 22 = 1650$ $85 \times 23 = 1955$ $95 \times 24 = 2280$ $105 \times 19 = 1995$ $8660/100 =$	86.6	4	M1 for use of fx with x consistent within intervals (including end points) allow 1 slip M1 (dep) for use of midpoints M1 (dep on 1 st M1) for use of $\frac{\sum fx}{100}$ or $\frac{\sum fx}{\sum f}$ A1 86.6 – 87.1
8	$2x + 5 = 6 \times 3$ $2x = 18 - 5$	$6\frac{1}{2}$ oe	2	M1 for $2x + 5 = 6 \times 3$ or $\frac{2}{3}x + \frac{5}{3} = 6$ A1
9	(a) (-14) -4 (0) 4 14	-4, 4, 14	2	B2 for all 3 values correct (B1 for just 1 or 2 values correct)
	(b)	curve	2	B1 for all 5 points plotted correctly $\pm \frac{1}{2}$ square (ft from table if at least B1 awarded in (a)) B1 (indep) ft for any smooth curve through their points

GCSE MATHEMATICS 5538/19
 FINAL VERSION 18/06/2007
 MARK SCHEME - JUNE 2007

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10	(a) $8 \times \frac{10}{4}$	20	2	M1 for $\frac{10}{4}$ or $\frac{4}{10}$ or 0.4 or 2.5 oe seen A1 cao Alternative method M1 for $\frac{8}{4}$ or $\frac{4}{8}$ oe seen A1 cao
	(b) $15 \times \frac{4}{10}$	6	2	NB. Ratios get M0 unless in the form 1 : n M1 $15 \times \frac{4}{10}$ oe A1 cao

GCSE MATHEMATICS 5538/19
 FINAL VERSION 18/06/2007
 MARK SCHEME - JUNE 2007

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11	(a) $x^2 - 4x + 3x - 12 = x^2 - x - 12$	$x^2 - x - 12$	2	M1 for exactly 4 terms correct ignoring signs (x^2 , $4x$, $3x$, 12) or 3 out of 4 terms with correct signs (x^2 , $-4x$, $+3x$, -12) A1 cao
	(b)	$12p^8q^3$	2	B2 cao (B1 for any 2 out of 3 terms correct in a product or 3 terms correct in a sum or part product)
	(c) $6=15+4q-20$ $6-15=4(q-5)$ $p-3t=4q-4t$	$2\frac{3}{4}$	3	M1 for correct substitution of p and t M1 for correct expansion of bracket $4(q-t)$ oe (eg. $4q-20$, $4q-4t$) A1 $\frac{11}{4}$ or $2\frac{3}{4}$ or 2.75 Alternative scheme M1 for correct substitution of p and t M1 for $\frac{p-3t}{4} = q-t$ oe A1 $\frac{11}{4}$ or $2\frac{3}{4}$ or 2.75
12	(a) $T=kx$; $150=6k$; $k=25$	$T=25x$	3	M1 for $T=kx$, k algebraic M1 subs $T=150$ and $x=6$ into $T=kx^n$ ($n \neq 0$) A1 for $T=25x$ oe SC: B1 for $T \propto 25x$ oe
	(b) $T = 25 \times 15 =$	375	1	B1 ft from $T=kx$, $k \neq 1$
	(c) $600 = 25x$; $x = 600 \div 25 =$	24	1	B1 ft from $T=kx$, $k \neq 1$

GCSE MATHEMATICS 5538/19
FINAL VERSION 18/06/2007
MARK SCHEME - JUNE 2007

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13	$\frac{120}{570} \times 50 = 10.5263$ $\frac{250}{570} \times 50 = 21.9298$ $\frac{200}{570} \times 50 = 17.5438$	10 22 18	3	M1 method shown eg $\frac{120}{120 + 250 + 200} \times 50$ or one of 10.5(263), 21.9(298), 17.5(438) OR $570 \div 50 = 11.4$ and one of $120 \div 11.4 (=10.5(263))$, $270 \div 11.4 (=21.9(298))$, $200 \div 11.4 (=17.5(438))$ A1 for 10.5(263), 21.9(298), 17.5(438) or 11, 22, 18 B1 correction to add to 50: 10, 22, 18 or 11, 22, 17
14	$AB^2 = 8^2 + 9^2 - 2 \times 8 \times 9 \times \cos 40$ $AB^2 = 64 + 81 - 144 \times \cos 40$ $AB^2 = 145 - 144 \times 0.766$ $AB^2 = 145 - 110.31... = 34.6896$ $AB = \sqrt{34.6796} = 5.8897877$	5.89	3	M1 Subs in Cos Rule: $8^2 + 9^2 - 2 \times 8 \times 9 \times \cos 40$ M1 for correct order of evaluation of $8^2 + 9^2 - 2 \times 8 \times 9 \times \cos 40$ A1 cao 5.88 – 5.89 SC: Award B2 for one of $AB^2 = 241.03... \text{ or } AB = 15.525... \text{ (radians)}$ $AB^2 = 28.50... \text{ or } AB = 5.33... \text{ (gradians)}$

GCSE MATHEMATICS 5538/19
 FINAL VERSION 18/06/2007
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15	$\frac{4}{7} \times \frac{4}{7} \times \frac{3}{7} + \frac{3}{7} \times \frac{3}{7} \times \frac{4}{7}$ $\frac{48 + 36}{343} = \frac{84}{343}$ <p>But there are three ways this can be achieved: BBG, BGB, GBB So the probability is</p> $\frac{84}{343} \times 3 = \frac{252}{343} \text{ OR}$ $1 - \frac{64}{343} - \frac{27}{343} = \frac{252}{343}$ <p>NB: $\frac{84}{343} = 0.244897$; $\frac{252}{343} = 0.73469$</p> $\frac{4}{7} = 0.57(142...) \text{ , } \frac{3}{7} = 0.42(857...)$	$\frac{252}{343}$	3	<p>M1 for $\frac{4}{7} \times \frac{4}{7} \times \frac{3}{7}$ or $\frac{3}{7} \times \frac{3}{7} \times \frac{4}{7}$ or $\left(\frac{4}{7}\right)^3$ or $\left(\frac{3}{7}\right)^3$ or $\frac{91}{343}$ oe</p> <p>M1 (indep) for identification of all 6 outcomes</p> <p>(M2 for $1 - \left[\left(\frac{4}{7}\right)^3 + \left(\frac{3}{7}\right)^3\right]$ or $\left[1 - \frac{91}{343}\right]$)</p> <p>A1 $\frac{252}{343}$, $\frac{36}{49}$, 0.73(469...) oe</p>

GCSE MATHEMATICS 5538/19
 FINAL VERSION 18/06/2007
 MARK SCHEME - JUNE 2007

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16	(a) $\frac{1}{3} \times \pi \times 5^2 \times 8 = \pi \times 25 \times 8 \div 3 =$ 209.4395	209–210	2	M1 for $\frac{1}{3} \times \pi \times 5^2 \times 8$
	(b) Arc length = $\frac{216}{360} \times 2 \times \pi \times 15 = 18\pi$ $18\pi = 2 \times \pi \times r$ $r = 9$ Area of sector = $\frac{216}{360} \times \pi \times 15^2 = 135\pi$ $135\pi = \pi \times r \times 15$ $r = 9$ Height = $\sqrt{(15^2 - "9"{}^2)} = 12$	12	4	A1 for 209–210 M1 for $216 \div 360$ or $\frac{216}{360}$ A1 for 9 M1 for $\sqrt{(15^2 - "9"{}^2)}$ A1 cao
17	(a) $\sqrt{12^2 + 9^2 + 5^2}$	15.8	2	M1 for a complete correct method to find <i>DF</i> A1 for 15.8 – 15.82
	(b) $\sin FDB = \frac{9}{"15.8"}$	34.7	3	M1 for identification of angle <i>FDB</i> M1 for $\sin FDB = \frac{9}{"15.8"}$ or $\cos FDB = \frac{13}{"15.8"}$ or $\tan FDB = \frac{9}{13}$ or $\frac{9}{\sin FDB} = \frac{15.8}{\sin 90}$ oe A1 for 34.6 – 34.75: NB: $5\sqrt{10}$ may be used for 15.8 SC: B2 for 0.604 – 0.6061 (radians) OR 38.4 – 38.6 (gradians)