ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme
March 2003

GCSE

Mathematics B (Modular)

Module 3: Higher

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.
cao	Correct answer only.
SC	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
oe	Or equivalent.
BOD	Benefit of doubt.

1	$28 \times \frac{3}{7}$	M1	
	= 12	A1	SC1 16 or 12:16 or 12 and 16

2	$\frac{40.1956}{4.12}$	M1	M1 for 40.1956
	= 9.756….	A1	Accept 9.8, 9.76

3(a)	$5.24\ldots \times 10^6$	B1	
(b)	(Over max by) 637 120	B1	
	$\% = \frac{637120}{5242880} \times 100$	M1	$\frac{\textit{their}\ 637120}{524....} \times 100$
	= 12.15…%	A1	Accept 12%, 12.1%, 12.2% SC2 112%, 112.1%, 112.2%, 12.21%

4(a)	(1.7 × 1.2 =) 2.04	B1	
(b)	2.04 × 1.2 or 2.448 or 2.45	M1	Can be implied from 2.94
	2.448 × 1.2 or 2.9376 or 2.94 (2.9376 × 1.2 or 3.52512)	M1	
	6 (windmills)	A1	5, 6, 7, 8, 9, 10 (windmills) scores SC2

5(a)	0	B1	
(b)	Plot points	B1	
	Smooth curve	B1	
(c)	1, 3	B1	ft if (a) not zero within ½ square Condone (1,0), (3,0)
(d)	$x^2 - 4x + 3 = x - 2$	M1	$x^2 - 4x + 3 - (x^2 - 5x + 5)$ or reverse
	Draw $y = x - 2$ or their line (but not parallel to an axis)	M1	
	3.6, 1.4	A1	Accept 3.55 to 3.65 and 1.35 to 1.45

6(a)	$R \propto 1/I$ **or** $R = k\frac{1}{I}$	M1	
	$12 = \frac{k}{8}$	M1	Implies 1st M1
	$k = 96$		
	$R = \frac{96}{I}$	A1	Or IR = 96 Marks can be awarded if answer seen in (b)
(b)	$I = \frac{96}{6.4}$	M1	ft dep on M1 in (a)
	= 15	A1	

7(a)	n, $n-1$, $n+1$ are three consecutive integers so one of these must be a multiple of 3	B1	
(b)	If n is odd, $n-1$ and $n+1$ are both even	B1	
	One of above is a multiple of 4	B1	
	One of n, $n-1$, $n+1$ is a multiple of 3 $n^3 - n$ is a multiple of 2, 3, 4		
	$n^3 - n$ is a multiple of 24	B1	SC1 at least 2 correct examples

8	Minimum distance 8.5 miles	B1	
	Minimum number of journeys 175	B1	
	Minimum distance is 175×17 miles =		
	$175 \times 17 \times 5280 \times 12 \times 2.54$ (cm)	M1	Accept $175 \times 8.5 \times 5280 \times 12 \times 2.54$
	= 478 779 940 ÷ 100 ÷ 1000 (km)		
	= 4788 (km)	A1	Accept 4787 or 4787.7994 2394 scores SC2

9	$\frac{400\times3}{0.2}$ or $\frac{420\times3}{0.2}$	M1	Two numbers correctly rounded Accept $\frac{400\times30}{2}$
	$= \frac{1200}{0.2}$ or $\frac{1260}{0.2}$	A1	
	= 6000 or 6300	A1	

10	3.3(0)	B1	
	$\frac{3.30}{16.50} \times 100$	M1	
	= 20	A1	80(%) scores SC2

11	Least 8.5 kg	B1	Accept 8.50
	Greatest 9.5 kg	B1	Accept $9.4\dot{9}$, 9.499

12	80% = 560	M1	And used
	$100\% = 560 \times \frac{100}{80}$	M1	
	= 700	A1	140 scores SC2

13(a)	= 320 000 – 28 900	M1	Alternative: $32 \times 10^4 - 2.89 \times 10^4$ (same power) correctly converted
	$= 2.911 \times 10^5$	A1	Accept 291 100, 2.91×10^5 or 29.11×10^4 oe
(b)	$1\frac{5}{4} - \frac{2}{5}$ or $2 + \frac{5}{20} - \frac{8}{20}$ or 3.25 – 1.4	M1	Accept $\frac{13}{4} - \frac{7}{5}$ (One of $\frac{5}{20}$ or $\frac{8}{20}$ correct; must both be over 20)
	$= 1\frac{25-8}{20}$ or $2 - \frac{3}{20}$	M1 dep	or $\frac{65-28}{20}$
	$= 1\frac{17}{20}$	A1	Accept $\frac{37}{20}$ or 1.85 Note: $2\frac{3}{20}$ on its own scores SC1
(c)	4	B1	
(d)	$2^{7^{\left(-\frac{3}{7}\right)}}$ or 8 or 2^3 or 8^{-1} or $\frac{1}{128^{\frac{3}{7}}}$	M1	
	$\frac{1}{8}$	A1	Accept 0.125
(e)	$\sqrt{3^{12}}$	B1	Accept 3^{12}
	$= 3^6$	B1	

14	No of passengers is 1.25 of safety limit	B1	Or 125(%)
	0.25 of safety limit must leave		
	(% =) $\frac{0.25}{1.25} \times 100$	M1	
	= 20	A1	

15(a)	$10\sqrt{6} + 3\sqrt{6}$	B1	either
	$= 13\sqrt{6}$	B1	
(b)	$\frac{13\sqrt{6}}{13\sqrt{2}}$ or $13\sqrt{2}$ seen	B1	
	$= \sqrt{3}$	B1	

16(a)	$x = 0.\dot{4}\dot{6}$		
	$100x = 46.\dot{4}\dot{6}$	M1	
	$99x = 46$		
	$x = \frac{46}{99}$	A1	
(b)	$\frac{3}{10} + \frac{46}{990}$ or $100x = 34.6464\ldots$ $x = 0.3464\ldots$ $99x = 34.3$	M1	$1000x = 346.464\ldots$ $10x = 3.464\ldots$ $990x = 3.43$
	$= \frac{297 + 46}{990}$		
	$= \frac{343}{990}$	A1	