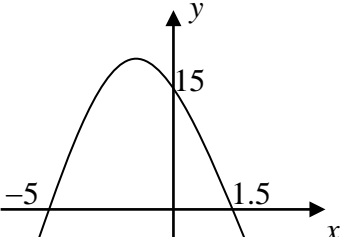
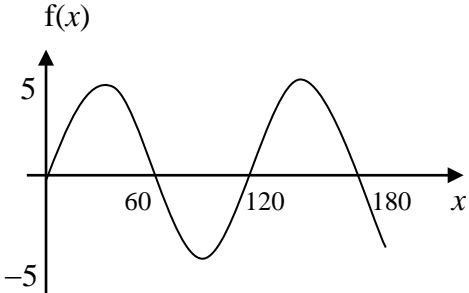


**Edexcel GCE
Core Mathematics C2
Practice Paper B4
(Mark Scheme)**

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Question number	Scheme	Marks
<p>1. (a)</p> <p>(b)</p>	$1 + n(3x) + \frac{n(n-1)}{2!}(3x)^2 + \frac{n(n-1)(n-2)}{3!}(3x)^3$ $\frac{n(n-1)(n-2)}{6} \times 27 = 10 \times \frac{n(n-1)}{2} \times 9$ <p style="text-align: center;">$n = 12$</p> $\frac{n(n-1)(n-2)(n-3)}{4!}(3x)^4 \quad \text{coefficient: } 40095$	<p>B1, B1 (2)</p> <p>M1</p> <p>A1 (2)</p> <p>M1 A1 (2)</p> <p style="text-align: right;">(6 marks)</p>
<p>2.</p>	<p><i>Complete attempt at remainder theorem, or long division</i> Either $f(3) = 27 + 9a + 3b - 10 = 14$,</p> <p><i>Or complete attempt at long division by (x-3) leading to equation.</i> Either $f(-1) = -1 + a - b - 10 = -18$ or long division by $(x+1)$ leading to equation.</p> <p>Equation equivalent to $9a + 3b = -3 \quad (3a + b = -1)$</p> <p>Equation equivalent to $a - b = -7$</p> <p>Solve two equations to get $a = -2, b = 5$</p> <p>Either $f(2) = 8 - 8 + 10 - 10 = 0$, or complete division with no remainder.</p> <p>$\therefore (x - 2)$ is a factor.</p> <p>or $f(x) = (x - 2)(x^2 + 5)$</p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>M1, A1 (5)</p> <p>M1,</p> <p>A1</p> <p>(M1 A1) (2)</p> <p style="text-align: right;">(7 marks)</p>
<p>3. (a)</p> <p>(b)</p> <p>(c)</p>	<p>$f(x) = 0 \Rightarrow 2x^2 + 7x - 15 = 0$</p> <p style="text-align: center;">$(2x - 3)(x + 5) = 0$</p> <p>\therefore points are $(\frac{3}{2}, 0), (-5, 0); (0, 15)$</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>shape</p> <p>vertex in correct quadrant</p> </div> </div> <p>or Calculus: $-7 - 4x = 0$</p> <p>or Algebra: $-2[(x + \frac{7}{4})^2 - k]$</p> <p>$\Rightarrow x = -\frac{7}{4}, y = 21\frac{1}{8}$</p>	<p>M1</p> <p>A1 (both); B1 (3)</p> <p>B1</p> <p>B1 ft (2)</p> <p>M1</p> <p>A1, A1 (3)</p> <p style="text-align: right;">(8 marks)</p>

Question number	Scheme	Marks
<p>4. (a)</p>  <p>(b) $(30^\circ, 5); (150^\circ, 5); (90^\circ, -5)$</p> <p>(c)</p>	<p>shape 60, 120, 180 on x-axis 5, -5 on y-axis (may be implied by part (b))</p> <p>one x-coordinate all x-coordinates all correct</p> <p>$f(x) = 2.5 \Rightarrow \sin 3x^\circ = \frac{1}{2}$ $3x = 30$ (150, 390, 510) $3x = (\alpha), 180 - \alpha, 360 + \alpha, (540 - \alpha)$ $x = 10, 50, 130, 170$</p>	<p>B1 B1 B1 (3)</p> <p>B1 B1 B1 (3)</p> <p>B1 M1, M1 A1 (ignore extras out of range) (4) (10 marks)</p>
<p>5.</p>	<p>$2 \log x = \log x^2$</p> <p>Combine logs, e.g. $\log_2 \left(\frac{y}{x^2} \right) = 3$</p> <p>$\frac{y}{x^2} = 2^3, \quad y = 8x^2$ (*)</p> <p>$14x - 3 = 8x^2$</p> <p>$(4x - 1)(2x - 3) = 0$ Roots $\frac{1}{4}$ and $\frac{3}{2}$</p> <p>$\log_2 \alpha = \log_2 \frac{1}{4} = \log_2 (2^{-2}) = -2$ (*)</p> <p>$\log_2 1.5 = k \quad 2^k = 1.5$</p> <p>$k = \frac{\log 1.5}{\log 2} = 0.585$</p>	<p>B1 M1 A1 (3) M1 M1 A1 (3) B1 (1) M1 M1 A1 (3) (10 marks)</p>

Question number	Scheme	Marks
<p>6. (a)</p> <p>(b)</p>	$2x^{\frac{3}{2}} - 3x^{-\frac{3}{2}} = 0$ $x^3 = \frac{3}{2}$ $x = \sqrt[3]{\frac{3}{2}}$ $= 1.1447\dots = 1.14 \text{ (3 sf)}$ $f(x) = 4x^3 + 9x^{-3} - 12 + 5$ $= 4x^3 + \frac{9}{x^3} - 7$ $\int_1^2 f(x) \, dx = \left[x^4 - \frac{9}{2}x^{-2} - 7x \right]_1^2$ $= \left(2^4 - \frac{9}{2} \times 2^{-2} - 14 \right) - \left(1 - \frac{9}{2} - 7 \right)$ $= 11 \frac{3}{8} \text{ or } 11.375$	<p>M1</p> <p>M1</p> <p>A1 cao (3)</p> <p>B1</p> <p>B1, B1 (3)</p> <p>M1</p> <p>A2 ft (candidate's A B, C) (-1 eeo)</p> <p>M1 (use of limits)</p> <p>A1 (5)</p> <p>(11 marks)</p>
<p>7. (a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p>	$BM = \sqrt{7^2 + 24^2} = 25$ $\tan \alpha = \frac{7}{24} \text{ or equiv. and } \angle BMC = 2\alpha, \text{ or cosine rule}$ $\angle BMC = 0.568 \text{ radians}$ $\triangle ABM: \frac{1}{2}(14 \times 24) (= 168 \text{ mm}^2) \text{ (or other appropriate } \Delta)$ $\text{Sector: } \frac{1}{2}(25^2 \times 0.568)$ $\text{Total: "168 + 168 + 177.5" = 513 mm}^2 \text{ (or 514, or 510)}$ $\text{Volume = "513" } \times 85 \text{ mm}^3 \text{ (M requires unit conversion)}$ $= 44 \text{ cm}^3$	<p>(*)</p> <p>B1 (1)</p> <p>M1 A1</p> <p>(*)</p> <p>A1 (3)</p> <p>B1</p> <p>M1 A1</p> <p>M1 A1 (5)</p> <p>M1</p> <p>A1 (2)</p> <p>(11 marks)</p>

Question number	Scheme	Marks
8.	(a) $S = a + (a+d) + (a+2d) + \dots + [a+(n-1)d]$	B1
	$S = [a + (n-1)d] + [a + (n-2)d] + \dots + a$	M1
	Add: $2S = n[2a + (n-1)d] \Rightarrow S = \frac{1}{2}n[2a + (n-1)d]$	M1 A1 (4)
	(b) $a = 54000$ and $n = 9$	B1
	$619200 = \frac{1}{2} \times 9 \times (2 \times 54000 + 8d)$	M1 A1ft
	$d = 3700$	A1 (4)
(c) $a + (n-1)d = a + 10d = 54000 + 10d = \text{£}91000$		M1 A1 (2)
(d) $ar^{n-1} = 54000 \times 1.06^{10}$		M1 A1ft (ft their n)
	$= \text{£}96700$ (or $\text{£}97000$)	A1 (3)
		(13 marks)