GCSE 2004
June Series

ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark Scheme

Mathematics B (3302)
Module 3 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

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1	$\frac{4.2790...}{13.88}$	M1	
	= 0.308	A1	Accept 0.308… Ignore further working SC1 0.31

2	Profit is £281 – £150 = (= £131)	M1	Must be a profit
	% profit = $\frac{(\text{their } 131)}{150} \times 100$	M1 dep	
	= 87.3%	A1	Accept 87%
			$\frac{(\text{their } 281)}{150} \times 100$ M1 187.3% A1

3(a)	200 × 1.15	M1	
	= 230 g	A1	
(b)	(Mass at 1 pm on day 2 =) 230 × 1.15	M1	or 230×1.15^n where $n \geq 2$
	= 264.5 g		
	(Mass at 1 pm on day 3 =) 264.5 × 1.15		
	= 304.175 g		
	Mass at 1 pm on day 4 = 304.175 × 1.15		
	= 349.80125 g	A1	Accept 349 or 350
	Mass at 1 pm on day 5 = 349.80125 × 1.15		
	= 402.2714375 g		
	After 5 days	A1	If all correct working and 4 (further) days accept No marks for incorrect method OR 1.15, 1.3225, 1.520… M1 1.749 A1 2.01 ⇒ 5 days A1

4	€2.80 = 1.12 of pre-VAT price or 112%	M1	or $\frac{2.80}{1.12}$ (= 2.50) M1
	VAT = $\frac{12}{112} \times$ €2.80	M1	VAT = 2.80 – (their 2.50) M1
	= €0.30	A1	= €0.30 or €0.3 A1

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5	$\frac{1.6\times10^{10}}{276\times10^{6}}$	M1	Division
	= 58	A2	Accept 57.97 A1 for sight of 5797… or 58…

6	$MAX_{diff} = MAX_{Mark} - Min_{Eileen}$		
	= 203.5 – 184.5	M1	M1 for max – min and at least one correct
	= 19 cm	A1	Accept 18.99…

7	$x = 0.47$ $10x = 4.77$	M1	Both needed correct
	$9x = 4.3$		
	$x = \frac{4.3}{9}$	M1	
	$= \frac{43}{90}$	A1	or $10x = 4.77$ $100x = 47.77$ M1
			$90x = 43$ M1
			$x = \frac{43}{90}$ A1
			or $x = 0.7$ $10x = 7.7$ M1
			$9x = 7$
			$x = \frac{7}{9}$
			$= \frac{4}{10} + \frac{7}{90}$ M1
			$= \frac{43}{90}$ A1

8(a)	$V \propto \frac{1}{p}$ or $v = k\frac{1}{p}$	M1	OR $p \propto \frac{1}{v}$
	When $v = 5$, p = 150 000		
	$5 = \frac{k}{150000}$	M1	
	$k = 750\,000$		
	$\therefore\ v = \frac{750000}{p}$	A1	or $pv = 750\,000$

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8(b)	$p = 250\,000 \Rightarrow$		
	$v = \frac{750000}{250000}$		
	$v = 3$	B1 ft	If M2 gained above
(c)	$v = 300$		
	$300 = \frac{750000}{p}$	M1	If M2 gained above
	$p = \frac{750000}{300}$		
	$p = 2500$	A1	

9	Cost (£) 2001 = $\frac{\text{USA price}}{1.42}$ = 0.704… of USA price		or if cost \$100 in 2001 Cost in 2001 is £$\frac{100}{1.42}$ = £70.42
	Cost (\$) 2002 = 0.82 of USA price in 2001	B1	In 2002, cost is \$82 B1
	Cost (£) 2002 = $\frac{0.82}{1.64}$ of USA price in 2001	M1	Which is £$\frac{82}{1.64}$ M1
	= 0.5 of USA price in 2001	A1	= £50 A1
	Reduction is 0.204… of USA price in 2001		Reduction is £20.42
	% reduction is $\frac{0.204...}{0.704...} \times 100$	M1	% reduction is $\frac{20.42...}{70.42...} \times 100$ M1
	= 29.0%	A1	= 29.0% A1
			OR in 2002 cost is \$82 B1 Old cost was $\frac{1.42}{1.64} \times$ \$82 M1 = \$71 A1 Reduction is 100 – 71 M1 = 29% A1
			OR in 2002 cost is \$82 B1 Reduction is \$82 × $\frac{0.22}{1.64}$ M1 = \$11 2002 cost is \$82 – 11 = \$71 A1 Reduction is 100 – 71 M1 = 29% A1

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10	2:3 $\Rightarrow$ 5 parts		
	$60 \times \frac{3}{5}$	M1	
	= 36	A1	SC1 24 or 24 and 36

11(a)	$\frac{300\times8}{0.4}$	B1	At least 2 correct
	$= \frac{2400}{0.4}$	B1	Needs both terms correct
	= 6000	B1	Accept $\frac{300\times10}{0.5} = 6000$ B3
(b)	$\frac{13}{3} - \frac{7}{5}$	M1	Allow one error in 13 or 7
	$= \frac{65}{15} - \frac{21}{15}$	M1	Allow one error in 65 or 21
	$= \frac{44}{15}$ or $2\frac{14}{15}$	A1	Accept either
			or $3\frac{1}{3} - \frac{2}{5}$ oe $= (3)\frac{5}{15}(-)\frac{6}{15}$ or $(4)\frac{5}{15}(-)(1)\frac{6}{15}$ M1 $= 3\frac{-1}{15}$ M1 $= 2\frac{14}{15}$ A1 SC1 $3\frac{1}{15}$ 4.33… – 1.4 M1
(c)	$\frac{\frac{1}{4}\times16}{\frac{1}{27}\times(3)^2} = \frac{4}{\frac{1}{3}}$	B1	Need both, not necessarily division
	$= 4 \times \frac{3}{1}$	M1	Must be $\frac{4}{\frac{1}{x}} = 4x$ $\frac{16}{4} \times \frac{27}{9}$ M1
	= 12	A1	OR $\frac{4}{\frac{9}{27}} = 4 \times \frac{27}{9}$ M1 $= \frac{108}{9}$ or 4×3 A1 = 12 A1
(d)	$42.7 \times 10^5 - 2.9 \times 10^5$	M1	Conversion to the same power
	$= 39.8 \times 10^5$		
	$= 3.98 \times 10^6$	A1	oe eg 3 980 000, 39.8×10^5

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12(a)	6	B1	
(b)	Plot points	B1	
	Draw curve	B1	
(c)	$x = 1.4$ and -1.4	B1	
(d)	$(3x^2 - 6) - (3x^2 - 5x - 6)$	M1	Sight of $(\pm)\ 5x\ (+k)$
	$= 5x$		
	Draw $y = 5x$	B1 ft	
	$x = 2.5,\ -0.8$	A1	Accept 2.4 to 2.55 and –0.75 to –0.85

13(a)	$2\sqrt{2} + 5\sqrt{2}$	B1	Either
	$= 7\sqrt{2}$	B1	
(b)	$\sqrt{24} + \sqrt{54} = 2\sqrt{6} + 3\sqrt{6}$		
	$= 5\sqrt{6}$	B1	$\sqrt{192} + \sqrt{1200} + \sqrt{432} + \sqrt{2700}$ B1
	$(\sqrt{8} + \sqrt{50})(\sqrt{24} + \sqrt{54})$ $= 7\sqrt{2} \times 5\sqrt{6}$		
	$= 35\sqrt{12}$ or $35\sqrt{2}\ \sqrt{6}$ or $35\sqrt{4}\ \sqrt{3}$	B1	$8\sqrt{3} + 20\sqrt{3} + 12\sqrt{3} + 30\sqrt{3}$ B1
	$= 70\sqrt{3}$	B1	

14(a)	$7 \times \frac{1}{125}$	B1	Either
	$= \frac{7}{125}$	B1	
(b)	4^9	M1	OR $\frac{2^{14}}{2^{-4}}$
	$= 2^{18}$	A1	
(c)	$\frac{1}{81^{\frac{3}{4}}}$	M1	Handling minus power
	$= \frac{1}{(3^4)^{\frac{3}{4}}}$ or $\frac{1}{3^3}$	M1	$81 = 3^4$
	$= \frac{1}{27}$	A1	