MARK SCHEME for the October/November 2007 question paper

4024 MATHEMATICS

4024/01

Paper 1, maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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1	(a)	9	1	
1		$\frac{9}{40}$ cao		9 10 102
	(b)	0.018 or equiv.	1	e.g. $\frac{9}{500}$, 1.8 x 10 ⁻²
2	(a)	$\frac{8}{9}$ cao	1	
	(b)	$\frac{1}{6}$ cao	1	
3	(a)	4.32(0)	1	not 4320. Accept $4\frac{32}{100}$ or equiv.
	(b)	$(-1)^3$, 3^{-1} , 3^0 , 3^1	1	Accept corresponding correct values
4	(a)	56°	1	
	(b)	2 cm	1	
5	(a)	375	1	
	(b)	27	1	
6	(a)	6	1	
	(b)	3-2x	1	Accept any correct equiv.
7		rectangle from 4-5 height 20 rectangle from 5-8 height 5	1 1	
8	(a)	y > 1, $y < 2x$ or equiv.	1+1	or sc1 for using the two correct equations
	(b)	3	1	but with the wrong inequalities
9	(a)	$B \cap C \cap A'$	1	
	(b)	(i) 31 (ii) 9 or f.t. 40 – their (b)(i)	$\begin{array}{c} 1\\ 1 \end{array}$	
10	(a)			
10	(a)	$\begin{pmatrix} 8 & -3 \\ 9 & -4 \end{pmatrix}$	1	
	(b)	$\begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$	1	
	(c)	$\begin{pmatrix} 0 & \frac{1}{3} \\ -1 & 1\frac{1}{3} \end{pmatrix}$	1	Allow $\frac{1}{3} \begin{pmatrix} 0 & 1 \\ -3 & 4 \end{pmatrix}$
		$\left(-1,1\frac{1}{3}\right)$		(-3 4) Accept decimals to 2 d.p. or better.
11	(a)	5.35 5.45		
	(b)	82.587.5all correct189.5 gor f.t. from their lower bounds	$\begin{array}{c} 2\\ 1 \ \end{array}$	or B1 for 2 or 3 correct
12	(a)	120 newtons	1	
	(b)	8	2 *	or B1 for " <i>k</i> " = 24

	Page 3		Mark Scheme							S	Syllabus		Paper			
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13	(a)	4 minut	es						1							
	(b)	st. line from $(0,0)$ to (their (a), $2h$) st. line from (their (a), $2h$) to $(12, 3h)$							1 1		sc1 for a single straight line from $(0,0)$ to $(12,3h)$ regardless of the value in (a).					
14	(a)	<i>x</i> = 28							1							
	(b)	$y = \frac{2}{3}$ (accept 0.66 or better)						2	*	or B1 for $-10 + 2y$ or $-5 + y$ seen						
15			orrect cossible v						1	*						
W L A	3 33 99		5 29 145	6 27 162	7 25 175	8 23 184	9 21 189	10 19 190	11 17 187	12 15 180	13 13 0 169	14 11 154	15 9 135	16 7 112	17 5 85	18 3 54
		Length Area =	= 19 m 190 m ²						1 1							
16		<i>x</i> = 7	<i>y</i> = -2					botl	n 3					alues 1	that fit	ts either
17	(a)	(i) 5	x 10 ⁻²						1							
		(ii) 2	x 10 ²						1							
	(b)	(i) 2	$x 3^2 x 5$	³ (or 2	$^{1} x 3^{2}$	$x 5^3$)			1		Accep	t 3x3	etc.			
		(ii) <i>n</i>	= 12						1							
18	(a)	$\frac{360}{180-165}$	or 180	(<i>n</i> –2)	= 165	<i>n</i> or early	quiv	M	l							
		24						A	2	*						
	<i>a</i> \	4.5									D 4					
	(b)	45							2	*	or B1	for 30	or 150 s	seen		
19	(a)	40							2	*	rounds or B1	s to 40	h 16 an			wer that
	(b)	their10 their1	— or 5	500 x 6	50			M	l		¥150	~ 12 5	con			
		30 km/ł						A	2	*	Accep	t 29.8 1	to 30.31			
20	(a)	$3a^2(5-$	+ 4 <i>a</i>)						1							
	(b)	(1 - 4b)	(1 + 4b))					1							
	(c)	(3 <i>c</i> – <i>d</i>)	(2x-y)						2	*		for cor vo term		rtial f	actoris	sation of

Page 4	Mark Scheme	Syllabus	Paper
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21	(a)	$h = \frac{1}{4}$ or 0.25	1	
	(b)	(i) $\frac{3}{10}$ or 0.3	1	
	(0)			
		(ii) 0 cao	1	
		(iii) $\frac{1}{10}$ or 0.1	1	
22	(a)	clear $30 + (300 - \frac{1}{2} \times 30 \times "12") \div "12"$ M1		or sc1 for a final answer of 10
		40 s A1	2 *	or B1 for 180 or 120 seen
	(b)	tangent drawn at $t = 55$ T1		no "daylight", nor freehand
		0.12 to 0.24 (+ or -) B1	2 *	dep. on using an acceptable tangent
23	(a)	20°C	1	
	(b)	(i) 4°C	1	
		(ii) 2400 m	1	
		(11) 2400 11	-	
		(iii) $16 - \frac{x}{150}$	2	or sc1 for $\frac{\text{their (a)}}{3000} \times x$
24	(a)	(4) 8, 16, 12	1	
	(b)	x = 2n	1	
		$y = n^2$	1	
		$z = n^2 - n$ or equiv	2	or sc1 for a correct expression in terms of x and/or y (and possibly also including
				the variable <i>n</i>)
25	(a)	293° to 295°	1	
	(b)	completed $\triangle ACD$ with two arcs at D	1	within 2 mm of correct pt
	(c)	(i) perp. bisector of AC	1	within 2 mm, 2°
		(ii) line parallel to AB , 5 cm above AB	1	within 2 mm Accept dashed lines.
	(d)	CP = 6.3 to 6.7	1	dep. on the correct loci and the label <i>P</i> at their intersection