

MARK SCHEME for the May/June 2008 question paper

4024/01

4024 MATHEMATICS

Paper 1, maximum raw mark 80

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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1	(a) $\frac{1}{14}$	1	In both parts, if answers decimal, accept fractions in working	
	(b) $4\frac{2k}{3k}$	1 2	After $0 + 0$, answers 0.0714(0) to 0.07145 and {4.665 to 4.67(0) or $\frac{14k}{3k}$ }	C1
2	(a) 6.7 oe	1		
	(b) (0).051 oe	1 2		
3	(a) -8	1		
	(b) $\frac{x-2}{5}$ oe	1 2	Must use x	
4	100 or 120	2 2	Answer with more sig figs which rounds to this or figs 1 or 12 or at least 2 of 9, 2^2 and 0.3 seen	C1 M1
5	(a) 160.27	1	Accept 160 or 160.3	
	(b) 6820	1 2		
6	26 (cm)	2 2	$\frac{10}{\sin \theta}$ or $\frac{10 \times 13}{5}$ or $\sqrt{\{10^2 + 24^2\}}$ seen Accept $\frac{10(\sin 90)}{\sin \frac{5}{13}}$ for M1	M1
			[12]	[12]
7	(a) $32x + 120$ (cm ²) oe	M1	Accept any equivalent seen anywhere	
	(b) 8 (cm)	2 3	Their (a) = 376 oe seen [Their (a) must be linear in x]	M1

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8	(a) 1	1		
	(b) $\frac{1}{81}$	1		Accept (0).0123(0) to (0).01235
	(c) 27	1	3	Accept ± 27
<hr/>				
9	(a) ($BDC =$) 42°	1		Accept all answers on the diagram if not seen in answer or working space
	(b) ($ABC =$) 90°	1		
	(c) ($ACB =$) 48° or 138° – their (b) $\sqrt{\text{ft}}$	1	3	$\sqrt{\text{ft}}$ only allowed if $0^\circ < ACB \leq 96^\circ$
<hr/>				
10	(a) $y = 4x^2$ or $y = kx^2$ with $k = 4$ seen anywhere	2		$4x^2$ seen or $y = kx^2$ seen M1 M1
	(b) $\frac{3}{2}$ and $-\frac{3}{2}$ oe www cao	1	3	Both required
				[12] [12]
<hr/>				
11	(a) Equilateral triangle	1		Accept either word alone
	(b) Rectangle	1		
	(c) Kite	1	3	
<hr/>				
12	$x = 2$ and $y = -3$	3	3	One correct with supporting working or correct method to eliminate one variable condoning one arithmetic slip [reaching such as $11x = k$, $kx = 22$, $11y = k$ or $ky = (-)33$] C2 M1
<hr/>				
13	(a) 3.75 or $3\frac{3}{4}$ or $\frac{30}{8}$ (m/s ²) oe	1		Accept -3.75 etc.
	(b) 270 (m)	2	3	Correct method to find complete area under graph M1 [9] [9]

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14 (a) 259 (g)	1		
(b) 20 (%)	2	3	120, $16\frac{2}{3}$ or 16.6 to 16.7 oe or fig ($\frac{5}{25}(\times 100)$)
			C1 M1
15 Final answer $\frac{8-t}{(2t-1)(t+2)}$ oe	3	3	$8-t$ and $(2t-1)(t+2)$ or $2t^2+3t-2$ seen in single fraction, not necessarily together or $3(t+2)-2(2t-1)$ seen in single fraction with quadratic denominator [condoning missing brackets]
			M2 M1
16 (a) Ruled line from (0, -2) to (2, -1) drawn	1		Allow tolerance of $\frac{1}{2}$ small square
(b) Correct region shaded and labelled R Allow $\sqrt{\text{ft}}$ if line wrong if possible	2	3	Accept shaded in or out if R correct or Shaded in or out, without R Allow C1 $\sqrt{\text{ft}}$ if line wrong if possible If no line, shading with R marked to right of C1 $x=0$, below $2y=4-3x$, not bounded by $y=0$
			C1
			[9] [9]
17 (a) (3, -6)	1		
(b) -4	1		Accept equivalents, such as $\frac{-16}{4}$ or $\frac{16}{-4}$
(c) $y=-4x+6$ or 3 term equivalent Accept $y=-4x+c$ with $c=6$ seen	2	4	3 term line of gradient their (b) or which passes through (1, 2) or (5, -14) $-4x+6$ alone
			C1 C1
18 (a) 9.19×10^7 (km)	2		Accept 9(or 9.2) $\times 10^7$ Correct answer not in standard form or 150 000 000 – 58 100 000 or $15 \times 10^7 - 5.81 \times 10^7$ seen
			C1 M1
(b) (0).15, $\frac{15}{100}$ or $\frac{3}{20}$ (terametres)	2	4	$1.5 \times 10^8 \times 10^3 / 10^{12}$ seen 1.5×10^{-4} oe seen
			M1 S C1

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19 (a)	(i) $5x(3x + 2)$	1	$\left. \begin{array}{l} \text{In both parts, ignore extra brackets,} \\ \text{condone missing outside brackets} \\ \text{If only solutions, accept factors in working} \end{array} \right\}$		
	(ii) $(t + 3)(t - 5)$	1			
(b)	$(0).6$ oe	2	4	$4x - 1.2 = 3x - 0.6$ oe, or better seen	M1

20 (a)	$\begin{pmatrix} 1 & 3 \\ 2 & 1 \end{pmatrix}$	2		At least 2 correct elements	C1
(b)	$\frac{1}{5} \begin{pmatrix} 4 & -1 \\ -3 & 2 \end{pmatrix}$ oe	2	4	$\frac{1}{5}$ soi or $\begin{pmatrix} 4 & -1 \\ -3 & 2 \end{pmatrix}$ soi	C1
				[16]	[16]

21 (a)	$t < -1.5, -1\frac{1}{2}$ or $-\frac{3}{2}$ oe (e.g. $-\frac{6}{4}$)	2		$t > -1.5$ or -1.5 alone	C1
				or $-6 > 4t$ oe or better seen	M1
(b)	58	2	4	At least two of +4, +36 and +18 seen	M1

22 (a)	-39	1			
(b) (i)	$3n + 1$ or any equivalent	1			
(ii) (a)	$\frac{19}{36}$	1			
(b)	$\frac{3n+1}{n^2}$ or <u>their (b)(i)</u>	1	4		

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23 (a) (i)	(1 :) 300 000	1		
(ii)	30 (km)	1	Accept answers in range 29.5 to 30.5	
(b)	Correct triangle drawn with sides 7 (± 0.2) and 6 (± 0.2) cm, arcs visible	2	No arcs seen, sides in wrong order and/or sides ± 0.4 cm and/or AC, BC not joined	C1
			If C on wrong side of AB , otherwise correct	C1
(c)	Perpendicular bisector of AB drawn	1	Within 0.2 cm of centre of AB and within 2° of perp Minimum length 5 cm	
(d)	F and G marked correctly \sqrt{ft}	1	Each to be 3 (± 0.2) cm from C on attempt at perp bisector, even if C is below AB	C1
		6		
			[14]	[14]

24 (a) (i)	2	1		
(ii)	$2.52, 2\frac{13}{25}$ or $2\frac{26}{50}$ www	3	2.52 oe or 2.5 seen www or such as $\frac{126}{50}$ seen or $\frac{(0 \times 10) + 1 \times 11 + 2 \times 8 + 3 \times 3 + \dots}{10 + 11 + 8 + 3 + \dots}$ (condoning one error)	M2 M1
(iii)	$\frac{3k}{175k}$ oe	2	$\frac{7}{50} \times \frac{6}{49}$ or $\frac{7}{50} \times \frac{6}{50}$ or better seen	M1
(b)	Ignore any block diagrams and outside the range $5 \leq t \leq 11$ Plots at heights 21, 11, 13 and 5 joined with straight lines	1	(Accept $10\frac{1}{2}, 5\frac{1}{2}, 6\frac{1}{2}$ and $2\frac{1}{2}$)	
	Time axis scaled and plots at 5, 7, 9 and 11	1	8	independent
			[8]	[8]