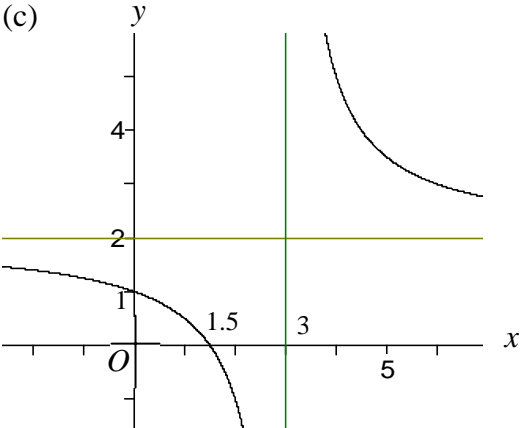


January 2012 International GCSE Mathematics (4PM0) Paper 01 Mark Scheme

| Question | Working | Notes |
|----------|---|--|
| 1 | $y = -\frac{6}{4}x - \frac{15}{4}$, gradient = $-\frac{3}{2}$ oe $y = \frac{10}{15}x - \frac{9}{15}$, gradient = $\frac{2}{3}$ oe Product of gradients = $-\frac{3}{2} \times \frac{2}{3} = -1 \Rightarrow$ lines perpendicular | M1 A1 A1 A1 4 |
| 2 | $x(x+2) - (x+1) = 2(x+1)(x+2)$ $x^2 + x - 1 = 2x^2 + 6x + 4$ $x^2 + 5x + 5 = 0$ $x = \frac{-5 \pm \sqrt{25 - 20}}{2} = -3.62, -1.38$ | M1 A1 M1 A1 4 |
| 3 | $(3x+1)(2x-7) < 0$ $-\frac{1}{3} < x < 3\frac{1}{2}$ | M1 A1 M1 A1 4 |
| 4 | $\frac{10!}{7!3!} 1^3 \left(\frac{1}{\sqrt{3}}\right)^7$ $= 120 \frac{1}{27\sqrt{3}}$ $= 120 \frac{1}{27} \frac{\sqrt{3}}{3}$ $= \frac{40}{27} \sqrt{3}$ | Allow all marks if x^7 included. M1 A1 M1 rationalise A1 4 |
| 5 | (a) $\frac{dy}{dx} = x^2 e^x + 2xe^x$ (b) $\frac{dy}{dx} = 5(x^3 + 2x^2 + 3)^4 (3x^2 + 4x)$ | M1 two terms with one correct A1 M1 use chain rule A1 $5(x^3 + 2x^2 + 3)^4$ A1 $(3x^2 + 4x)$ 5 |

| | | |
|---|--|---|
| 7 | <p>(a) $A(1\frac{1}{2}, 0)$, $B(0, 1)$</p> <p>(b) (i) $x = 3$ (ii) $y = 2$</p> <p>(c) </p> <p>(d) $\frac{dy}{dx} = \frac{2(x-3) - (2x-3)}{(x-3)^2} = \frac{-3}{(x-3)^2}$ At B, $x = 0$ so $\frac{dy}{dx} = \frac{-3}{(-3)^2} = -\frac{1}{3}$ Grad of normal $= -1/(-1/3) = 3$ Normal $y = 3x + 1$</p> <p>(e) At D, $3x + 1 = \frac{2x-3}{x-3}$ $3x^2 - 8x - 3 = 2x - 3$ $3x^2 - 10x = 0$ $x(3x - 10) = 0$ $x = 0$ or $x = 10/3$ At D, $x = 3\frac{1}{3}$</p> | <p>B1, B1</p> <p>B1 B1</p> <p>B1 two branches in correct quadrants B1 asymptotes dep on some curve B1 intercepts</p> <p>M1 Quotient rule A1 Result (unsimplified)</p> <p>A1</p> <p>B1ft B1ft</p> <p>M1</p> <p>A1 M1</p> <p>A1 16</p> |
|---|--|---|