**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**International General Certificate of Secondary Education**

# MARK SCHEME for the May/June 2011 question paper

# for the guidance of teachers

# 0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

**0607/21** Paper 2 (Extended), maximum raw mark 40

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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|---|---|---|---|---|
| **1** | **(a)** | $5\sqrt{3}$ | B1 | |
| | **(b)** | $\frac{5+\sqrt{3}}{11}$ or $\frac{2(5+\sqrt{3})}{22}$ oe<br>Final Answer | B2 | Only allow denominators of 11 or 22.<br>If B0 give M1 for intention of multiplying by $\frac{5+\sqrt{3}}{5+\sqrt{3}}$<br>**[3]** |
| **2** | **(a)** | Both 24 and 35 | B1 | |
| | **(b)** | $n^2 - 1$ oe | B2 | If B0 give B1 for $n^2$ seen but no $n$ term.<br>i.e. $n^2 + k$ where $k$ is an integer.<br>**[3]** |
| **3** | **(a)** | 4 | B2 | If B0 give B1 for either $\pm 6x$ or $\pm 24$ seen<br>**[2]** |
| **4** | **(a)** | $\begin{pmatrix}16\\-3\end{pmatrix}$ | B2 | Give B1 for each correct number |
| | **(b)** | 5 | B2 | Not $\pm 5$<br>If B0 give M1 for $(\pm 4)^2 + 3^2$ [condone no brackets] which can be implied by $\pm 5$ or 25.<br>**[4]** |
| **5** | **(a)** | $(x-4)(x+1)$ oe | B2 | ISW for any solutions once **correct factors** seen, but any solutions without working score 0.<br>If B0 give SC1 for signs reversed. Still ISW for any solutions. |
| | **(b)** | $x < 1$ | B2 | Condone $\leq$ used throughout.<br>If B0 give M1 for $12 - 2x$ or $5 < 6 - x$ or $5 = 6 - x$ seen.<br>($x =$) 1 ww is M0.<br>**[4]** |
| **6** | **(a)** | $A \cap B$ | B1 | |
| | **(b)** | $B \cap A'$ oe | B1 | E.g. $(A \cup B) \cap A'$<br>$(A \cup B')'$<br>**[2]** |
| **7** | **(a)** | $\frac{36}{d^2}$ [Condone $k/d^2$ with $k = 36$ stated]<br>Final Answer | B2 | If B0 give B1 for $(F =) \frac{k}{d^2}$<br>or $(F =) \frac{1}{kd^2}$ seen $[k \neq 1]$ |
| | **(b)** | 4 | B1ft | Ft only from answers in the form $\frac{k}{d^2}$ or $kd^2$ or $\frac{k}{d}$ $[k \neq 1]$<br>**[3]** |

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| **8 (a)** | For correct use of $n\log a = \log a^n$ | M1 | E.g. $\log 2^3$ or $\log 8$ or $\log 6^2$ or $\log 36$. |
| | For correct use $\log a + \log b = \log ab$ **or** $\log a - \log b = \log \frac{a}{b}$ | M1 | Using their figures |
| | $\log 2$ www3 | A1 | |
| **(b)** | $\frac{8}{27}$ or $\left(\frac{2}{3}\right)^3$ Final Answer | B2 | If B0 give B1 for answers with numerator 8 or denominator 27 **OR**<br>SC1 for answers of<br>$\frac{27}{8}$ or $\frac{1}{(27/8)}$ or $\left(\frac{3}{2}\right)^{\pm 3}$<br>**[5]** |
| **9** | Clearing both denominators correctly to get $d^2 = (x + c)(x - c)$ or better. | M1 | Condone $d(x - c)$ as denominator on <u>both</u> sides. |
| | Making $x^2$ the subject of an equation with no denominators. | M1 | |
| | Finding the square root of an equation having $x^2$ as the subject. | M1 | Condone missing ± |
| | $(\pm)\sqrt{(c^2 + d^2)}$ as final answer www3 | | Their final answer must be correct and www to score M3 **[3]** |
| **10 (a)** | $12 - x$, $11 - x$, $x - 3$ oe | B1B1B1 | SC1 for Venn diagram with 7, 6 and 2 seen |
| **(b)** | 5 | B2 | If B0 scored give M1 for<br>their $(x - 3) = 2$ or<br>their $(12 - x) + x +$ their $(11 - x) + 2 = 20$ seen.<br>**[5]** |
| **11** | 120 and 240 | B1B1 | **[2]** |
| **12 (a)** | $y = 3\sin 2x$ Final Answer | B2 | If B0 give B1 for $3\sin(f(x))$ or $k\sin 2x$ |
| **(b)** | Correct sketch | B2 | If B0 give SC1 for either correct amplitude (2) or correct period (360°).<br>**[4]** |

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