



General Certificate of Secondary Education

Mathematics 3301

Specification A

Paper 2 Intermediate Tier

Mark Scheme

2006 examination - June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

The following abbreviations are used on the mark scheme:

M	Method marks awarded for a correct method.
A	Accuracy marks awarded when following on from a correct method. It is not necessary always to see the method. This can be implied.
B	Marks awarded independent of method.
M dep awarded.	A method mark which is dependent on a previous method mark being awarded.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special Case. Marks awarded for a common misinterpretation which has some mathematical worth.
oe	Or equivalent.
eeoo	Each error or omission.

Paper 2I

1(a)	12.5	B1	
1(b)	$36 \div 100 \times 420$	M1	oe Allow full method of 10%, 10%, 10%, 5%, 1%
	£151.20	A1	
1(c)	$84 \div 240 \times 100$	M1	oe
	35	A1	

2	3×52	M1	156 or $245 - 26 (= 219)$
	Their $156 + 26$	M1dep	and $3 \times 52 (= 156)$
	$245 - \text{their } 182$	M1dep	and their $219 - \text{their } 156$
	63	A1	SC2 £167

3(a)	7, 13	B1	
3(b)	Correct plotting on ft to $\frac{1}{2}$ sq	B1ft	Allow 1 error
	Line from (0,4) to (5,19) to $\frac{1}{2}$ sq	B1	
3(c)	Line at least 3cm long to $\frac{1}{2}$ sq	B1	Label not needed if correct

4(a)	$72 \times \frac{5}{8}$	M1	72×0.625 , $72 \div 1.6$
	45	A1	
4(b)	3.5	B1	oe or 210
	$\frac{200}{\text{their } 3.5}$	M1	$\frac{200}{\text{their } 210} \times 60$
	57.1(4)	A1	
	Round their answer to 1dp or 0dp	B1ft	57 or 57.1, or 60 with working

5	Prism with triangular cross section	B2	B1 for any prism Allow free hand sketch
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6	$\frac{(180-126)}{2}$	M1	
	$x = 27$	A1	
	153	B1ft	126 + their x , 180 – their x
7(a)	1	B1	
7(b)	$3n$	M1	$n + n + n$, $n \times 3$, but not n^3
	$3n + 7$	A1	SC1 $n^3 + 7$ $3n + 7 = 10n$ is M1, A0
8(a)	58	B1	
8(b)	13	B1	
8(c)	15	B1	
8(d)	Σx at least 6 correct values	M1	
	$\frac{\text{their } 288}{\text{their } 13}$	M1dep	
	22.2	A1	22.1, 22.15 or 22 with working
9	Square any number between 0 and 1 inclusive and show answer	B2	B1 square any number > 1 and show answer B1 (number in range) ² but not evaluated or evaluated incorrectly
10	-2, 1, 6	B2	-1 each error or emission. Ignore extra terms $1^2 - 3$, $2^2 - 3$, $3^2 - 3$ is B1
11	$20 \times 10 \times 20$ (= 4000)	M1	Must be volume calculation not surface area
	$5 \times 5 \times 2$ (= 50)	M1	Must be volume calculation not surface area
	$\frac{\text{their } 4000}{\text{their } 50}$ or 80 or $\frac{(20 \times 10 \times 20) - (70 \times 5 \times 5 \times 2)}{(5 \times 5 \times 2)}$	M1	M3 for $4 \times 2 \times 10$ M2 for two of 2, 4 or 10 multiplied together and by another number
	10	A1	

Allow embedded answers unless contradicted when M marks only

12(a)	$4v = 9 + 1$ (or 10)	M1	
	$v = 2.5$	A1	oe
12(b)	$3w + 2w = 19 - 4$	M1	oe Allow one sign error
	$5w = 15$	M1dep	Gathering terms
	$w = 3$	A1	
12(c)	$x = 5 \times (11 + 2)$	M1	$x = 5 \times 11 + 10$
	65	A1	
12(d)	$4y + 12 = 9y - 18$	M1	Allow one error
	$30 = 5y, -5y = -30$	A1ft	ft if M1 awarded and equation in form $ay = b$ with no further errors
	6	A1ft	ft only if M1, A0 previously and their equation of form $ay = b$ is solved correctly

13	$5x > 10 - 3$ (= 7)		Accept $5x \geq 7, 5x \geq 10 - 3$
	$x > \frac{7}{5}$		oe eg accept $x > 1.4$ or $x > 1\frac{2}{5}, \frac{7}{5} < x, 1.4 < x$ SC1 $x > 2.6$ oe $x = 1.4$ on answer line after $x > 1.4$ is M1, A0

14	Line 4cm, arcs 6cm (above)	B1	All ± 2 mm
	Complete correct triangle	B1	
	Arcs 6cm (below)	B1	
	Complete correct rhombus	B1	
	or line 6cm, arcs 4cm and 6cm	B1	or line 2cm, construction 90° with arcs
	Complete correct triangle	B1	Hypotenuse of length 6cm
	Arcs 6cm from 4cm line	B1	Repeat below
	Complete correct rhombus	B1	Complete correct rhombus

15	Angle bisector to $\pm 2^\circ$	B1	See overlay. Just points plotted is B0
	Circles of arcs 4cm and 7cm from A to ± 2 mm	B1	See overlay. Accept crosses on their angle bisector
	Correct line segment indicated	B1	

16(a)	Plot (50,0.4)	B1	1mm tolerance
16(b)	27	B1	
16(c)	Yes + reason with numbers eg Yes if fair expect 15 As Yes if fair prob = 0.25	B2	B1 Yes + reason that must have some sense eg Yes As A comes up nearly half the time Yes There are 4 sections and A is winning an unfair amount of spins
16(d)	$1000 \times (0.3 \text{ to } 0.5)$	M1	$\frac{1000}{50} \times 20$ or 20×20 from part(a)
	300 to 500	A1	Must be an integer
16(e)	$0.3 + 0.4$	M1	
	0.7	A1	70%, $\frac{7}{10}$

17	Fruity bar $17.4 \times \frac{62.6}{100}$	M1	
	10.9, 10.89...	A1	11 with working
	Sports bar $3.4 \times \frac{100}{10.3}$	M1	
	33.(.....)	A1	

18(a)	$(m - 7)(m + 7)$	B1	oe
18(b)	Attempt to rearrange one equation and substitute into another or Attempt to balance x or y and eliminate	M1	eg $15x + 9y = 18$ $15x - 35y = 95$ followed by an attempt to subtract eg $44y = -77$ $35x + 21y = 42$ $9x - 21y = 57$ followed by an attempt to add eg $44x = 99$
	Solving resultant equation to find $x = 2.25$ or $y = -1.75$	A1	
	Attempt to eliminate other variable or substitution of found value into one of their equations	M1	eg $11.25 + 3y = 6$, $5x - 5.25 = 6$
	Solving to find another value $y = -1.75$ or $x = 2.25$	A1	

19	Total reduction $\pounds 6 + \pounds 1$ ($=\pounds 7$) or cost is $\pounds 3$	M1	25% of $\pounds 4 = \pounds 1$ 25% of 40% = 10%
	Hence Jill plus justification eg $\pounds 7$ is 70% of $\pounds 10$	A1	60% + 10% = 70% 85% off $\pounds 10 = \pounds 1.50$

20(a)	0.007	B1	
20(b)(i)	0.9119215(052)	B1	
20(b)(ii)	9.12×10^{-1}	B1	
20(c)	0.00805 or 8.05×10^{-3}	B1	oe

21	Identifying -2 as constant term in equation $y = mx + c$	B1	
	Gradient = $\frac{20}{4}$	M1	Attempt to find gradient $\frac{\pm 20}{\pm 4}$, $\frac{\pm 16}{\pm 4}$
	$y = 5x - 2$	A1	oe

22	$400 - 2 \times 80$	M1	240
	πd or πr or $2 \pi r = \text{anything}$	M1	Anything but not 400
	$240 \div \pi$	M1	$240 \div (2\pi)$ (=38.2)
	76.4	A1	76 with working or 80 with working
23(a)	$10^2 - 5^2 = QR^2$	M1	
	$QR = \sqrt{75}$	M1dep	
	8.66(0...) or $5\sqrt{3}$ or 8.7	A1	9 with working
23(b)	$\cos P = \frac{5}{10}$ $\sin P = \text{their } \sqrt{\frac{75}{10}}$ $\tan P = \text{their } \sqrt{\frac{75}{5}}$	M2	Finding R then subtract from 90
	60	A1	

24	Sight of 1.072	B1	or 144
	$(2000) \times (\text{their } 1.072)^{10}$	M1, A1	<p>Calculating at least 5 intermediate values correctly using their values M1</p> <p>2144, 2298.37 (.368), 2463.85(0496), 2641.25(.2477732), 2831.42(.417568)</p> <p>3035.28(.279633), 3253.82(.819767), 3488.09(.09479), 3739.24(.237615), 4008.46(.462723)</p> <p>All 10 correct A1</p> <p>No penalty for rounding or truncating to nearest pound or 1 decimal place</p> <p>Truncated values 2144, 2298, 2463, 2640, 2830, 3033, 3251, 3485, 3735, 4004</p> <p>Rounded values 2144, 2298, 2463, 2640, 2830, 3034, 3252, 3486, 3737, 4006</p> <p>No penalty for incorrect money notation eg $4008.5 > 2 \times 2000$</p>
	Yes. 4008.(46) or 2.004(2..)	A1ft	<p>ft if only one error made and correct conclusion drawn</p> <p>Accept $1.072^{10} > 2$ for 3 marks</p> <p>SC2 for $2000 \times \text{their } 1.072^9$</p>