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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Mathematics 3302

Specification B

Module 5 Paper 1 Tier H 33005/H1

THREE TIER

Mark Scheme

2007 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.

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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	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.

MODULE 5 HIGHER TIER 33005/H1

1(a)	$x = 5$	B1	
1(b)	5 0	B1	
1(c)	180º	B1	
	(5, 2.5)	B1	

2(a)	$\frac{15}{5}$ (≤) $\frac{5n}{5}$ (<) $\frac{30}{5}$	M1	Attempt at division by 5
	$3 \leq n < 6$	A1	3, 4, 5, 6 or 4, 5
	3, 4, 5	A1	
2(b)	$4n > 15$	M1	$n = \frac{15}{4}$
	$n > \frac{15}{4}$ or $n > 3.75$	A1	
2(c)	5	B1 ft	

3	$5^2 = 4^2 + h^2$	M1	
	$\sqrt{5^2 - 4^2}$	M1 dep	
	3	A1	
	$\frac{1}{2} \times 8 \times$ their 3	M1	
	12	A1 ft	
	cm^2	B1	UNITS mark

4(a)	Valid explanation	B1	eg $- \times - = +$ and $+ \times + = +$ Lowest value on curve is zero
4(b)	At least 4 correct values	M1	Could be plotted on diagram $\pm\frac{1}{2}$ square tolerance
	7 correct plots and smooth curve	A1	$\pm\frac{1}{2}$ square tolerance
4(c)	Reading off at 3 on *y*-axis	M1	Note: One answer in range implies M1
	[± 1.7, ± 1.8]	A1 ft	± 0.1 tolerance

5(a)	(Side =) 10 cm	B1	
	(Area of face =) 10 × 10	M1	
	50	A1	
5(b)	750 or 0.75 (litre) or 0.2 (litre) seen	B1	
	550 seen	B1	
	0.55	B1	

6(a)	180 – 90 – 20	M1	oe
	70	A1	
6(b)(i)	4	B1	
6(b)(ii)	Valid explanation	B1	Equal to *RS* Tangent from same point (are equal) Tangents symmetrical Tangents equal Congruent triangles
6(b) (iii)	36.9	B1	
6(b) (iv)	90 – their 36.9 or their 36.9 × 2 or 90 + their 36.9	M1	
	2 × (90 – their 36.9) or (180 – their (90 + 36.9)) × 2	M1 dep	oe
	106.2	A1 ft	Note: ft from (b)(iii) 41.4 → 97.2 and 48.6 → 82.8

7(a)	Volume	B1	
	None	B1	
	Area	B1	
7(b)	Valid explanation	B1	eg area + length

8(a)	$\frac{2}{5}$ or 0.4	B1	
8(b)	Attempt at reciprocal of $\frac{2}{5}$ or indication that product of gradients = –1	M1	
	$-\frac{5}{2}$	A1	oe
8(c)	$y = -\frac{5}{2}x + 4$	B1 ft	oe

9(a)	$(x - 2)(x - 4)$	B2	B1 for $(x + a)(x + b)$, where $ab = \pm 8$
9(b)	One x coordinate is 2	B1 ft	Could be seen on diagram
	Other x coordinate is 4	B1 ft	
	$x = 3$	B1 ft	

10	$4(x + 1)$ or $4x + 4$	B2	B1 for partial cancelling

11	$st = 3(10 - s)$	B1	Multiply through by s
	$st = 30 - 3s$	B1	Removing brackets
	$st + 3s = 30$ or $s(t + 3) = 30$	B1	Collecting terms
	$s = \frac{30}{t+3}$	B1	Do not accept $s = \frac{30}{t} + 10$

12	$2n^2 + n + 6n + 3$	M1	$(2n + 1)(n + 3 + n - 2)$ Allow 1 error
	$2n^2 + n - 4n - 2$	M1	$(2n + 1)(2n + 1)$ Allow 1 error
	$4n^2 + 4n + 1$	A1	$2n + 1$ is odd (Must see method)
	$2(2n^2 + 2n) + 1$ or even + even + odd	A1	eg odd^2
	eg multiple of 2 + 1 eg odd	A1	= odd SC1 $2n + 1$ is odd with no method shown

13	(Volume of sphere =) $\frac{4}{3}\pi 4^3$	M1	
	(Volume of cone =) $\frac{1}{3}\pi 6^2 \times h$	M1	
	$\frac{4}{3}\pi 4^3 = \frac{1}{3}\pi 6^2 \times h$	M1 dep	
	$(\frac{1}{3}\times) 4 \times 64 = (\frac{1}{3}\times) 36 \times h$	A1	$\frac{85.3...}{12}$
	$\frac{64}{9}$ or 7.1 or 7.1...	A1	oe $\frac{256}{36}$

14	$5x - 1 = 2x^2 + 1$	M1	
	$2x^2 - 5x + 2 = 0$	A1	
	$(2x - 1)(x - 2)$ (= 0)	M1 dep	$(2x + a)(x + b)$, where $ab = \pm c$ for their equation (allow $c = 0$) Note: Use of formula, allow one error
	$2x - 1 = 0 \quad x - 2 = 0$	A1 ft	Note: Use of their formula simplified
	$(x =) \frac{1}{2}$ and 2	A1 ft	Note: Use of formula, allow in surd form Only ft on a correct factorisation or correct formula
	$y = 1\frac{1}{2}$ and 9	A1	T & I: SC1 for one correct pair SC2 for both correct pairs