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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Mathematics 3302
Specification B

Module 5 Paper 1 Tier H 33005H1

Mark Scheme

2005 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.

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 1 HIGHER TIER 33005/H1

1(a)	–12 –4 –3	B2	–1 eeoo
(b)	Five points plotted	B1 ft	$\pm \frac{1}{2}$ square
	Smooth curve	B1 ft	Through all five points $\pm \frac{1}{2}$ square

2(a)	$3x \leq 11$	M1	$(x =) \frac{11}{3}$ $11 \div 3$ $x \leq \frac{16-5}{3}$ $x < \frac{16-5}{3}$
	$x \leq \frac{11}{3}$ or 3.66... or 3.67	A1	oe
(b)	$\frac{5}{2} < x < \frac{7}{2}$ or $2x = 6$	M1	oe $5 < 2 \times 3 < 7$
	3	A1	

3(a)	$r^4(r^2 - 3)$	B1	
(b)	i) $(x + a)(x + b)$	M1	$ab = \pm 14$
	$(x + 7)(x – 2)$	A1	
	ii) –7, 2	B1 ft	ft from two linear brackets

4(a)	9.4 cm	B1	
(b)	Valid reason	B1	Accept: Angles opposite to side 5.6 cm In the same position Smallest angles (in the triangle) Angles between 9.4 and 10.3 Corresponding (angles) Not accept: Rotation Reflection (unless clarified)

5(a)	$y = 5x + c$ $c \neq 0$	B1	oe
(b)	$y = – 2x + 6$	M1	$–2x$ scores M1A0 $m = –2$ and $c = 6$ scores M1A0
	$(m =) –2$	A1	

6(a)	π (×) 5^2	M1	Condone 3.1… × 5^2	
	π (×) 5^2 × 10 or their area × 10	M1	Condone 3.1… × 5^2 × 10 Their area must contain π (or 3.1...)	
	250π or 250 × π or π × 250	A1	775 to 790 implies M2A0 Do not accept π250 Ignore fw 250π can be recovered in (b)	
(b)	40 × 50	M1	10 × 10 × 10	40 × 50
	their 2000 × 10	M1	their 1000 – their 250π	20 × their π (×) 5^2
	20 × their 250π	M1	20 × their (1000 – 250π)	their 2000 – their 500π
	20 000 – 5000π	A1	oe 4290 – 4500 implies M3A0 Ignore fw except 15000π	

7(a)	45	B1	
(b)	53	B1	
(c)	90	B1	
(d)	80	B1	

8(a)	$\frac{1}{2} \times 4 \times 4$ or $\frac{1}{2} \times 8 \times 4$ or 4×4 or $x^2 + x^2 = 64$ or $4^2 + 4^2 = y^2$	M1	Correct attempt at **one** area
	$\frac{1}{2} \times 4 \times 4 \times 4$ or $\frac{1}{2} \times 8 \times 4 \times 2$ or $4 \times 4 \times 2$ or 8×4 or $8 \times 8 = 64$ and $64 \div 2$ or $2x^2 = 64$ or $x = \sqrt{32}$ or $\sqrt{\text{their } y^2}$	M1 dep	Correct attempt at **total** area
	32	A1	Notes: Penalise if clearly using perimeter $8 \times 8 = 64$ and $64 \div 4 = 16$ scores M0
(b)	i) 2×25 or $100 - 50$	M1	oe
	50	A1	
	ii) Attempt to use patterns of areas or lengths or stating or implying that 29.7 cm is redundant data	M1	Area 50, 100, 200, 400, (800) Pattern 1 (5 cm) Pattern 3 (10 cm) Pattern 5 (20 cm)
	Pattern 5	A1	

9	$(x - 2)y = m + x$	M1	Condone missing brackets for this mark only unless recovered
	$xy - 2y = m + x$	A1	oe
	$xy - x = m + 2y$ or $x(y - 1) = m + 2y$	M1 dep	Allow one sign error
	$x = \frac{m+2y}{y-1}$	A1	oe

10(a)	(–1, 0)	B1	Condone missing brackets
(b)	$-\frac{1}{2}$	B1	

11	$\frac{1}{2} \times 8 \times 3 \times \sin 30$	M1	oe
	$\frac{1}{2} \times 8 \times 3 \times 6 \times \sin 30$	M1 dep	oe
	36	A1	
	cm^2	B1	Units mark

12(a)	$CB = -\mathbf{t} + \mathbf{s}$ or $BC = -\mathbf{s} + \mathbf{t}$ or states route $AM = AC + CM$ or states route $AM = AB + BM$	M1	
	$CM = \frac{1}{2}(-\mathbf{t} + \mathbf{s})$ or $BM = \frac{1}{2}(-\mathbf{s} + \mathbf{t})$	M1 dep	
	$AM = \frac{1}{2}\mathbf{s} + \frac{1}{2}\mathbf{t}$	A1	oe Must be simplified
(b)	i) Parallelogram	B1	Accept quadrilateral
	ii) Correct fact	B1	Accept: In a straight line M is midpoint of AD
	Valid explanation	B1	Accept: Properties of diagonal of a parallelogram Use of vectors eg $\overrightarrow{AM} = \frac{1}{2}\overrightarrow{AD}$

13	Attempt to draw 1 line with either correct gradient or correct y-intercept	M1	Attempt to add (or subtract) simultaneous equations
	Both lines correctly drawn	A1	$2y = 2$ or $0 = 4x + 4$
	Both lines of symmetry drawn (for their lines)	A1 ft	$y = 1$ or $x = -1$
	$x = -1$ and $y = 1$	A1	$x = -1$ and $y = 1$ on answer line or explicitly given as lines of symmetry

14(a)	(a =) 5	B1	
	(b =) 15	B1	
(b)	15	B1 ft	their b

15(a)	2	B1	Answers from quadrants 2 & 3 eg 120 and 240
(b)	2	B1	Answers from quadrants 2 & 3 eg 104 and 256
(c)	1	B1	180°
(d)	4	B1	One answer from each quadrant eg 60, 120, 240, 300

16	$\frac{(x+2)(x+1)}{x(x+1)}$ or $\frac{x(x-1)}{x(x+1)}$	M1	$(x + 2)(x + 1) - x(x - 1)$
	$\frac{(x+2)(x+1)-x(x-1)}{x(x+1)}$	M1 dep	$(x + 2)(x + 1) - x(x - 1) = 2(2x + 1)$
	$x^2 + 2x + x + 2 - x^2 + x$ Allow one error	M1	$x^2 + 2x + x + 2 - x^2 + x$ Allow one error
	$\frac{4x+2}{x(x+1)} = \frac{2(2x+1)}{x(x+1)}$	A1	$4x + 2 = 4x + 2$ or $2(2x + 1) = 2(2x + 1)$

17(a)	*A*	B1	
(b)	*D*	B1	
(c)	*C*	B1	Note: *C* and *D* reversed scores B0B1
(d)	*B*	B1	Note: *A* and *B* reversed scores B0B1