

**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)	$(\pm) 5$ cao	1	
	(b)	(i) 6 (ii) (1.5, 0)	1 1	

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" $\sqrt{89}$ (\pm) 8	M1 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 $\det \mathbf{A} = -3$ or for $k \begin{pmatrix} 0 & 3 \\ 1 & 2 \end{pmatrix}$ or for $-\frac{1}{3} \begin{pmatrix} \dots & \dots \\ \dots & \dots \end{pmatrix}$
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

19	(a)	$p = 1, q = 0$	1	
	(b)	(i) $\frac{5}{7}$ (ii) $\frac{2}{7}$ or ft 1 – their (i) or ft $(\frac{1}{7} + \frac{1}{7} \times \text{their } p)$	1 1ft	ft depends on $0 < \text{Ans.} < 1$
20	(a)	$3x > 7$ oe $4x + 4y < 35$ oe	1 1	or C1 for $3x \dots 7$ and $4x + 4y \dots 35$ (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) $p + kq$ oe	1 1	
	(iii)	$\frac{1}{3}$	1	
25	(a)	30	2	or B1 for $10u$ or $\frac{1}{2} \times 20 \times u$ 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	<p>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) $(8r = 60, \text{ oe (e.g. } \frac{8}{3}r = 20 \text{)}, \text{ gets B1 and M1)$</p>
	(b)	80	1	
	(c)	$7\frac{1}{2}$ oe	3	