# Year 12 Oct/Nov Test Answers

1) $8^{4x+1} = 4^{3x}$

$(2^3)^{4x+1} = (2^2)^{3x}$

$2^{3(4x+1)} = 2^{6x}$

$2^{12x+3} = 2^{6x}$

$\therefore 12x + 3 = 6x$

$12x - 6x = -3$

$6x = -3$

$x = \frac{-3}{6}$

$x = -\frac{1}{2}$

2) a) $\frac{(4\sqrt{2} - \sqrt{11})}{(3\sqrt{2} + \sqrt{11})} \times \frac{(3\sqrt{2} - \sqrt{11})}{(3\sqrt{2} - \sqrt{11})}$

$= \frac{24 - 4\sqrt{22} - 3\sqrt{22} + 11}{18 - 3\sqrt{22} + 3\sqrt{22} - 11}$

$= \frac{35 - 7\sqrt{22}}{7}$

$= 5 - \sqrt{22}$

b) $\frac{7}{2\sqrt{14}} \times \frac{\sqrt{14}}{\sqrt{14}} + \frac{14\sqrt{14}}{8}$

$= \frac{7\sqrt{14}}{28} + \frac{7\sqrt{14}}{4}$

$= \frac{\sqrt{14}}{4} + \frac{7\sqrt{14}}{4}$

$= \frac{8\sqrt{14}}{4}$

$= 2\sqrt{14}$

3) $2x^2 - 4x + 1$

$= 2\left[x^2 - 2x + \frac{1}{2}\right]$

$= 2\left[(x-1)^2 - 1 + \frac{1}{2}\right]$

$= 2\left[(x-1)^2 - \frac{1}{2}\right]$

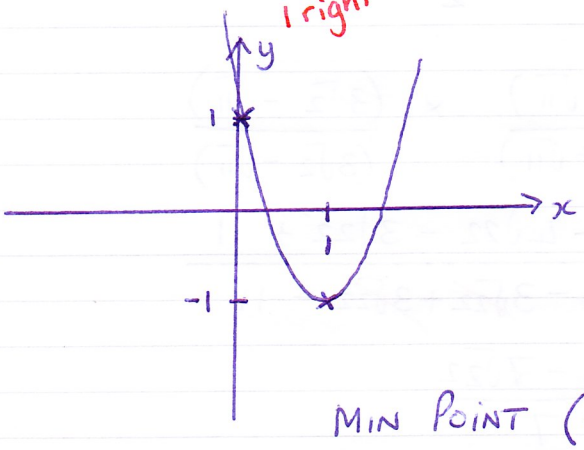
$= 2(x-1)^2 - 1$

$a = 2 \quad b = -1 \quad c = -1$

$\therefore$ Curve $y = 2x^2 - 4x + 1$ ← U

$y = 2(x-1)^2 - 1$

↑ 1 right ↖ 1 down




MIN POINT $(+1, -1)$

Curve crosses y axis

$x = 0$

$y = 0 - 0 + 1$

$y = 1$

4) a) $y + 3 = x^2 + 2x$ — (1)

$y + 7 = 6x$ — (2)

(2) $\Rightarrow y = 6x - 7$ (*)

Sub (*) into (1)

$6x - 7 + 3 = x^2 + 2x$

$6x - 4 = x^2 + 2x$

$0 = x^2 - 4x + 4$

$0 = (x-2)(x-2)$

$\therefore$ either $x - 2 = 0$ $\quad x = 2$ or $x - 2 = 0$ $\quad x = 2$

b) Only 1 intersection point $(2, 5)$.

$\therefore$ line $y = 6x - 7$ is a tangent to the curve

(*) $y = 6(2) - 7$

$y = 12 - 7$

$y = 5$

$\therefore$ $(2, 5)$ is intersection point.

5) a) $x^2 - 2x - 15 > 0$

$(x-5)(x+3) > 0$

either $(+) \times (+) = (+)$

or $(-) \times (-) = (+)$

either $x-5 > 0$ and $x+3 > 0$

$x > 5$ $\quad$ $x > -3$

$\Rightarrow x > 5$

or $x-5 < 0$ and $x+3 < 0$

$x < 5$ $\quad$ $x < -3$

$\Rightarrow x < -3$

b) $y = 2x^2 + 5x - 3$

Curve crosses $y$ axis, $x = 0$

$y = 0 + 0 - 3$

$y = -3$

Curve crosses $x$ axis, $y = 0$

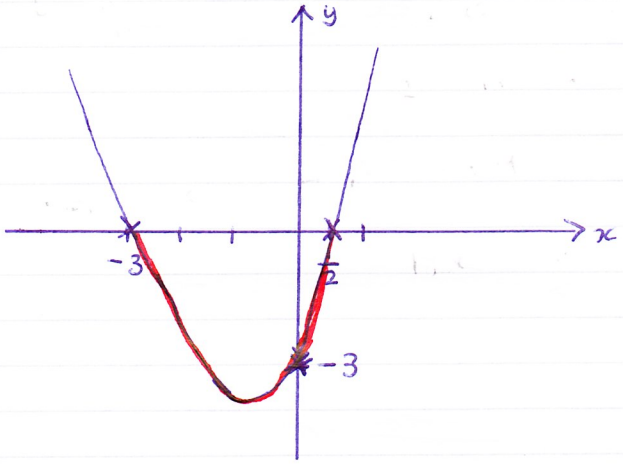
$0 = 2x^2 + 5x - 3$

$0 = (2x - 1)(x + 3)$

either

$2x - 1 = 0$ or $x + 3 = 0$

$x = \frac{1}{2}$ $\quad$ $x = -3$




Now for $2x^2 + 5x - 3 < 0$

we use $y < 0$

Use $x$ values

$-3 < x < \frac{1}{2}$

6) $x^2 + (2k-1)x + (k^2 - 2k + 1) = 0$

$a = 1 \quad b = 2k-1 \quad c = k^2 - 2k + 1$

$b^2 - 4ac$

$= (2k-1)^2 - 4(1)(k^2 - 2k + 1)$

$= 4k^2 - 4k + 1 - 4k^2 + 4k - 4$

$= 1 - 4$

$= -3$

$\therefore b^2 - 4ac < 0$

$\therefore$ No real roots for any k value.