

**MARK SCHEME for the October/November 2014 series**

**4024 MATHEMATICS (SYLLABUS D)**

**4024/12**

Paper 1, maximum raw mark 80

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

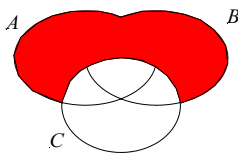
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**Abbreviations**

- 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
- soi seen or implied

Question	Answers	Mark	Part marks
1	(a) 5.11 oe	1	
	(b) 2 hours and 35 minutes	1	
2	(a) 59	1	
	(b) $T = \frac{13M}{500} + 20$ oe seen	1	
3	(a) -0.5	1	
	(b) 0.1	1	
4	(a) -5	1	
	(b) $\frac{x+6}{2}$ oe	1	
5	(a) 1200 cao	1	
	(b) 3	1	
6	(a) Correct region shaded	1	
	(b) 3	1	
7	25	2	C1 for figs. 25 or M1 for $\frac{\text{figs } 9}{60 \times 60}$ oe
8	(a) 1 : 2 oe	1	
	(b) 1 : 8 oe, or ft <i>their(a)</i> cubed	1 <sup>ft</sup>	

9	(a) 54.25	1	
	(b) $\frac{d+0.5}{54.25}$ , or ft $\frac{d+0.5}{their(a)}$ , seen	1 <sup>1/2</sup>	
10	12	2	<b>B1</b> for “k” = 72 or <b>M1</b> for $9 \times 8 = 6y$ oe or <b>M1</b> for $y = (their\ k)/6$ when $y =$ “k”/x used
11	(a) 1	1	
	(b) 41 40 81 (all three)	1	
	(c) $(2n + 1)^2$ oe	1	
12	(a) $5.67 \times 10^{-4}$	1	
	(b) $6 \times 10^{-12}$	2	<b>C1</b> for figs 6, or for the index -12
13	(a) 140	1	
	(b) 1.2	2	<b>M1</b> for $3 \times \left(\frac{7}{5} - 1\right)$ ; or $3 \times \left(\frac{their(a)}{100} - 1\right)$ ; oe or a complete algebraic method.
14	(a) 10	1	
	(b) 216	2	<b>M1</b> for $\pi \times 6 \times 10 = \frac{x}{360} \times \pi r^2$ or $2 \times \pi \times 6 = \frac{x}{360} \times 2\pi r$ where $r = 10$ or <i>their(a)</i> . Where radians are used, method must include multiplication by $\frac{180}{\pi}$ .
15	(a) 720	1	
	(b) 20	2	<b>M1</b> for $(\pi \times 62 \times d)$ (oe) = $k\pi$ where $k = 720$ or <i>their(a)</i>

16	(a)	$\begin{pmatrix} -4 \\ -3 \end{pmatrix}$	1	
	(b)	$\begin{pmatrix} -3 \\ -4 \end{pmatrix}$	1	
	(c)	5 cao	1	
17	(a)	$p^5 - 3$	2	<b>B1</b> for $p^5$ , or for $-3$ .
	(b)	$3x^2$	2	<b>C1</b> for 3; <b>C1</b> for $x^2$
18	(a)	$4a(1 - 4a)$	1	<b>B1</b> for one of the partial factorisations $x(x - y)$ ; $5(x - y)$ ; $x(x + 5)$ ; $y(x + 5)$ , or their negatives.
	(b)	$(3b - c)(3b + c)$	1	
	(c)	$(x + 5)(x - y)$	2	
19	(a)	4	1	<p>If [0] earned for the two 150s, award <b>M1</b> for</p> <p>using <math>360^\circ</math> correctly in a quadrilateral, or for using <math>540^\circ</math> correctly in a pentagon, or for using <math>720^\circ</math> correctly in a hexagon, to find the 135.</p> <p>If [0] earned in (b), then <b>B1</b> for (angle sum of a hexagon equals) <math>720^\circ</math> seen.</p>
	(b)	$90^\circ$	1	
		two $150^\circ$ } correctly obtained	1	
		two $135^\circ$ } correctly obtained	1	

20	(a)	68	1	
	(b)	44	1	
	(c)	112 or ft 180 – <i>their</i> (a)	1 <sup>✓</sup>	
	(d)	44 or ft <i>their</i> (b)	1 <sup>✓</sup>	
21	(a)	Correct completion of tree diagram	1	
	(b)	(i) $\frac{1}{10}$ (ii) $\frac{17}{50}$ or ft from <i>their</i> tree diagram	1 2 <sup>✓</sup>	<b>M1</b> for $\left\{ \frac{2}{5} \times \frac{1}{4} \text{ or } \textit{their}(bi) \right\} + \frac{3}{5} \times \textit{their} \left( \frac{2}{5} \right)$
22	(a)	1.2	1	
	(b)	3.6	1	
	(c)	480	2	<b>M1</b> for $\frac{1}{2} \times (20 + 60) \times 12$ oe  or <b>B1</b> for 180, or 240, or 60, or 420, or 300, as a correct evaluation of an identifiable appropriate area.
23	(a)	(8, 10)	1	
	(b)	$x > 8$ oe $2y > 12 + x$ oe	1 1	If 0 scored, then <b>C1</b> for $x \geq 8$ oe and $2y \geq 12 + x$ oe.
	(c)	(9, 11)	1	
24	(a)	137° to 140° inclusive	1	
	(b)	(i) perp. bisector of $AB$	1	
		(ii) circle, centre $C$ , radius 4 cm	1	
		(iii) correct region (bottom part) shaded	1	

25	(a)	$\left(-\frac{1}{2}, 1\right)$	1	C1 for one correct coordinate	
	(b)	$-\frac{6}{7}$	1		
	(c)	(i)	(10, -8)		2
		(ii)	$\frac{1}{3}$		1
26	(a)	$\frac{1}{7}$	1	C1 for 2 or 3 correct elements.  M1 for $(Y =) (6 \ 2) A^{-1}$ seen. If $(x \ y) A = (6 \ 2)$ is used, then award <b>M1</b> at the stage where an attempt to solve the simultaneous eqns. is made.	
	(b)	$\begin{pmatrix} -1 & -4 \\ 2 & 0 \end{pmatrix}$	2		
	(c)	(2 0), or (14 × their (a) 0) ft	2 <sup>1/2</sup>		