

**MARK SCHEME for the October/November 2011 question paper  
for the guidance of teachers**

**4024 MATHEMATICS (SYLLABUS D)**

**4024/11**

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, which would have considered the acceptability of alternative answers.

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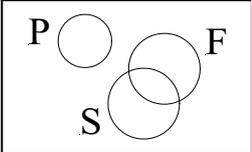
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**Abbreviations**

- 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

Qu	Answers	Mark	Part marks
1	(a) 11(.0) cao	1	
	(b) 0.014	1	
2	(a) $\frac{13}{15}$ oe	1	
	(b) $\frac{4}{7}$ cao	1	
3	(a) 66(%) $\frac{2}{3}$ 0.67 $\frac{7}{9}$	1	
	(b) 20	1	
4	(a) 3 hours 19 minutes	1	
	(b) 1550	1	
5	$\frac{3}{5x-2}$ or any equiv.	2	or C1 for $\frac{3}{5\text{"y"}-2}$ or B1 for $5x\text{"y"} = 2x + 3$ oe or B1 for $5\text{"y"} - 2 = \frac{3}{x}$ (from $y = \frac{2}{5} + \frac{3}{5x}$ ).
6	6 000 or 6080 or 6100 only	2	or C1 for figs 6, 61 or 608 or B1 for $\sqrt{15.98} \approx 4$ or for 1500 <b>from</b> $\frac{300}{0.2}$
7	$x = -5$	1	
	$y = 4$	1	
8	(a) $2.18 \times 10^6$	1	
	(b) $3(.0) \times 10^4$	1	

9	$a = -5\frac{1}{2}$	1	or <b>C1</b> for $b = -5\frac{1}{2}$ or for $a = -3$
	$b = -3$	1	
10	$(x - 5)(2y - 3)$ or $(5 - x)(3 - 2y)$ only	2	or <b>C1</b> for $(..x .. 5) (..2y .. 3)$ with incorrect +s and -s for .. or <b>B1</b> for factorisation of <b>any</b> two terms; e.g. $x(2y - 3), 3(-x + 5)$
11	(a) rectangle rhombus	1	
	(b) parallelogram rectangle rhombus	1	
	(c) rectangle square	1	
12	(a) -13	1	
	(b) 35	1	
	(c) -5	1	
13	(a) 250 000	1	
	(b) 14		
	(c) 50		
14	(a) 5	1	
	(b) 3.8 or $3\frac{4}{5}$ or $\frac{19}{5}$	2	
15	(a) 	2	or <b>C1</b> for a separate P or <b>C1</b> for an S that intersects F but not P (unless a null intersection is indicated). or <b>B1</b> for three intersecting loops with correctly placed integers, all greater than 5, that illustrate the sets correctly – with spaces for nulls.
	(b) 10 or 14 or 22 or 26 etc	1	
16	(a) 12	1	
	(b) 344	2ft	

<b>17</b>	<b>(a)</b> (0, -3) cao	<b>1</b>	
	<b>(b)</b> $y > \frac{1}{4}x$ oe	<b>1</b>	if 0 scored then <b>C1</b> for $y \dots \frac{1}{4}x$ oe
	$2x - y > 3$ oe	<b>1</b>	with incorrect (in)equalities for “...”
<b>18</b>	<b>(a)</b> $9a^8$	<b>1</b>	
	<b>(b)</b> 16	<b>1</b>	
	<b>(c)</b> 1	<b>1</b>	
	<b>(d)</b> $\frac{2}{3}$ cao	<b>1</b>	
<b>19</b>	<b>(a)</b> 18	<b>2</b>	or <b>B1</b> for $160n = (n - 2) \times 180$ oe or <b>M1</b> for $\frac{360}{(180 - 160)}$
	<b>(b)</b> <b>(i)</b> 10 <b>(ii)</b> 150	<b>1</b> <b>1ft</b>	ft 160 – their <b>(i)</b>
<b>20</b>	<b>(a)</b> correct Shape 4 drawn	<b>1</b>	
	<b>(b)</b> (12) (18) 24 30	<b>1</b>	
	<b>(c)</b> $6n + 6$ oe	<b>1</b>	
	<b>(d)</b> convincing explanation	<b>1</b>	e.g. 100 is not a multiple of 6 $6n + 6 = 100$ does not have a whole number solution; $\frac{94}{6}$ is not a whole number.
<b>21</b>	<b>(a)</b> 24	<b>2</b>	or <b>B1</b> for $40 \times 3 = 5^x$ or <b>B1</b> for “ $k$ ” = 120 or <b>B1</b> for “ $T = \frac{120}{A}$ ” oe
	<b>(b)</b> $\frac{120}{A}$	<b>1</b>	
	<b>(c)</b> $\frac{3}{10}$ cao	<b>1</b>	

22	<p>(a) 7</p> <p>(b) <math>\frac{1}{7} \begin{pmatrix} 1 &amp; -2 \\ 1 &amp; 5 \end{pmatrix}</math></p> <p>(c) <math>\begin{pmatrix} 3 \\ -2 \end{pmatrix}</math></p>	<p>1</p> <p>1ft</p> <p>2</p>	<p>ft <math>k \begin{pmatrix} 1 &amp; -2 \\ 1 &amp; 5 \end{pmatrix}</math> where <math>k = \frac{1}{\text{their(a)}}</math></p> <p>or M1 for <math>(\text{their } \mathbf{A}^{-1}) \times \begin{pmatrix} 11 \\ -5 \end{pmatrix}</math></p> <p>or M1 for attempting to multiply <math>\begin{pmatrix} 5 &amp; 2 \\ -1 &amp; 1 \end{pmatrix}</math> by <math>\begin{pmatrix} x \\ y \end{pmatrix}</math> and to equate the result to <math>\begin{pmatrix} 11 \\ -5 \end{pmatrix}</math>, thus obtaining two equations.</p>
23	<p>(a) 15</p> <p>(b) between 33 and 39 inclusive</p> <p>(c) 36</p> <p>(d) st. line from (3, 0) to (5, 60)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	
24	<p>(a) <math>\mathbf{p} - \frac{1}{2}\mathbf{q}</math> oe</p> <p>(b) <math>\frac{1}{3}\mathbf{p} - \frac{1}{6}\mathbf{q}</math> oe or ft <math>\frac{1}{3} \times</math> their (a)</p> <p>(c) <math>\frac{1}{3}\mathbf{p} + \frac{5}{6}\mathbf{q}</math> or ft <math>\mathbf{q} +</math> their (b)</p> <p>(d) (i) <math>\mathbf{p} + \frac{k}{2}\mathbf{q}</math> oe</p> <p>(ii) 5</p>	<p>1</p> <p>1ft</p> <p>1ft</p> <p>1</p> <p>1</p>	
25	<p>(a) 136° to 138° inclusive</p> <p>(b) (i) st line, parallel to AD, 4 cm above AD</p> <p>(ii) perp. bisector of AD</p> <p>(c) top r.h. region identified by shading</p> <p>(d) P marked on their (b)(i) locus, such that CP is perpendicular to the locus</p>	<p>1</p> <p>1</p> <p>1</p> <p>1ft</p> <p>1ft</p>	

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<b>26</b>	<b>(a)</b> 90° ... tangent-radius property oe	<b>1</b>	must mention “tangent” and “radius
	<b>(b)</b> recognisable attempt at Pythagoras in $\Delta OTB$ .	<b>M1</b>	
	$(x + 10)^2 = x^2 + 40^2$ oe	<b>A1</b>	
	$(x + 10)^2 = x^2 + 20x + 100$	<b>B1</b>	indep
	$x = 75$ www	<b>1</b>	ww award <b>C2</b>