GCSE 2004
June Series

ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark Scheme

Mathematics B (3302)
Module 5 Paper 2 Tier H

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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 Paper 2 HIGHER TIER 33005/H2

1	Trial for $x > 4$	B1	All trials correctly evaluated to at least 1 dp, rounded or truncated 5 → 5.2 4.5 → 4.72 4.6 → 4.81 4.7 → 4.91 4.75 → 4.96 4.76 → 4.97 4.77 → 4.979… 4.78 → 4.989… 4.79 → 4.998… 4.8 → 5.008… or 5 4.85 → 5.056…
	Trial for $4 < x \leq 5$	B1	
	Trials for $4.7 \leq x \leq 4.85$ that bracket the answer	B1	
	Trial for $4.75 \leq x < 4.8$ **and** answer 4.8	B1	

2(a)	$s^3 + 6s$	B2	B1 for s^3 or (+)$6s$
(b)	i) $6t^4u^3$	B2	–1 eeoo
	ii) $8c^{12}$	B2	B1 for 8 or c^{12}

3(a)	$2x \geq -2$	M1	Allow > but not = unless recovered in answer
	$x \geq -1$	A1	
(b)	$x < 2$	B1	oe condone change of letter
(c)	–1, 0, 1	B1 ft	ft their (a) and/or (b)

4(a)	$\pi(\frac{1}{2}\ 7.5)^2\ 11.6$	M2	M1 for $\pi(\frac{1}{2}\ 7.5)^2$ or 44.1(…) seen or 44.1786(π) or 44.1562(3.14)
	512.2 to 512.5…	A1	or 512
			$\pi \times (3.\ \ldots)^2 \times 11.6$ scores M1 $\pi(7.5)^2\ 11.6$ → 2048 to 2051… SC1
(b)	(circumference =) π7.5	M1	23.56… or 23.55 if used 3.14
	(their 23.56) + 1	M1 dep	or (their 23.56) × 11.6 M1 dep add 11.6 M1 dep 284.78 to 285 A1
	(their 24.56) × 11.6	M1 dep	
	284.78 to 285	A1	

5	$\sin(x) = \frac{20}{230}$	M1	
	0.0869(56…)	A1	or 0.0870
	4.99 or 5 or 4.9885…	A1	NB watch out for tangent
			Ans 5 from scale drawing scores 3 0.08706… or 5.542 as final answer scores M1A1A0

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6	$y(y + 5)$	M1	
	0	A1	Trial & improvement giving 0 or –5 only: SC1
	–5	A1	

7	$\frac{60}{15} = \frac{h}{2.7}$	M2	oe M1 for $\frac{60}{15}$ or $\frac{15}{60}$ or $\frac{2.7}{15}$ or $\frac{15}{2.7}$
	10.8	A1	
			Trig method: Tan $G = \frac{2.7}{15}$ M1 (10.2º)
			(h =) 60 × tan (their 10.2) M1 dep
			10.79 or 10.8 A1

8	$V = x^2h$	M1	oe
	$x^2 = \frac{V}{h}$	M1 dep	
	$x = \sqrt{\frac{V}{h}}$	A1	

9	$3(3x + 1) - 2(2x + 5)$	M1	Could have 6 as denominator here Condone lack of brackets
	$9x + 3 - 4x - 10$	A1	
	(their $5x - 7$) = 6	M1 dep	
	$x = 2.6$	A1	or $2\frac{3}{5}$

10(a)	0.51(2)	B1	
(b)	Correct plots	B1 ft	$\pm \frac{1}{2}$ square, ft their (a)
	Smooth curve	B1 ft	
(c)	1.2	B1 ft	$\pm \frac{1}{2}$ square

11	$AB = AD$ sides of square	B1	Must give the reason
	Angle AQB = angle APD = 90°	B1	Must have = 90° oe
	Angle BAQ = angle ADP = $90 - y$	B1	Must have = $90 - y$ oe
	AAS with the above 3 statements	B1	Accept statements without reasons for this mark

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12(a)	Gradient of $PQ = \frac{y\text{ - difference}}{x\text{ - difference}}$	M1	(= $\frac{8}{6}$ oe)
	Perp. grad. = $\frac{-1}{(\text{their } 4/3)}$	M1 dep	Drawing method: Perpendicular line drawn and attempt at finding its gradient M2
	$\frac{-3}{4}$	A1	oe
(b)	$y = (\text{their } -\frac{3}{4})\,x + \text{c}$	M1	
	$y = -\frac{3}{4}x + \frac{3}{2}$	A1	oe Accept 1.4 to 1.6 for $\frac{3}{2}$ from graph

13(a)	i) $-\mathbf{b} + \mathbf{a}$ or $\mathbf{a} - \mathbf{b}$	B1	
	ii) $\mathbf{b} - \frac{1}{2}\mathbf{a}$	B1	oe
(b)	$\overrightarrow{BN} = \overrightarrow{BM} + \overrightarrow{MN} = \overrightarrow{BM} + \overrightarrow{AM}$	M1	oe
	$= \frac{1}{2}\mathbf{a} + \mathbf{b} - \frac{1}{2}\mathbf{a}$	A1	
(c)	$\overrightarrow{ON} = 2\overrightarrow{OB}$	B1	or *OBN* a straight line or *BN* = *OB* or B is midpoint of *ON*

14	$3x^2 = x + 2$	M1	
	$3x^2 - x - 2 = 0$	A1	
	$(3x + 2)(x - 1) = 0$	M1	or $[1 \pm \sqrt{(1 - -24)}]/6$
	$x = 1$ or $-\frac{2}{3}$	A1	Accept –0.66 or –0.67
	$y = 3$ or $\frac{4}{3}$	A1 ft	Must match appropriate values of *y* with *x*
			$x = 1, y = 3$ without working …SC1

15	$AC^2 = 7^2 + 9^2 - 2 \times 9 \times 7 \times \cos 75$	M1	
	$AC^2 = 97.3888\ldots$	A1	Accept 97.4
	$DC^2 = (\text{their } AC)^2 - 6^2$	M1	
	$DC = 7.8(35\ldots)$	A1 ft	or 7.84
	29.8(35…)	A1 ft	or 29.84 or 30 with correct working

33005/H2

16	Extra volume = $50 \times 34 \times 4.5$	M1	7650
	1912.5	A1	
	$\frac{4}{3}\pi r^3$ = (their 1912.5) or (their 7650)	M1	Must be from volume calculation Allow $\frac{4}{3}\pi r^3$ = (their 7650) for this M1
	$r^3 = (3 \times 1912.5) \div 4\pi$	M1	Allow $(3 \times 7650) \div 4\pi$
	$r = 7.7$	A1	