**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**Cambridge Ordinary Level**

# MARK SCHEME for the October/November 2014 series

## 4024 MATHEMATICS (SYLLABUS D)

**4024/21** Paper 2, maximum raw mark 100

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.

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) (i)** | 6 | **1** | |
| **(ii)** | $\frac{1}{500}$ | **1** | |
| **(iii)** | 2.7 | **1** | |
| **(b)** | 9 | **1** | |
| **(c) (i)** | 3.5 | **2** | **B1** for 1.2 seen or division by 120<br>or **M1** for $x + \frac{20x}{100} = 4.2$ oe |
| **(ii)** | Special promotion tin + working | **2** | **M1** attempt at one rate |
| **2 (a)** | 15 05 or 3 05 pm | **2** | **B1** for (0)9 05 or (0)3 50 seen |
| | | | or **M1** for 21 50 + 11 15 or 21 50 + 6 |
| **(b)** | 11 hours 55 minutes | **2** | **B1** for (0)1 45 or 5 hours and 55 minutes seen<br>or **M1** for 13 40 – (0)7 45 + 6 oe |
| **(c) (i)** | 290 (280 to 300) | **1** | |
| **(ii)** | 45 or ft from their **(c)(i)** | **1** | |
| **(d)** | 827 | **2** | **M1** for $683 + k \times 24$ |
| **3 (a) (i)** | Correct quadratic graph through 11 points | **3** | **B2** for curve through at least 8 ft points or for 11 ft points<br>or **B1** for 16 in the table twice<br>or for 6 ft points |
| **(ii)** | – 2.35 to – 2.25 and<br>4.25 to 4.4 | **2ft** | **B1** for one correct solution<br>or **M1** for $y = 2$ drawn |
| **(iii)** | 3.25 to 4.75 | **2** | **B1** for tangent drawn at $x = 3$<br>or for a gradient in range |

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|---|---|---|---|---|
| | **(b)** | 2.54, – 3.54 | **3** | Working seen and www<br>**B1** for $\sqrt{1^2 - 4\times1\times(-9)}$ soi<br>and **B1** for $\frac{-1 \pm \sqrt{their 37}}{2\times1}$<br>After **B1** or **B0** so far,<br>**M1** for both real values of *their* $\frac{p \pm \sqrt{q}}{r}$ |
| | **(c)** | $(y =) -3x + 1$ | **2** | **B1** for $(y =) -3x + c$ or $(y =) mx + 1$<br>or **M1** for (i) theoretical or (ii) practical |
| **4** | **(a)** | $p = 12$, $q = 16$ | **2** | **B1** for one correct<br>Or **M1** for $k \times 5$ or $l \times 2.5$ where $k$ and $l$ are attempts to read from the histogram |
| | **(b) (i)** | 29.5 | **3** | **M1** for sum of the midvalues × frequency<br>and **M1** for division by 60 |
| | **(ii)** | 2070 | **2** | **M1** for attempt to use upper bounds of individual intervals |
| **5** | **(a)** | 19.46 seen | **4** | Working seen. No wrong working.<br>**M2** for $14^2 + 8^2 - 2\times14\times8\times\cos122$<br>and **A1** for 378.7 soi<br>or **M1** for an incorrect formula with one error<br>and **A1** for 141.3 or 319.35 or 250.7 soi |
| | **(b)** | 37.5 to 37.6 | **3** | **M2** for $\frac{14\sin122}{19.5}$<br>or **M1** for $\frac{\sin B}{14} = \frac{\sin122}{19.5}$ oe<br>**SC1** for correct method for wrong angle |
| | **(c)** | 247 to 248 | **4** | **M1** for 0.5 × 8 × 8 × sinC = 26 oe soi<br>and **A1** for 54.34<br>and **M1** for 180 – *their* 54.34<br>or 238 – *their* 54.34<br>**SC1** after 0 for CE = 8 |
| **6** | **(a)** | $-1$ | **1** | |
| | **(b)** | $\frac{x+7}{2}$ | **2** | **M1** for $x = 2y - 7$ soi<br>or **SC1** for the answer $\frac{y+7}{2}$ |
| | **(c)** | $g = 2.2$ or $2\frac{1}{5}$ or $\frac{11}{5}$ | **3** | **B1** for $2(3g) - 7 = g + 4$ soi<br>and **B1** for $mg = 11$ or $5g = n$<br>or **SC1** after **B0** for solving *their* linear f(3$g$) = $g$ + 4 |

| | | | |
|---|---|---|---|
| **7 (a) (i)** | $\frac{3}{4}$ or 0.75 | **1** | |
| **(ii)** | $(y =) -4$ | **2** | **M1** for 4y – 6y – 3 = 5<br>or<br>correctly rearranges their linear equation |
| **(b)** | $\frac{3w}{w+2}$ final answer | **3** | **B1** for 15w(w – 2)<br>and **B1** for 5(w + 2)(w – 2) |
| **(c) (i)** | $p(p + 20)$ or $p^2 + 20p$ | **1** | |
| **(ii)** | Correct equation and the given form correctly derived. | **2** | **M1** for $35(p^2 + 20p)$<br>and **A1** for $35(p^2 + 20p) = 122500$<br>And the given form established. |
| **(iii) (a)** | $p = 50$ and $p = -70$ | **2** | **M1** for $(p \pm h)(p \pm k)$ where $hk = 3500$ |
| **(b)** | 70 | **1ft** | Accept *their* **positive** $p + 20$ |
| **8 (a) (i)** | 112 to 116 | **1** | |
| **(ii)** | Perpendicular bisector of AB | **1** | |
| **(iii) (a)** | Correct region shaded. | **2** | **M1** for clearly identifiable arc centre B radius 8 cm |
| **(b)** | 2.9 to 3.1 | **1** | |
| **(iv)** | Yes as path of D passes through the shaded region | **2** | **M1** for line from their D on a bearing 075 |
| **(b) (i)** | 9.43 | **2** | **M1** for $(PR^2 =) 5^2 + 8^2$ |
| **(ii)** | 6.38 to 6.39 | **3** | **M2** for $\sin 53 = \frac{x}{8}$ oe<br>or **B1** for correct triangle soi |
| **9 (a)** | $-1$ | **1** | |
| **(b)** | correct triangle | **2** | **B1** for two vertices correct<br>or for an incorrect reflection |
| **(c)** | $x = -2.5$ | **1** | |
| **(d)** | 4 | **1** | |
| **(e)** | Correct octagon | **2** | **M1** for 6 correct vertices<br>or octagon scale factor 2 incorrectly placed |

| | | | |
|---|---|---|---|
| **(f) (i)** | 1575 | **2** | **B1** for any correct relevant area such as 2025 or 1125 or 112.5 soi<br>or **M1** for a complete, consistent, method |
| **(ii)** | 30 | **1** | |
| **(iii)** | 10350 | **2ft** | ft *their* 900 + 6 × *their* 1575<br>**B1** for 450 seen<br>or **M1** for complete, consistent, method |
| **10 (a) (i) (a)** | $2x$ | **1** | |
| **(b)** | $4x$ | **1** | |
| **(c)** | $90 - 2x$ oe | **1ft** | |
| **(ii)** | 19 | **3** | **M2** for $180 - 3x = 123$ oe<br>or **B1** for $B\hat{E}0 = (180 - 123)$ |
| **(b) (i)** | 22.3 | **2** | **M1** for $\frac{40}{360} \times \pi \times 8^2$ |
| **(ii)** | 476 to 477 | **4** | **M1** for $\frac{40}{360} \times \pi \times 16$<br>and **M1** for 2 × their 22.3<br>and **B1** for 8 × 20 |
| **11 (a) (i)** | 23 to 25 | **1** | |
| **(ii)** | 12 45 (pm) | **1** | |
| **(iii)** | 1.9 | **1** | |
| **(iv) (a)** | Straight lines to (14 45, 5.4)<br>and from (14 45, 5.4) to (15 39, 0) | **2** | **M1** for straight line $d = 5.4$<br>or straight line from *their* (14 45, 5.4) to (15 39, 0) |
| **(b)** | 6 cao | **1** | |
| **(b) (i)** | Correct sectors and labels | **2** | **M1** for sector of 30 or 150 |
| **(ii)** | $\frac{5}{12}$ or 0.417 or 0.4166.... | **1** | |
| **(iii)** | $\frac{41}{66}$ oe, 0.621 | **3** | **M2** for $1 - \frac{5}{12} \times \frac{4}{11} - \frac{6}{12} \times \frac{5}{11}$ oe<br>or **M1** for such as $\frac{5}{12} \times \frac{4}{11}$ or $\frac{6}{12} \times \frac{5}{11}$<br>After **0**, **SC1** for<br>$(2) \times \frac{5}{12} \times \frac{6}{12} + (2) \times \frac{5}{12} \times \frac{1}{12} + (2) \times \frac{6}{12} \times \frac{1}{12}$ |