

Edexcel GCSE

Mathematics 2544

Paper 5544H/15H

Summer 2008

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Mark Scheme (Results)

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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Question	Working	Answer	Mark	Notes
1 (a) (b)		5 enlargement	1 2	B1 B2 for correct enlargement (B1 for any 3 sides correctly enlarged)
2 (a) (b)	$3 \times -4 + 5 \times 6$ $= -12 + 30$	12.7 18	1 2	B1 for 12.7 or $12\frac{7}{10}$ M1 for 3×-4 or -12 AND 5×6 or 30 seen A1 cao
3	$\frac{22.4 \times 14.5}{8.5 \times 3.2} = \frac{324.8}{27.2}$	11.94117647	2	M1 for 324.8 or 27.2 or $\frac{136}{5}$ or $\frac{1624}{5}$ A1 for 11.941(17647...). Accept $\frac{203}{17}$ or $11\frac{16}{17}$
4		Sketch	2	B2 for complete 3-D sketch (B1 for partial 3-D sketch eg pyramid or base only, or a shape with a box and 2 pyramids either end) NB : If more than one shape is shown : For 2 marks there should be no choice or alternatives other than those also worth 2 marks; if there are several diagrams of which at least one is worth 1 or 2 marks, award B1. 2D diagrams get B0

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Question	Working	Answer	Mark	Notes
5	$2x - 6 = 5$ $2x = 5 + 6 = 11$	5.5	3	M1 for $2x - 6 (= 5)$, or $x - 3 = 5 \div 2$ M1 ft for $2x = 5 + \text{"6"}$ or $x = \frac{5}{2} + \text{"3"}$ or clear intention to add "6" or "3" to both sides of the equation A1 for 5.5 or $\frac{11}{2}$ oe
6	$2 \rightarrow 12$ $3 \rightarrow 33$ $2.1 \rightarrow 13.(461)$ $2.2 \rightarrow 15.(048)$ $2.3 \rightarrow 16.(767)$ $2.4 \rightarrow 18.(624)$ $2.73 \rightarrow 25.8(06)$ $2.75 \rightarrow 26.2(96)$ $2.5 \rightarrow 20.(625)$ $2.6 \rightarrow 22.(776)$ $2.7 \rightarrow 25.(083)$ or 25 $2.8 \rightarrow 27.(552)$ $2.9 \rightarrow 30.(189)$ $2.74 \rightarrow 26.0(508)$ or 26 $2.76 \rightarrow 26.5(44576)$	2.7	4	B2 for trial between 2.7 and 2.8 inclusive (B1 for trial between 2 and 3 inclusive) B1 for different trial between 2.73 and 2.75 inclusive B1 (dep on at least one previous B1) for 2.7 only NB Trials where x has 1 dp. should be evaluated to at least 2sf. truncated or rounded Trials where x has more than 1 dp. should be evaluated to at least 3 sf. truncated or rounded.

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Question	Working	Answer	Mark	Notes
7	$\frac{91-85}{85} \times 100 = \frac{6}{85} \times 100 =$ $7.05882..$	7.06	3	<p>M2 for $\frac{91-85}{85} \times 100$ or $\frac{6}{85} \times 100$</p> <p>(M1 for $\frac{91-85}{85}$ or sight of $\frac{6}{85}$ or 0.0705 – 0.071 or $\frac{91}{85}$ or 1.0705 – 1.071 oe)</p> <p>A1 7.05 - 7.06</p> <p>OR</p> <p>M1 for $\frac{91}{85} \times 100$ (= 107.05...)</p> <p>M1 for “107.05” – 100</p> <p>A1 7.05 - 7.06</p> <p>Trial and Improvement methods must lead to an answer 7.05 – 7.06 for full marks, otherwise 0 marks</p>

5544H/15H				
Question	Working	Answer	Mark	Notes
8 (a)	$2x+2x+x+10+50=360$	$5x+60 = 360$	2	M1 for any 3 or 4 of $2x$, $2x$, $x + 10$, 50 added together A1 for $2x+2x+x+10+50 = 360$ oe including $x = 60$
(b)	$5x+60=360$ $5x=300$	60	3	M1 for isolating their terms in x M1 for dividing their numerical term by the coefficient of their x term A1 cao All the marks in (b) may be given for work done in answering (a) providing there is no contradiction Candidates can score full marks in (b) independent of their answer to (a) (eg by starting again)

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Question	Working	Answer	Mark	Notes
9 (a)	$45 \times 2 \div 9$	10	2	M1 for $45 \div "2 + 7"$ or 45×2 or 5 seen or 90 seen or 10 seen or as part of a ratio (eg. 10 : 35) A1 cao
(b)	$(80 \times 17.5/100) + 80 = 14 + 80 =$	94	3	M2 for 80×1.175 or $80 \times \frac{117.5}{100}$ oe A1 cao OR M1 for $80 \times \frac{17.5}{100}$ or 80×0.175 or 14 seen or 8+4+2 seen M1 (dep) for $80 + "14"$ or $80 + 80 \times \frac{17.5}{100}$ oe A1 cao
(c)	12000×0.8^2 OR 1 st yr: $12000 \times 0.2 = 2400$; $12000 - 2400 = 9600$ 2 nd yr: $9600 \times 0.2 = 1920$; $9600 - 1920 = 7680$ [3 rd year is 6144; 4 th yr is 4915.20]	7680	3	M1 for 12000×0.8 or sight of 9600 or 2400 or 4800 or 7200 seen M1 (dep) " 9600 " $\times 0.8$ oe A1 cao OR M2 for 12000×0.8^2 or 12000×0.8^3 A1 cao (if correct answer seen ignore subsequent years)

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Question	Working	Answer	Mark	Notes
10	$\pi \times 4^2 \times 10 = 502.65$ (502-503)	503	2	M1 for $\pi \times 4^2 \times 10$ (=502.65) A1 for 502-503 SC: B1 for $\pi \times 8^2 \times 10$
11 (a)	$8^2 + 7^2$ $64 + 49 = 113$ $\sqrt{113} = 10.630145$	10.63	3	M1 for $8^2 + 7^2$ or $64+49$ or 113 or $8^2 + 7^2 - 2 \times 8 \times 7 \times \cos 90$ M1 for $\sqrt{\text{"(64+49)"}}$ or $\sqrt{\text{"113"}}$ where it is clear that the 8 and 7 have been squared A1 for any answer in 10.63 – 10.631 inclusive SC : B1 for 10.6 with no working with or without a scale drawing
(b)	$\tan y = 32/46 = 0.6956$ $\tan^{-1} 0.6956 = 34.82^\circ$	34.8	3	M1 for $\tan (y =) \frac{32}{46}$ M1 for $\tan^{-1} 0.6956$ or $\tan^{-1} \left(\frac{32}{46} \right)$ oe (including shift tan or inv tan for \tan^{-1}) A1 for 34.79 – 34.85 OR M1 for $\sqrt{(32^2 + 46^2)}$ (= 56.03(5...)) and $\frac{\sin 90}{56.(0\dots)} = \frac{\sin y}{32}$ oe M1 ($y =$) $\sin^{-1} \frac{(\sin 90) \times 32}{56.(0\dots)}$ (= $\sin^{-1}(0.5710(6\dots))$) A1 34.79 – 34.85 SC: B2 for (radians) 0.607(8...) or (gradians) 38.6(93...) Alternative methods using Pythagoras and then sin or cos must have a fully correct method for Pythagoras and sin or cos before they score the first M1. The trigonometry could be sohcahtoa or Sine rule or Cosine rule

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Question	Working	Answer	Mark	Notes
12	<p>B at $(-2, -1), (-4, -1), (-2, -4)$</p> <p>C at $(4, -1), (6, -1), (4, -4)$</p>	<p>Rotation 180° about $(1,0)$</p>	3	<p>B1 for rotation B1 for 180° or half a turn B1 (for centre)(1,0) OR B1 for enlargement B1 for scale factor -1 accept -1 on its own if ti is clear candidate is describing an enlargement B1 for centre $(1,0)$</p> <p>Ignore diagram unless no marks scored in which case SC: B1 for showing both B and C correctly</p> <p>NB: Award no marks if more than one transformation given.</p>
13		$5c^2$ $ab+bc$	2	<p>B2 for both correct, no extras (B1 for 1 correct out of 1 or 2 answers) NB: If more than 3 crosses, deduct 1 mark for each extra to a minimum of zero.</p>
14	$\frac{150}{360} \times \pi \times 13^2 = 221.22\dots$	221	2	<p>M1 for $\frac{150}{360} \times \pi \times 13^2$ or $\pi \times 13^2 \div 2.4$ oe or A1 220 – 222</p>

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Question	Working	Answer	Mark	Notes
15	238 has a max of 238.5, a min of 237.5 27.3 has a max of 27.35, a min of 27.25 Upper: $\frac{238.5}{27.25} = 8.75229$	8.75	3	B1 for any one of 238.5, 237.5, 27.35, 27.25, 238.4 $\dot{9}$, 27.34 $\dot{9}$ seen M1 for “UB no. of miles” \div “LB no. of litres” where $238 < \text{UB of miles} \leq 238.5$ and $27.25 \leq \text{LB of litres} < 27.3$ A1 for 8.75 or 8.752 or 8.7522 or 8.7523 or better SC : $\frac{238.4}{27.25}$ which leads to 8.748.. B1 M1 A0
16	$\frac{10x+5}{3} = 4x+7$ $10x+5 = 12x+21$ $-16 = 2x$	-8	3	M1 for $10x+5$ or $12x+21$; either of these could be seen anywhere in the candidates working M1 (dep) for $10x - 12x = 21 - 5$ oe or $5 - 21 = 12x - 10x$ oe A1 cao

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Question	Working	Answer	Mark	Notes
17	$a = 3, b = 7, c = -13$ $x = \frac{-7 \pm \sqrt{7^2 - 4 \times 3 - 13}}{2 \times 3}$ $= \frac{-7 \pm \sqrt{(49+156)}}{6} = \frac{-7 \pm \sqrt{205}}{6}$ $x = 1.2196... \text{ or } -3.55297....$ OR $x^2 + \frac{7}{3}x - \frac{13}{3} = 0$ $\left(x + \frac{7}{6}\right)^2 - \frac{49}{36} - \frac{13}{3} = 0$ $\left(x + \frac{7}{6}\right)^2 = \frac{205}{36}$ $x = -\frac{7}{6} \pm \sqrt{\frac{205}{36}}$	1.22 -3.55	3	M1 for correct substitution in formula of 3, 7 and ± 13 M1 for reduction to $\frac{(-7 \pm \sqrt{205})}{6}$ A1 1.215 to 1.22 and -3.55 to -3.555 OR M1 for $\left(x + \frac{7}{6}\right)^2$ M1 for $-\frac{7}{6} \pm \sqrt{\frac{205}{36}}$ A1 1.215 to 1.22 and -3.55 to -3.555 SC : Trial and Improvement : 1 mark for 1 correct root, 3 marks for both correct roots
18	$7 = ka^1 \quad 175 = ka^3$ $k = \frac{7}{a}, \quad 175 = \frac{7a^3}{a} = 7a^2$ $a^2 = 25, \quad \text{so} \quad a = 5$ $k = \frac{7}{a}, \quad \text{so} \quad k = \frac{7}{5} = 1.4$	$a = 5$ $k = 1.4$	3	M1 for $7 = ka$ or $7 = ka^1$ and $175 = ka^3$ A1 for $a = 5$ A1 for $k = 1.4$ oe SC : Either $a=5$ or $k=1.4$ oe with no working gets B2