UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2010 question paper

for the guidance of teachers

4024 MATHEMATICS (SYLLABUS D)

4024/12 Paper 1, maximum raw mark 80

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Abbreviations

cao correct answer only
cso correct solution only
dep dependent
ft follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
www without wrong working
art anything rounding to
soi seen or implied

1	**(a)**	$\frac{17}{21}$ oe	1	
	(b)	$\frac{5}{12}$ cao	1	
2	**(a)**	70	1	
	(b)	4.05	1	
3	**(a)**	7.06×10^{-5} cao	1	
	(b)	150	1	
4	**(a)**	7	1	
	(b)	6	1	
5	**(a)**	1.65	1	
	(b)	2 : 25	1	
6	**(a)**	$(2t - 3)(2t + 3)$	1	
	(b)	$(3x - 1)(x + 2)$	1	
7	18		2	or **B1** for "k" = 2, or for $\frac{y}{50} = \frac{3^2}{5^2}$ oe
8	$(\pm)\sqrt{\frac{y-3}{2}}$ oe e.g. $(\pm)\left(\frac{y-3}{2}\right)^{\frac{1}{2}}$ (sq. root symbol must extend below the fraction line)		2	or **C1** for $\frac{\sqrt{y-3}}{2}$ or for $\sqrt{\frac{y+3}{2}}$ or for $\sqrt{\frac{3-y}{2}}$ or for $\sqrt{y-3/2}$ oe for all
9	**(a)**	(±) 5 cao	1	
	(b)	**(i)** 6	1	
		(ii) (1.5, 0)	1	

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10	**(a)**	$\frac{4}{5}$, or 0.8, only	1	
	(b)	$25x^6$ cao	1	
	(c)	$\frac{4}{n^8}$	1	
11	**(a)**	8	1	
	(b)	{5, 6, 7, 8, 9}	1	
	(c)	$\frac{3}{10}$ or 0.3	1	
12	**(a)**	$3\frac{1}{2}$, or $\frac{7}{2}$, or 3.5, only	1	
	(b)	$12 - 2x$ or **any** equivalent	2	or **C1** for $12 - 2$ "y" or **any** equivalent or **C1** for $6 - 2x$, or for any incorrect linear combination of 12 and $2x$ (but not 2"y")
13	**(a)**	Irrational	1	
	(b)	$(AB^2 =)\ AC^2 - 5^2$ or $(AB =)\ \sqrt{AC^2 - 5^2}$ or $AC^2 = AB^2 + 5^2$. AC must be "their" $\sqrt{89}$	M1	
		$(\pm)\ 8$	A1	
14		$x = 9,\ y = 6$ both	3	or **C2** for one answer correct; or **C1** for a pair of values that fits either equation, provided that this pair has been obtained by the method of substitution, equal coeffs., or matrices/determinants and **not** by trial and error.
15	**(a)**	16 (.0)(0)	1	
	(b)	75 (.0)(0) www	2	or **M1** for $\frac{60}{0.8}$ oe, e.g. $\frac{3k \times 100}{4k}$
16	**(a)**	$\begin{pmatrix} -1 & -2 \\ 0 & -2 \end{pmatrix}$	1	
	(b)	$\begin{pmatrix} 0 & -1 \\ -\frac{1}{3} & -\frac{2}{3} \end{pmatrix}$ oe e.g. $-\frac{1}{3}\begin{pmatrix} 0 & 3 \\ 1 & 2 \end{pmatrix}$	2	or **B1** for det **A** = –3 or for $k\begin{pmatrix} 0 & 3 \\ 1 & 2 \end{pmatrix}$ or for $-\frac{1}{3}\begin{pmatrix} .. & .. \\ .. & .. \end{pmatrix}$
17	**(a)**	$\begin{pmatrix} 490 \\ 520 \end{pmatrix}$	2	or **C1** for a 2×1 matrix with one element correct; or for (490 520)
	(b)	The cost, (in cents), of each bunch. oe	1	Indep. of **(a)**
18	**(a)**	14.7(0) cao	1	
	(b)	30	2	or **B1** for 170 seen in working or in Ans. Space

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19	**(a)**	$p = 1,\ q = 0$	1	
	(b)	**(i)** $\frac{5}{7}$	1	
		(ii) $\frac{2}{7}$ or ft 1 – their **(i)** or ft $(\frac{1}{7}+\frac{1}{7} \times$ their $p)$	1ft	ft depends on 0 < Ans. < 1
20	**(a)**	$3x > 7$ oe $4x + 4y < 35$ oe	1 1	or **C1** for $3x$ ... 7 **and** $4x + 4y$ ... 35 (oe) with incorrect inequalities for ... .
	(b)	(5, 3)	1	
21	**(a)**	53.35°	1	
	(b)	65.15°	2	or **C1** for 64.65; or 65.1; or 64.05
22	**(a)**	**(i)** 16 000 cao **(ii)** 0.0030 cao	1 1	
	(b)	50 cao	2	Give 0 for multiplication using either original number. or **C1** for figs. 5, or 6; or 45; or 48
23	**(a)**	123°	1	
	(b)	57°	1	
	(c)	33°	1	
	(d)	66°	1	
24	**(a)**	**3p** + **q** oe	1	
	(b)	**(i)** Trapezium **(ii)** **p** + k**q** oe	1 1	
		(iii) $\frac{1}{3}$	1	
25	**(a)**	30	2	or **B1** for $10u$ or ½ × 20 × u clearly seen
	(b)	90	2	or **C1** for 30 (if as the further time from 60) or **M1** for $100 - \frac{1}{4} \times 40$, or for $60 + \frac{3}{4} \times 40$
26	**(a)**	$-\frac{4}{5}$, or –0.8, only	1	
	(b)	16	3	or **M1** for $\frac{AC}{\sin b} = \frac{10}{\sin a}$ soi and **M1** for $AC = \frac{10 \times \frac{24}{25}}{\frac{3}{5}}$ oe

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27	**(a)**	3	1	
	(b)	80	1	
	(c)	$7\frac{1}{2}$ oe	3	or **B1** for $\frac{A}{360} \times 2 \times \pi \times r$ with $A = 40$ or 120, **and** $\pi = \pi$ or 3 or 3.14 or $\frac{22}{7}$ etc and **M1** for adding the appropriate radii ($6r$ or $2r$) to their arc(s) **and** equating to the appropriate wire length (60 or 20) ($8r = 60$, oe (e.g. $\frac{8}{3}r = 20$), gets B1 and M1)

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