

Edexcel GCSE

Mathematics A 1387

Paper 5525/06

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

Paper 5525_06				
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 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...) or 31	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 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	$45^2 + 34^2 =$ $2025 + 1156 = 3181$ $\sqrt{3181} = 56.4$	56	4	M1 for $45^2 + 34^2$ M1 for $\sqrt{(2025 + 1156)}$ A1 for 56.4 ... B1 for rounding their diagonal to the nearest integer (dep on evidence from decimal) NB 56 with no incorrect working as the final answer gets full marks. NB Scale drawings result in 0 marks.

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No	Working	Answer	Mark	Notes
6	$2000 \times (1.055)^3$ Interest = 2348.48 – 2000 =	£348.48	3	M1 for $5.5/100 \times 2000$ (oe) or 330 or $16.5/100 \times 2000$ or 2330 or 110 or 2110 M1 (dep) for $5.5/100 \times (2000 + \text{“110”} + \text{“116.05”})$ or 122.4... seen 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]
7	(a)	Line	2	B2 line fully within tramlines, crossing AB and CD (B1 a straight line which crosses AB within the tramline, and also crosses CD) NB: Accept dotted or dashed lines, but not curves; accept freehand if considered to be straight. SC B1 for the perpendicular bisector of AB reaching halfway or more from AB B2 correct arc ± 2 mm and shaded within. Allow dotted or continuous arc. (B1 inaccurate arc and shaded or accurate arc unshaded)
	(b)	Region		
8	$65 \times 12 = 780$ $75 \times 22 = 1650$ $85 \times 23 = 1955$ $95 \times 24 = 2280$ $105 \times 19 = 1995$ $8660/100 =$	86.6	4	M1 for use of fx with x consistent within intervals (including end points). Allow one slip even if outside interval M1 (dep) for use of midpoints M1 (dep on 1 st M1) for use of $\sum fx/100$ or $\sum fx/\sum f$ A1 86.6

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No	Working	Answer	Mark	Notes
9	Distance ÷ time: $1400 \div 2$ h 20 min 20 mins is $\frac{1}{3}$ hour $1400 \times 3 \div 7 =$	600 kph	3	B1 20 mins as $\frac{1}{3}$ hour or as 0.33.....hour M1 for distance ÷ time eg $1400 \div$ “2h 20 min” A1 cao OR B1 2 hour 20min = 140 (min) M1 Speed = $\frac{1400}{140} =$ (10 km per minute) A1 cao
10 (a)	$(x+18)+2x+(2x+7)=180$	Equation	2	B2 for $(x+18)+2x+(2x+7)=180$ oe (B1 for $(x+18)+2x+(2x+7)$)
(b)	$5x+25 = 180$ $5x = 155$	31	2	M1 for simplifying to at least $5x+25=180$ or 360 (may be earned in (a)) A1 for $x=31$
11 (a)	(-14) -4 (0) 4 14	-4, 4, 14	2	B2 for all 3 values correct (B1 for 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

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No	Working	Answer	Mark	Notes	
12	(a)	$8 \times \frac{10}{4}$	20	2	M1 $\frac{10}{4}$ or $\frac{4}{10}$ or 0.4 or 2.5 oe seen A1 cao NB ratios get M0 unless of the form 1:n OR M1 $\frac{8}{4}, \frac{4}{8}$ oe seen A1 cao
	(b)	$15 \times \frac{4}{10}$	6	2	M1 $15 \times \frac{4}{10}$ oe A1 cao
13	(a)	$9.9 \times 10^8 - 6.0 \times 10^7$	$\pm 9.3 \times 10^8$	2	M1 for $99 \times 10^7 - 6.0 \times 10^7$ or $9.9 \times 10^8 - 0.60 \times 10^8$ or correct conversion of either to an ordinary number or 930000000 or 9.3×10^n where n is any positive integer A1 cao
	(b)	$\frac{6.0 - 4.5}{4.5} \times 100 = \frac{1.5}{4.5} \times 100 =$ or $\frac{6.0 \times 10^7 - 4.5 \times 10^7}{4.5 \times 10^7} \times 100$	33.3%	3	M2 $\frac{6.0 \times 10^7 - 4.5 \times 10^7}{4.5 \times 10^7} \times 100$ oe (M1 for $\frac{6.0 \times 10^7 - 4.5 \times 10^7}{4.5 \times 10^7}$ or $\frac{6.0 \times 10^7 - 4.5 \times 10^7}{6.0 \times 10^7} \times 100$ oe A1 33.3 – 33.4 OR M2 $\frac{6.0 \times 10^7}{4.5 \times 10^7} \times 100 - 100$ or 33.3% (M1 $\frac{6.0 \times 10^7}{4.5 \times 10^7} \times 100$ or 133.3%) A1 33.3-33.4 NB Accept any of the above expressions without any reference to 10^7 .

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No	Working	Answer	Mark	Notes
14	LCM (40,24) = 120 Bread buns $120 \div 40$ Burgers $120 \div 24$ OR Bread buns: 40 is $2 \times 2 \times 2$ ($\times 5$) Burgers: 24 is $2 \times 2 \times 2$ ($\times 3$)	Bread Buns 3 Burgers 5	3	M1 attempt to find LCM by eg lists of multiples, or summing of 40s and summing of 24s, with at least 3 numbers in each list A1 identify 120 as LCM A1 cao (both) OR M1 expansion of either number into its prime factors in a factor tree or 8×5 or 8×3 A1 both expansions correct A1 cao (both) SC B2 if answers given the wrong way around
15	$\sin 32 = \frac{AB}{12}$ $AB = 12 \times \sin 32$ $AB = 6.35903\dots$	6.36	3	M1 $\sin 32 = \frac{AB}{12}$ (accept $\sin \frac{AB}{12}$) M1 $12 \times \sin 32$ or $12 \times 0.5299\dots$ A1 accept 6.359 – 6.360 SC Gradians 5.78(1...) Radians 6.62 Get M1M1A0 OR Use of Sine Rule $\frac{\sin 32}{AB} = \frac{\sin 90}{12}$ or $\frac{AB}{\sin 32} = \frac{12}{\sin 90}$ M1 $AB = \frac{12 \times \sin 32}{\sin 90}$ M1 $AB = 6.359 - 6.36$ A1 SC Gradians 5.85(...) Radians 7.40(...) M1M1A0

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No	Working	Answer	Mark	Notes	
16	$8 \times 41 = 328$ $2 \times 29 = 58$ $328 - 58 = 270$ $270 \div 6 = 45$	45	3	M1 for either $8 \times 41 (=328)$ or $2 \times 29 (=58)$ M1 (dep) “328” – “58” (=270) A1 cao NB 328 and /or 58 on the answer line gets M1 (implied); 270 on the answer line gets M2 (implied)	
17	(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)	$6x^2 - 8x + 15x - 20 = 6x^2 + 7x - 20$	$6x^2 + 7x - 20$	2	M1 for exactly 4 terms correct ignoring signs ($6x^2, 8x, 15x, 20$) or 3 out of 4 terms with correct signs ($6x^2, -8x, +15x, -20$) A1 cao
	(c)	$(x+2)(x+5)$	$(x+2)(x+5)$	2	B2 cao (B1 for exactly one of $(x + 2), (x + 5)$)
	(d)		$12p^8q^3$	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)
	(e)	$6 = 15 + 4(q-5)$ $6 = 15 + 4q - 20$ $11 = 4q$	$2\frac{3}{4}$	3	M1 for correct substitution of p and t . M1 for correct expansion of $4(q-t)$ oe (eg $4q-20, 4q-4t$) A1 $11/4$ or $2\frac{3}{4}$ or 2.75 OR M1 for correct substitution of p and t . M1 for $\frac{p-3t}{4} = q-t$ oe A1 $11/4$ or $2\frac{3}{4}$ or 2.75

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No	Working	Answer	Mark	Notes
18	(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 $T \propto 25x$ oe
	(b) $T = 25 \times 15 =$	375	1	B1 ft on k , $k \neq 1$
	(c) $600 = 25x; x = 600 \div 25 =$	24	1	B1 ft on k , $k \neq 1$
19	$120 \times 50 = 10.5263$ 570 $250 \times 50 = 21.9298$ 570 $200 \times 50 = 17.5438$ 570	10 22 18	3	$\frac{120}{\quad}$ M1 method shown eg $\frac{120 + 250 + 200}{\quad} \times 50$ or one of 10.5(263) 21.9(298), 17.5(438) OR $570 \div 50 = 11.4$ and one of $120 \div 11.4 = 10.526\dots$, $270 \div 11.4 (=21.9298\dots)$, $200 \div 11.4 (=17.5438\dots)$ 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
20	$x(x+1) + 4(2x-3) = (2x-3)(x+1)$ $x^2 + x + 8x - 12 = 2x^2 + 2x - 3x - 3$ $x^2 - 10x + 9 = 0$ $(x - 9)(x - 1) = 0$	$x = 1,9$	5	M1 for multiplying through by common denominator $(2x-3)(x+1)$ M1 (dep)for either $x^2 + x + 8x - 12$ or $2x^2 + 2x - 3x - 3$ oe A1 for correct quadratic ($= 0$) M1 for a correct method to solve 3 term quadratic A1 cao for both solutions
21	$AB^2 = 82 + 92 - 2 \times 8 \times 9 \times \cos 40$ $AB^2 = 64 + 81 - 144 \times \cos 40$ $AB^2 = 145 - 144 \times 0.766$ $AB^2 = 145 - 110.31\dots = 34.6896$ $AB = \sqrt{34.6796} = 5.8897877$	5.89	3	M1 Subs in Cos Rule: $82 + 92 - 2 \times 8 \times 9 \times \cos 40$ M1 correct order of evaluation of $82 + 92 - 2 \times 8 \times 9 \times \cos 40$ A1 cao 5.88 – 5.89 SC: Award B2 for one of $AB^2 = 241.03\dots$ or $AB = 15.525\dots$ (radians) $AB^2 = 28.50\dots$ or $AB = 5.33\dots$ (gradians)

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No	Working	Answer	Mark	Notes
22	(a)	24 30	2	B1 24 cao B1 30 cao
	(b)	10 4	2	B1 10 and correct width (tol $\pm \frac{1}{2}$ small square) B1 4 and correct width (tol $\pm \frac{1}{2}$ small square)
23	(a)	100.5	1	B1 cao
	(b)	10.515	1	B1 cao
	(c)	$\frac{100.5}{10.515}$ 9.5577746	2	M1 for greatest distance divided by least time Where $100 < \text{greatest distance} \leq 100.5$, $10.51 \leq \text{least time} < 10.52$ A1 for 9.555 – 9.56
	(d)	$\frac{99.5}{10.525}$ 9.45368..	2	M1 for least distance divided by greatest time Where $99.5 \leq \text{least distance} < 100$, $10.52 < \text{greatest time} \leq 10.53$ A1 for 9.45 – 9.455

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No	Working	Answer	Mark	Notes
24	$\frac{4}{7} \times \frac{4}{7} \times \frac{3}{7} + \frac{3}{7} \times \frac{3}{7} \times \frac{4}{7} =$ $\frac{48 + 36}{343} = \frac{84}{343}$ <p>But there are three ways this can be achieved: BBG, BGB, GBB So the probability is</p> $\frac{84}{343} \times 3$ <p>OR $1 - \frac{64}{343} - \frac{27}{343}$</p> <p>NB: $84/343 = 0.244897$; $252/343 = 0.73469$ $\frac{4}{7} = 0.57(142\dots)$, $\frac{3}{7} = 0.42(857\dots)$</p>	$\frac{252}{343}$	3	<p>M1 for $\frac{4}{7} \times \frac{4}{7} \times \frac{3}{7}$ or $\frac{3}{7} \times \frac{3}{7} \times \frac{4}{7}$ oe or $\left(\frac{4}{7}\right)^3$ oe or $\left(\frac{3}{7}\right)^3$ oe or $\frac{91}{343}$ or 0.10(49...) or 0.13(99....)</p> <p>M1 (indep) for identification of all 6 outcomes</p> <p>(M2 for $1 - \left[\left(\frac{4}{7}\right)^3 + \left(\frac{3}{7}\right)^3 \right]$) oe</p> <p>A1 $\frac{252}{343}$, $\frac{36}{49}$, 0.73(469...) oe</p>
25	<p>(a) $\frac{1}{3} \times \pi \times 5^2 \times 8 = \pi \times 25 \times 8 \div 3 =$ 209.4395</p> <p>(b) Base radius = $\frac{216}{360} \times 15 = 9$ Height = $\sqrt{(15^2 - 9^2)} =$</p>	<p>209–210</p> <p>12</p>	<p>2</p> <p>4</p>	<p>M1 for $\frac{1}{3} \times \pi \times 5^2 \times 8$</p> <p>A1 for 209–210</p> <p>M1 for $216 \div 360$ A1 for 9 M1 for $\sqrt{(15^2 - \text{“9”}^2)}$, where “9” < 15 A1 cao</p>