General Certificate of Education Ordinary Level 2018
Mathematics 4048/01
Syllabus 4048 Paper 1
**SUGGESTED** Solutions & Marking Scheme Mark Allocation
Prepared by: Jordan Tew (*@math_stuff_here*)

| | | | | | |
|---|---|---|---|---|---|
| 1 | | $\left(\frac{3}{4}\right)^2,\ \frac{3}{5},\ 0.65,\ \frac{3}{4}$ | B1 | c.a.o. | |
| | | | | | [1] |
| 2 | | $\left(\frac{y^6}{x^8}\right)^{\frac{3}{2}}$ | M1 | Flip fraction or M0 | |
| | | $=\frac{y^9}{x^{12}}$ | A1 | or B1 for numerator and denominator | |
| | | | | | [2] |
| 3 | (a) | $k=3$ | B1 | | |
| | | | | | |
| | (b) | $x=\frac{2}{3}$ | B1 | | |
| | | | | | [2] |
| 4 | | Angle $CBD=180°-129°=51°$<br>(Adjacent angles on a straight line)<br>Angle $CBD=180-51°-38°=91°$<br>(Angles sum of triangle) | M1 | | |
| | | Since angle $CBD=91°\neq 90°$, using the right-angle in semicircle property, $BC$ is not a diameter of the circle. | A1<br>AG | | |
| | | | | | [2] |
| 5 | | $(3n-1)^2+2$<br>$=9n^2-6n+1+2$ | M1 | Expand | |
| | | $=9n^2-6n+3$<br>$=3\left(3n^2-2n+1\right)$<br>Since 3 is a factor of the expression, then it is a multiple of 3 for all integer values of $n$. | A1<br>AG | | |
| | | | | | [2] |
| 6 | (a) | The greatest number of marriages per 1000 males in 2014 and 2004 both occurred in the age group of 30-34 years.<br>OR<br>There are more marriages per 1000 males at a later age in 2014 than 2004. | B1 | Accept any reasonable comparison between both graphs | |
| | | | | | |
| | (b) | **No** because **the mode age group for marriages per 1000 for both genders are within 30–34 years.** | B1 | Accept any other comparison o.e. | |
| | | | | | [2] |

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| | | | | | |
|---|---|---|---|---|---|
| 7 | (a) | $B' \cup A$ | B1 | | |
| | | | | | |
| | (b) | $(B' \cap A) \cup (A' \cap B)$ | B1 | | |
| | | | | | [2] |
| 8 | | Total monthly payments $= \$113 \times 12 = \$1356$ | M1 | | |
| | | Deposit $= \$1651 - \$1356 = \$295$ | M1 | | |
| | | Percentage $= \dfrac{\$295}{\$1475} \times 100\% = 20\%$ | A1 | | |
| | | | | | [3] |
| 9 | (a) | Angle $ABC = 64°$ | B1 | | |
| | | | | | |
| | (b) | Angle $AOC = 128°$ | B1 | | |
| | | | | | |
| | (c) | Angle $OAD = 64°$ | B1 | FT from (a) | |
| | | | | | [3] |
| 10 | | Time taken $= \dfrac{5408}{721} = 7.500693481 = 7.50$ hours | M1 | | |
| | | Estimated time of arrival (Australian Time) is 1655 | | | |
| | | Singapore is **<u>Ahead</u>** by **<u>1.50</u>** hours | A2 | | |
| | | | | | [3] |
| 11 | | $\dfrac{V}{184} = \left(\dfrac{1}{20}\right)^3$ | M1 | Form equation | |
| | | $V = \left(\dfrac{1}{20}\right)^3 \times 184 = 0.023\ \text{m}^3$ | A1 | | |
| | | $2.3 \times 10^{-2}\ \text{m}^3$ | A1 | | |
| | | | | | [3] |

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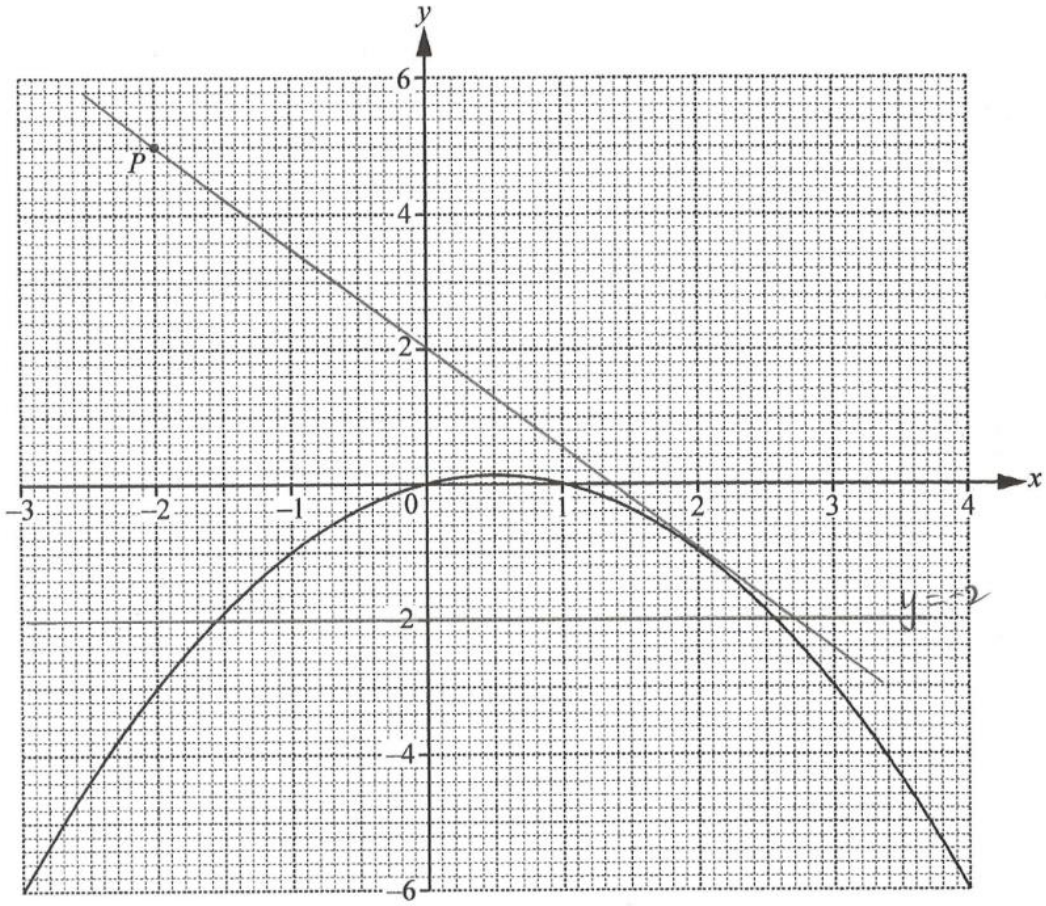
| | | | | | |
|---|---|---|---|---|---|
| 12 | (a) | 14 hours | B1 | | |
| | | | | | |
| | (b) | $F = \frac{k}{d^2}$, where $k$ is a constant.<br>Let $F_1 = \frac{k}{d_1^2}$ and $d_2 = 1.2d_1$. | | | |
| | | $F_2 = \frac{k}{d_2^2} = \frac{k}{(1.2d_1)^2} = \frac{25}{36}\left(\frac{k}{d_1^2}\right) = \frac{25}{36}F_1$ | M1 | Finds a relation between $F_1$ and $F_2$ | |
| | | $\text{Percentage} = \frac{F_1 - \frac{25}{36}F_1}{F_1} \times 100\% = 30\frac{5}{9}\% = 30.6\%$ (3 s.f.) | A1 | Accept 3 s.f. | |
| | | | | | [3] |
| 13 | (a) | $2pq\left(4p - 3q^2\right)$ | B2 | B1 for '2'<br>B1 for $pq$ | |
| | | | | | |
| | (b) | $2xy(3x-1) + (3x-1)$ | M1 | | |
| | | $= (2xy+1)(3x-1)$ | A1 | | |
| | | | | | [4] |
| 14 | | Interior angle of $C = \frac{(6-2)\times 180°}{6} = 120°$ | M1 | | |
| | | Interior angle of $B = 360° - 120° - 90° = 150°$ | M1 | | |
| | | Exterior angle of $B = 180° - 150° = 30°$ | *M1* | | |
| | | Number of sides in $B = \frac{360°}{30°} = 12$ | *A1* | | |
| | | **<u>Alternatively (using sum of interior angles):</u>** | | | |
| | | $(n-2)\times 180 = 150n$ | *M1* | Form equation | |
| | | $180n - 360 = 150n$<br>$30n = 360$<br>$n = 12$ | *A1* | | |
| | | | | | [4] |

| | | | | | |
|---|---|---|---|---|---|
| 15 | | Let $x$ denote the number of males in the group.<br>Number of females $= x+4$ | | | |
| | | $\dfrac{\text{Total height of females}}{x+4}=162$<br>$\Rightarrow$ Total height of females $=162x+648$<br>$\dfrac{\text{Total height of males}}{x}=183$<br>$\Rightarrow$ Total height of males $=183x$<br>$\dfrac{\text{Total height of students}}{2x+4}=171$<br>$\Rightarrow$ Total height of females $=342x+684$ | M2 | M1 for any correct expression seen<br>M1 for all correct | |
| | | $162x+648+183x=342x+684$<br>$3x=36$<br>$x=12$ | M1 | Find $x$ | |
| | | Total number of students in the group $=2(12)+4=28$ | A1 | | |
| | | | | | [4] |
| 16 | | Perimeter of minor sector $=2r+r\theta$<br>Perimeter of major sector $=2r+r(2\pi-\theta)$ | M1 | Either seen | |
| | | $2r+r(2\pi-\theta)=2(2r+r\theta)$ | M1 | Form equation | |
| | | $2r+2\pi r-r\theta=4r+4r\theta$<br>$3r\theta=2\pi r-2r$ | M1 | | |
| | | $\theta=\dfrac{2\pi-2}{3}=1.427728436=1.428$ rad (3 d.p.) | A1 | | |
| | | | | | [4] |
| 17 | | $x^2y-ay=x^2+3$ | M1 | Remove fraction | |
| | | $x^2y-x^2=3+ay$ | M1 | Rearranging | |
| | | $x^2(y-1)=3+ay$<br>$x^2=\dfrac{3+ay}{y-1}$ | M1 | | |
| | | $x=\pm\sqrt{\dfrac{3+ay}{y-1}}$ | A1 | | |
| | | | | | [4] |

| | | | | | |
|---|---|---|---|---|---|
| 18 | (a) | $\sqrt{a^2+9a^2}=\frac{5\sqrt{10}}{2}$<br>$10a^2=\frac{125}{2}$ | M1 | Form equation | |
| | | $a^2=\frac{25}{4}$<br>$a=\pm\sqrt{\frac{25}{4}}=\pm\frac{5}{2}$ | A1 | o.e. | |
| | | | | | |
| | (b) | $\overrightarrow{AB}=\begin{pmatrix}48\\37\end{pmatrix}$ | B1 | | |
| | | | | | |
| | (c) | $\overrightarrow{AC}=\begin{pmatrix}11\\13\end{pmatrix}-\begin{pmatrix}-5\\1\end{pmatrix}=\begin{pmatrix}16\\12\end{pmatrix}\neq k\begin{pmatrix}48\\37\end{pmatrix}$ | M1 | Find $\overrightarrow{AC}$ | |
| | | Since $\overrightarrow{AC}\neq k\overrightarrow{AB}$, the $AC$ is not a scalar multiple of $AB$ and hence $C$ does not lie on $AB$. | A1 | | |
| | | | | | [5] |
| 19 | (a) | 128 grams | B1 | | |
| | | | | | |
| | (b) | $x=7$ | B1 | | |
| | | | | | |
| | (c) | 1. On average, the masses of the Apples are heavier than the Bananas as the median of 128 g is larger than the median of 125 g of the Bananas. | B1 | Must quote values | |
| | | 2. The masses of the Bananas are more consistent than the Apples as the range of 44 g is lower than the range of 58 g of the Apples. | B1 | Must quote values | |
| | | | | | [4] |
| 20 | (a) | $126=2\times3^2\times7$ | B1 | | |
| | | | | | |
| | (b) | $k=14$ | B1 | | |
| | | | | | |
| | (c) | $x=3\times7\times11$ | M1 | Any two factors | |
| | | $x=231$ | A1 | | |
| | | | | | [4] |

| | | | | | |
|---|---|---|---|---|---|
| 21 | | When $x=-2,\ y=11.$<br>$11=a(-2)^2+b(-2)+3$<br>$4a-2b=8\ ---(1)$<br>When $x=4,\ y=-1.$<br>$-1=a(4)^2+b(4)+3$<br>$16a+4b=-4\ ---(2)$ | M1 | Substitution and either equation seen | |
| | | $(1)\times 2$<br>$8a-4b=16\ ---(3)$<br>$(2)+(3)$<br>$24a=12$ | M1 | Elimination or substitution s.o.i. | |
| | | $a=\frac{1}{2}$ | A1 | o.e. | |
| | | $b=-3$ | A1 | | |
| | | | | | [4] |
| 22 | | Angle $CBE$ = Angle $BEC$ $=35°$<br>Angle $BCE$ $=180°-2(35°)=110°$ | M1 | $110°$ s.o.i. | |
| | | Area $=\frac{1}{2}(8)(10)\sin 110°-\frac{1}{2}(8)^2\sin 110°$ | M3 | M1 for $ABCD$<br>M1 for $BCE$<br>M1 for difference | |
| | | $=45.1052458=45.1$ cm$^2$ (3 s.f.) | A1 | | |
| | | | | | [5] |
| 23 | (a) | $x=0.5$ | B1 | o.e. | |
| | | | | | |
| | (b) | $x-x^2=-4$<br>$\Rightarrow \frac{1}{2}\left(x-x^2\right)=-2$<br>$\Rightarrow y=-2$ | M1 | Find equation of line (no need to draw on grid, can be implied in working seen) | |
| | | $x=-1.55$ or $x=2.55$ | A1 | | |
| | | | | | |
| | (ci) | Drawing of tangent (Refer to graph on page 7) | B1 | | |
| | | | | | |
| | (cii) | Gradient $=\frac{5-2}{-2-0}=-\frac{3}{2}$ | M1 | s.o.i. | |
| | | $y=-\frac{3}{2}x+2$ | A1 | o.e. | |
| | | | | | [6] |




| | | | | | |
|---|---|---|---|---|---|
| 24 | (a) | Using sine rule,<br>$\frac{\sin \angle DMS}{4140} = \frac{\sin 29°}{2392}$<br>$\sin \angle DMS = \frac{4140 \sin 29°}{2392}$ | M1 | o.e. | |
| | | Angle $DMS = 57.04452664° = 57.0°$ (1 d.p.) | A1 | c.a.o. | |
| | | | | | |
| | (b) | Bearing $= 360° - (180° - (180° - 70° + 29°))$ | M1 | $180° - 70°$ s.o.i. | |
| | | $= 319°$ | A1 | | |
| | | | | | [4] |

END OF MARKING SCHEME

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