## MARK SCHEME for the May/June 2015 series

## 4024 MATHEMATICS (SYLLABUS D)

4024/22
Paper 2, maximum raw mark 100

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| Qu. | Answers | Mark | Part Marks |
| :---: | :---: | :---: | :---: |
| 1 (a) | $\frac{17 x+13}{6}$ cao final answer | 2 | M1 for $\frac{2(4 x-1)}{6}+\frac{3(3 x+5)}{6}$ or better oe |
| (b) (i) | $\frac{1}{2} \text { or } 0.5 \mathrm{cao}$ | 1 |  |
| (ii) | $y=1$ final answer | 1 |  |
| (iii) | Line from ( 6,1$)$ to $(4,3)$ | 1 |  |
| (iv) | $y=-x+7$ final answer | 2 | B1 for any equation with grad -1 and/or intercept 7 |
| (v) | $(0,6)$ | 2 | B1 for line from $(2,2)$ with $y$-intercept between 5 and 7 soi Or for correct (unsimplified) equation $(y=-2 x+6)$ |
| 2 (a) | 27 | 1 |  |
| (b) | Constant speed | 1 |  |
| (c) | 0.08 or $\frac{2}{25}$ final answer | 1 |  |
| (d) | 3 to 3.5 | 1 |  |
| (e) | 1500 | 2 | M1 for $\frac{1}{2}(200+50) 12$ <br> Or B1 for $\Delta=900$ or rectangle $=600$ After 0, allow SC1 for 1750 |
| (f) | 27 cao | 2 | M1 for their (total distance $\div$ total time) soi |
| 3 (a) (i) | 67.8 | 3 | M1 for <br> $15 \times 10+45 \times 15+75 \times 11+105 \times 7+135 \times 5+165 \times 2$ <br> i.e. $150+675+825+735+675+330(=3390)$ <br> B1 for $\div 50$ (independent of $\mathbf{M}$ mark) |
| (ii) | $90 \leqslant t<120$ | 1 | Or clear equivalent |
| (b) (i) | 100 and 76 and 48 | 2 | B1 for 100 and 76, or for 48 |
| (ii) | Completed pie chart with at least one sector correctly labelled | 1 |  |
| 4 (a) (i) | 72 | 1 |  |
| (ii) | 83 | 1 |  |
| (iii) | 108 | 1 |  |
| (iv) | 83 | 1FT | Their (ii) |


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| (b) (i) | 4 ( $\pi$ ) cao | 2 | B1 for $\pi \times 6^{2}$ or for $\frac{40}{360}$ |
| :---: | :---: | :---: | :---: |
| (ii) | $12+\frac{4}{3} \pi$ final answer | 2 | B1 for ( $a=$ ) 12, or for ( $b=$ ) $\frac{4}{3}$ |
| (iii) | 8 | 1 ft |  |
| 5 (a) | ( $\pm$ ) 9.3(0) to 9.31 | 4 | M2 for $B C^{2}=8^{2}+11^{2}-2 \times 8 \times 11 \cos 56$ Or M1 for $8^{2}+11^{2} \pm(2) \times 8 \times 11 \cos 56$ B1 for 86.5 to 86.6 |
| (b) | 122.2 to 122.3 | 3 | M2 for $(\sin A D C=) \frac{11 \sin 30}{6.5}$, or 57.7 to 57.8 , or 58 <br> Or M1 for $\frac{\sin A D C}{11}=\frac{\sin 30}{6.5}$ oe |
| (c) | 45.7 to 45.71 | 4 | B1 for 27.7 to 27.8 seen M1 for $\frac{1}{2} \times 11 \times 8 \times \sin 56(=36.478 \ldots)$ or for $8 \times \sin 56$ if using heights M1 for $\frac{\text { their stated area }}{\text { their area } A B C} \times 100$ or $\frac{\text { their height } A D C}{\text { their height } A B C} \times 100$ |
| 6 (a) | 325 | 2 | M1 for $\frac{250}{20500}$ or $\frac{26650}{20500}$ Or B1 for 82 seen |
| (b) | 465 and 2.56 to 2.57 | 3 | B2 for 465 or 2.56 to 2.57 seen Or M1 for $400 \times 1.17$ (468) |
| (c) | 170 | 3 | B2 for 420 or 144.5(0) <br> Or M1 for $357 \div 0.85$ <br> or $357-(250 \times 0.85)$ |


| SECTION B |  |  |  |
| :---: | :---: | :---: | :---: |
| Qu. | Answers | Mark | Part Marks |
| $7 \quad$ (a) (i) | $\mathrm{f}^{-1}(x)=\frac{3 x-7}{2}$ oe final answer | 2 | M1 for $3 y=2 x+7$ or $3 x=2 y+7$ oe |
| (ii) | $m=-14$ | 2 | M1 for $\frac{2 m+7}{3}=\frac{m}{2}$ oe |
| (b) (i) | 4, 4 and smooth correct graph drawn | 3 | B1 for 4 and 4 <br> B1 for 7 correct plots |
| (ii) | $(y=) 6.2$ to 6.4 | 1 |  |
| (iii) | line drawn and $x=-0.7$ to -0.8 $x=2.7 \text { to } 2.8$ | 2 | M1 for correct line drawn |
| (iv) | line drawn and $x=-2.3$ to -2.7 | 2 | M1 for horizontal line crossing curve at intersection of $x=3.5$ and their curve or for the line $y=-2.75$ |
| 8 (a) | 321 | 1 |  |
| (b) | 9.43 to 9.44 | 2 | $\mathbf{M 1}$ for $\sin 39=\frac{y}{15}$ oe |
| (c) | 19.3 to 19.31 | 2 | $\text { B1 for } \cos 39=\frac{15}{x} \mathrm{oe}$ |
| (d) (i) | $X$ marked 12 cm from $A$ on bearing of $141^{\circ}$ | 2 | B1 for either a correct distance or bearing |
| (ii) | Correct region shaded | 3 | B1 for arc, min length 3 cm , radius 6 cm , centre $A$ <br> B1 for bisector of $\angle A B C$, min length 3 cm <br> B1 for shading |
| (iii) | 17.6 to 18.4 dependent on an acceptable $X$ and $Y$ | 2 | M1 for $Y$ established at northern end of shading |
| 9 (a) (i) | $2 x\left(2 x^{2}-5 y\right)$ final answer | 1 |  |
| (ii) | $(3 a+b)(3 a-b)$ final answer | 1 |  |
| (b) | $m=\frac{5}{8}, 0.625$ | 2 | M1 for $7=12-8 m$ or $\frac{7}{4}=3-2 m$ |
| (c) (i) | $h^{2}+(h+7)^{2}=23^{2}$ leading to correct rearrangement | 2 | M1 for $h^{2}+(h+7)^{2}=23^{2}$ |
| (ii) | $\frac{h}{2}(h+7) \text { oe isw }$ | 1 |  |


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| (iii) | 120 cao | 1 |  |
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| (iv) | 12.4, -19.4 | 3 | B2 for one correct solution, or for 12.38 to 12.40 and -19.38 to -19.40 <br> Or if in form $\frac{p \pm \sqrt{q}}{r}, \mathbf{B 1}$ for $p=-7$ and $r=2$ <br> and B1 for $q=1009$ or $\sqrt{q}=31.7$ to 31.8 |
| (v) | 54.76 to 54.8 | 1FT |  |
| 10 (a) (i) | Rotation $90^{\circ}$ anticlockwise about (1,1) | 2 | B1 for Rotation <br> B1 for $90^{\circ}$ anticlockwise and about $(1,1)$ |
| (ii) | Correct triangle | 2 | B1 for two correct vertices |
| (iii) | Correct triangle | 2 | B1 for two correct vertices |
| (iv) | 24 | 2 | B1 for $4^{2}$ soi or M1 for $\frac{1}{2} \times 12 \times 4$ |
| (b) | 2 | 1 |  |
| (c) | 4 | 1 |  |
| (d) | Rectangle, Rhombus | 2 | B1 for one correct |
| 11 (a) (i) | $\frac{7}{30}$ or $0.23 \ldots$ or better | 1 |  |
| (ii) | $\frac{11}{15}$ cao | 1 |  |
| (iii) (a) | All probabilities correctly placed | 2 | B1 for at least 8 correct |
| (b) | $\frac{308}{870} \text { or } \frac{154}{435} \text { or } 0.354$ | 2 | M1 for $\begin{aligned} & \left(\text { their } \frac{7}{30} \times \text { their } \frac{6}{29}\right)+\left(\frac{15}{30} \times \text { their } \frac{14}{29}\right) \\ & +\left(\frac{8}{30} \times \text { their } \frac{7}{29}\right) \end{aligned}$ |
| (b) (i) | Correct histogram | 3 | B2 for at least 3 correct bars Or B1 for at least 1 correct bar or correct frequency densities seen |
| (ii) | 61 or 62 | 2 | B1 for 6 or 7 seen |
| (iii) | 10 | 1 |  |

