ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme June 2003

GCSE

Mathematics B

3302 Module 5

Paper 1 Higher

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1	180 – 162 or 18	M1	$(n-2) \times 180 = 162n$
	360 ÷ their 18	M1 dep	
	20	A1	

2	$3n + 1$	B2	oe Allow change of letter B1 for $3n$ + c B1 for $kn + 1$ $n3 + 1$ scores B0 B1 Ignore further working

3(a)	4	B1	
	– 5	B1	
(b)	All **their** 7 points correctly plotted	B1 ft	
	Correct smooth curve (± 2 mm)	B1 ft	Straight lines score B0 Penalise feathering or double lines
(c)	4.24	B1 ft	Read off values from their graph Tolerance $\pm \frac{1}{2}$ square (ie ± 0.1) If more than 2 points of intersection accept 2 answers Allow co-ordinates $(x, 0)$ but not $(0, x)$
	– 0.24	B1 ft	

4(a)	m^7	B1	
	p^3	B1	
(b)	q^8	B1	

5(a)	$7x + 17$	B2	B1 for each term If final answer incorrect $10x + 5 – 3x + 12$ (with at most 1 error) scores B1 $7x + 17 = 0$ B0 B1
(b)	$y^2 – 4y – 2y + 8$	B1	Allow mark if 3 terms correct Or 2 terms correct in $ay^2 + by + c$
	y^2 (+) $– 6y + 8$	B1	
(c)	$4t^2 + 10t – 10t – 25$ or $(2t)^2 – 5^2$	M1	Allow mark if 3 terms correct
	$4t^2 – 25$	A1	
			In whole question, penalise equating to 0 on the first occurrence only

6(a)	Reflection	B1	
	(in line) $y = x$	B1	
(b)	Translation left 4, down 3	B2	Allow B1 for left 3 down 4 Note: If evidence of triangle D used, treat as misread – 1
	Their translated triangle rotated through 90° anticlockwise	M1	Allow even if not about (0, – 2)
	Correct final position	A1	Correct position for C (0, – 2), (0, – 4), (– 3, – 2) Correct position for D (misread B1 M1 A1) (– 1, – 5), (– 3, – 5), (– 3, – 2)

7(a)	Pairs of intersecting arcs above and / or below AB	M1	Must be attempt at common radius for each pair Accept construction on any side
	Accurate perpendicular bisector	A1	Within 2 mm of mid-point and within 2° of perpendicular
(b)	i) Perpendicular bisector of AC or BC	B1	Same tolerance and conditions as above
	ii) Complete circle centred on point of intersection of perpendicular bisectors	M1	
	Correct circle drawn within 2 mm	A1	

8(a)	180 – 90 – 62 or 90 – 62	M1	oe
	28	A1	
(b)	$\angle Q = 80°$ or reflex $\angle POR = 200°$	M1	Note: 80° may be seen on diagram
	160	A1	
(c)	$\angle A = 44°$ or third $\angle$ at $C = 86°$	M1	Allow 180 – 44 – 50
	(z =) 86	A1	
	'Alternate segment'	B1	oe

9(a)	$16 - k$ seen	M1	Not $-x^2 = k - 16$
	$\sqrt{16-k}$ or $-\sqrt{16-k}$	A1	Penalise further working or $\sqrt{16} - k$
(b)	$100A = 100P + PRT$	M1	Correctly removing fraction
	$P(100 + RT)$ seen	M1	Correctly factorising for P Note: Method marks are independent $P(1 + \frac{RT}{100})$ earns M2
	$P = \frac{100A}{100 + RT}$ or $P = \frac{A}{1 + \frac{RT}{100}}$	A1	Note: Mark is dependent on both M marks

10(a)	$(2x \pm a)(x \pm b)$ where $ab = 15$	M1	
	$(2x + 3)(x – 5)$	A1	Ignore further working
(b)	– 1.5 and (+) 5	B1 ft	Must be seen in (b)
	[(their – 1.5) + (their 5)] ÷ 2	M1	1.75 seen B1 M1
	$x = 1.75$	A1	Note: Must have "x = …" here

11(a)	$\mathbf{a} + 2\mathbf{b}$	B1	oe	Note: $\begin{pmatrix} a \\ 2b \end{pmatrix}$ and $\begin{pmatrix} -3a \\ 2b \end{pmatrix}$ correct scores SC1
(b)	$2\mathbf{b} – 3\mathbf{a}$	B1	oe	
(c)	***SR*** ***UT***	B1 B1		

12	$x^2 + (x + 7)^2 = 25$ or $(y – 7)^2 + y^2 = 25$	M1	For substitution
	$x^2 + 14x + 49$ or $y^2 – 14y + 49$	M1	For expansion of $(y – 7)^2$ or $(x + 7)^2$ (at least 3 correct terms)
	$2x^2 + 14x + 24 = 0$ or $2y^2 – 14y + 24 = 0$	M1 dep	Complete simplification and all on one side of equation. Dependent on both previous marks
	$(x + 4)(x + 3) = 0$ or $(y – 4)(y – 3) = 0$	A1	Or $(2x + 8)(x + 3) = 0$ or $(x + 4)(2x + 6) = 0$ Or $(2y – 8)(y – 3) = 0$ or $(y – 4)(2y – 6) = 0$ Or $y = \frac{7 + 1}{2}$ Or $x = \frac{-7 \pm 1}{2}$ oe
	$x = – 4$ and $x = – 3$ or $y = (+)4$ and $y = (+)3$	A1	Or 1 correct pair
	$y = (+)3$ and $y = (+)4$ or $x = – 4$ and $x = – 3$	A1	
	Both correct pairings	A1	$x = – 4$, $y = (+)3$ SC1 $x = – 3$, $y = (+)4$ SC1 Note: Do not award SC marks from clearly incorrect working

13(a)	Wave curve through (0, 0) (90, 1) (180, 0) (270, – 1) (360, 0)	B1	
(b)	Use of symmetry on a reasonable attempt at sine curve Or 180 – 67	M1	0.75 < reading < 1 and obtuse angle answer
	113 or 427	A1	SC2 cosine graph and 293
(c)	– 0.92	B1	

14(a)	$\frac{120}{360} \times 2\pi\ 15$ Or $\frac{30\pi}{3}$	M1	oe
	Cancelling to 10π	A1	
(b)	$2\pi r = 10\pi$ Or $\frac{15}{3}$	M1	
	$(r =)\ 5$	A1	

15(a)	$(x + 3)^2$	B1	
(b)	Gradient ≈ -3 Or y intercept ≈ 2	M1	Line steeper than $y = -x$
	Completely correct	A1	Must pass through intercept on x axis and look symmetrical about the x axis