

Edexcel GCE
Core Mathematics C2
Silver Level S3
(Mark Scheme)

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Mr.S.V.Swarnaraja (Marking Examiner, Team Leader & Author)
www.swanash.com, Mobile: +94777304755 , email: swa@swanash.com**

| Question Number | Scheme | Marks |
|-------------------------------------|---|---|
| <p>1. (a)</p> <p>(b)</p> <p>(c)</p> | <p>$f(x) = 2x^3 - 7x^2 - 5x + 4$</p> <p>Remainder = $f(1) = 2 - 7 - 5 + 4 = -6$</p> <p style="padding-left: 40px;">$= -6$</p> <p>$f(-1) = 2(-1)^3 - 7(-1)^2 - 5(-1) + 4$</p> <p>and so $(x + 1)$ is a factor.</p> <p>$f(x) = \{(x + 1)\}(2x^2 - 9x + 4)$</p> <p style="padding-left: 40px;">$= (x + 1)(2x - 1)(x - 4)$</p> | <p>M1</p> <p>A1</p> <p style="text-align: right;">(2)</p> <p>M1</p> <p>A1</p> <p style="text-align: right;">(2)</p> <p>M1 A1</p> <p>dM1 A1</p> <p style="text-align: right;">(4)</p> <p style="text-align: right;">[8]</p> |
| <p>2. (a)</p> <p>(b)</p> | <p>$11^2 = 8^2 + 7^2 - (2 \times 8 \times 7 \cos C)$</p> <p>$\cos C = \frac{8^2 + 7^2 - 11^2}{2 \times 8 \times 7}$ (oe)</p> <p>$\{\hat{C} = 1.64228\dots\} \Rightarrow \hat{C} = \text{awrt } 1.64$</p> <p>Use of Area $\Delta ABC = \frac{1}{2}ab \sin(\text{their } C)$</p> <p style="padding-left: 40px;">$= \frac{1}{2}(7 \times 8) \sin C$</p> <p>$\{= 27.92848\dots \text{ or } 27.93297\dots\} = \text{awrt } 27.9$</p> | <p>M1</p> <p>A1</p> <p>A1 cso</p> <p style="text-align: right;">(3)</p> <p>M1</p> <p>A1 ft</p> <p>A1 cso</p> <p style="text-align: right;">(3)</p> <p style="text-align: right;">[6]</p> |
| <p>3. (a)</p> <p>(b)</p> | <p>$(1 + ax)^{10} = 1 + 10ax \dots$</p> <p>$+ \frac{10 \times 9}{2}(ax)^2 + \frac{10 \times 9 \times 8}{6}(ax)^3$</p> <p>$+ 45(ax)^2, + 120(ax)^3$ or $+ 45a^2x^2, + 120a^3x^3$</p> <p>$120a^3 = 2 \times 45a^2$ $a = \frac{3}{4}$ or equiv. $\left(\text{e.g. } \frac{90}{120}, 0.75 \right)$</p> | <p>B1</p> <p>M1</p> <p>A1A1</p> <p style="text-align: right;">(4)</p> <p>M1A1</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;">[6]</p> |

| Question Number | Scheme | Marks |
|-----------------|---|------------------------------|
| 4. (a) | $4^2 = 5^2 + 6^2 - (2 \times 5 \times 6 \cos \theta)$ $\cos \theta = \frac{5^2 + 6^2 - 4^2}{2 \times 5 \times 6}$ $\left(= \frac{45}{60} \right) = \frac{3}{4} \quad (*)$ | M1 A1 A1cso (3) |
| (b) | $\sin^2 A + \left(\frac{3}{4} \right)^2 = 1 \quad (\text{o.e. Pythag. method})$ | M1 |
| | $\left(\sin^2 A = \frac{7}{16} \right) \quad \sin A = \frac{1}{4} \sqrt{7} \quad (\text{o.e.})$ | A1 |
| | | (2) |
| | | [5] |
| 5. (a) | $a = 4p, ar = (3p+15) \text{ and } ar^2 = 5p+20$ $(\text{So } r =) \quad \frac{5p+20}{3p+15} = \frac{3p+15}{4p} \text{ or } 4p(5p+20) = (3p+15)^2 \text{ oe}$ $\text{See } (3p+15)^2 = 9p^2 + 90p + 225$ $20p^2 + 80p = 9p^2 + 90p + 225 \rightarrow 11p^2 - 10p - 225 = 0 \quad *$ | B1 M1 M1 A1* (4) |
| (b) | $(p-5)(11p+45) \text{ so } p =$ | M1 |
| | $p = 5 \text{ only (after rejecting - 45/11)}$ | A1 |
| | | (2) |
| (c) | $\frac{3 \times 5 + 15}{4 \times 5} \text{ or } \frac{5 \times 5 + 20}{3 \times 5 + 15}$ | M1 |
| | $r = \frac{3}{2}$ | A1 |
| | | (2) |
| (d) | $S_{10} = \frac{20 \left(1 - \left(\frac{3}{2} \right)^{10} \right)}{\left(1 - \frac{3}{2} \right)}$ | M1A1ft |
| | $(\text{= } 2266.601568\dots) = 2267$ | A1 |
| | | (3) |
| | | [11] |

| Question Number | Scheme | Marks |
|--|--|---|
| <p>6. (a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p> | $r\theta = 9 \times 0.7 = 6.3$ $\frac{1}{2}r^2\theta = \frac{1}{2} \times 81 \times 0.7 = 28.35$ $\tan 0.7 = \frac{AC}{9}$ $AC = 7.58$ <p>Area of triangle $AOC = \frac{1}{2}(9 \times \text{their } AC)$</p> <p>Area of $R = "34.11" - "28.35"$</p> $= 5.76$ | <p>M1 A1 (2)</p> <p>M1 A1 (2)</p> <p>M1 A1 (2)</p> <p>M1 M1 A1 (3) [9]</p> |
| <p>7. (a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p> | $9^2 = 4^2 + 6^2 - 2 \times 4 \times 6 \cos \alpha \Rightarrow \cos \alpha = \dots$ $\cos \alpha = \frac{4^2 + 6^2 - 9^2}{2 \times 4 \times 6} \left(= -\frac{29}{48} = -0.604.. \right)$ $\alpha = 2.22 \quad *$ $2\pi - 2.22 (= 4.06366\dots)$ $\frac{1}{2} \times 4^2 \times "4.06"$ 32.5 <p>Area of triangle = $\frac{1}{2} \times 4 \times 6 \times \sin 2.22 (= 9.56)$</p> <p>So area required = "9.56" + "32.5"</p> $= 42.1 \text{ cm}^2 \text{ or } 42.0 \text{ cm}^2$ <p>Arc length = $4 \times 4.06 (= 16.24)$ Or $8\pi - 4 \times 2.22$</p> <p>Perimeter = $ZY + WY + \text{Arc Length}$</p> <p>Perimeter = 27.2 or 27.3</p> | <p>M1 A1 cso (2) B1 M1 A1 (3) B1 M1 A1 (3) M1A1ft M1 A1 (4) [12]</p> |

| Question Number | Scheme | Marks |
|-----------------|---|-----------------------------------|
| 8. (a) | $50\,000r^{n-1}$ (o.e.) | B1 (1) |
| (b) | $50\,000r^{n-1} > 200\,000$ $r^{n-1} > 4 \Rightarrow (n-1)\log r > \log 4$ $n > \frac{\log 4}{\log r} + 1$ (*) | M1 M1 A1cso (3) |
| (c) | $r = 1.09: n > \frac{\log 4}{\log 1.09} + 1$ or $n-1 > \frac{\log 4}{\log 1.09}$ ($n > 17.086\dots$) Year 18 or 2023 | M1 A1 (2) |
| (d) | $S_n = \frac{a(1-r^n)}{1-r} = \frac{50000(1-1.09^{10})}{1-1.09}$ £760 000 | M1 A1 A1 (3) [9] |
| 9. (a) | $\left\{ \frac{dy}{dx} = \right\} 2x - 16x^{-\frac{1}{2}}$ $2x - 16x^{-\frac{1}{2}} = 0 \Rightarrow x^{\frac{3}{2}} =, x^{-\frac{3}{2}} =$,or $2x - =16x^{-\frac{1}{2}}$ then squared then obtain $x^3 =$ $(x^{\frac{3}{2}} = 8 \Rightarrow) x = 4$ $x = 4, y = 4^2 - 32\sqrt{4} + 20 = -28$ | M1 A1 M1 A1 M1 A1 (6) |
| (b) | $\left\{ \frac{d^2y}{dx^2} = \right\} 2 + 8x^{-\frac{3}{2}}$ $(\frac{d^2y}{dx^2} > 0 \Rightarrow) y$ is a minimum | M1 A1 A1 (3) [9] |

Statistics for C2 Practice Paper Silver Level S3

| Qu | Max score | Modal score | Mean % | Mean score for students achieving grade: | | | | | | | |
|----|-----------|-------------|-----------|--|-------|--------------|--------------|--------------|--------------|--------------|--------------|
| | | | | ALL | A* | A | B | C | D | E | U |
| 1 | 8 | | 80 | 6.40 | 7.77 | 7.56 | 7.26 | 6.88 | 6.33 | 5.52 | 3.34 |
| 2 | 6 | | 77 | 4.64 | 5.81 | 5.65 | 5.09 | 4.53 | 3.72 | 2.86 | 1.98 |
| 3 | 6 | | 69 | 4.11 | | 5.72 | 5.06 | 4.28 | 3.41 | 2.54 | 1.19 |
| 4 | 5 | | 61 | 3.07 | | 4.10 | 3.45 | 3.14 | 2.77 | 2.39 | 1.43 |
| 5 | 11 | | 86 | 9.44 | 10.89 | 10.64 | 9.91 | 8.71 | 8.08 | 7.40 | 3.39 |
| 6 | 9 | | 66 | 5.95 | 8.64 | 8.13 | 7.18 | 6.33 | 5.23 | 3.99 | 1.89 |
| 7 | 12 | | 60 | 7.20 | 11.04 | 10.22 | 8.15 | 6.20 | 4.69 | 3.25 | 1.77 |
| 8 | 9 | | 58 | 5.18 | | 7.75 | 6.29 | 5.13 | 3.98 | 2.97 | 1.51 |
| 9 | 9 | | 60 | 5.38 | 8.72 | 8.18 | 7.05 | 5.75 | 4.38 | 3.12 | 1.30 |
| | 75 | | 68 | 51.37 | | 67.95 | 59.44 | 50.95 | 42.59 | 34.04 | 17.80 |