Lauren Whitmore

1) $A(-7,4)$ $B(3,-1)$ $C(6,1)$ $D(K,-15)$

a) Gradient of AB.

$$\frac{y_1 - y_2}{x_1 - x_2} = \frac{-1-4}{3--7} = \frac{-5}{10} = -1/2$$

b) find equation of AB

$$y - y_1 = m(x - x_1)$$
$$y - -1 = -1/2(x - 3)$$
$$y + 1 = -1/2(x - 3)$$
$$2(y+1) = -x + 3$$
$$2y + 1 = -x + 3$$
$$2y + 1 - 3 = x$$
$$2y + 2 - 3 + x = 0$$
$$2y - 1 + x = 0$$

c) find Length of AB.

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(4 - -1)^2 + (-7 - 3)^2}$$
$$= \sqrt{(5)^2 + (-10)^2}$$
$$= \sqrt{25 + 100}$$
$$= \sqrt{125}$$

D) $\left(\frac{-7+3}{2}, \frac{4+-1}{2}\right)$

$-2, 1.5$

Gradient of line Gradient of line

c) AB = $-\frac{1}{2}$ CD = 2

$$2 = \frac{1 - -15}{6 - k}$$

13 marks out of 13

$$2 = \frac{16}{6 - k}$$

$k = -2$

* 2) $\sqrt{75} - \frac{9}{\sqrt{3}} + (\sqrt{6} \times \sqrt{2})$ more to do here

$= \sqrt{3}\sqrt{25} = 5\sqrt{3}$

1 mark out of 4 (so far!)

b) $\frac{(5\sqrt{5} \quad 2)}{(4 + \sqrt{5})} \times \frac{(4 - \sqrt{5})}{(4 - \sqrt{5})}$

Top

$(5\sqrt{5} - 2)(4 - \sqrt{5})$

$20\sqrt{5} - 5\sqrt{5}\sqrt{5} - 8 - 2\sqrt{5}$

* $18\sqrt{5} - 25 - 8$

$18\sqrt{5} \; 17$

Spot the error?

Total : $\frac{18\sqrt{5} \; 17}{11}$

Bottom

$(4 + \sqrt{5})(4 - \sqrt{5})$

$16 - 4\sqrt{5} + 4\sqrt{5} - \sqrt{5}\sqrt{5}$

$16 - 5$

11

2 marks out of 4

use h or δx
but not hx

4) $y = 5x^2 + 3x - 4$

$$\frac{dy}{dx} = \lim_{h \to 0} \left(\frac{f(x+h) - f(x)}{h} \right)$$

$$f(x) = 5x^2 + 3x - 4$$

$$f(x+h) = 5(x+h)^2 + 3(x+h) - 4$$

$$(x+h)(x+h)$$
$$x^2 + 2h^2 + h^2$$
NO

$$(x+h)(x+h)$$
$$x^2 + 2xh + h^2$$

$$f(x+h) = 5(x^2 + 2xh + h^2) + 3(x+h) - 4$$

Gradient of the chord $\dfrac{(\cancel{5x^2} + 10xh + 5h^2 + \cancel{3x} + 3h \cancel{-4}) - (\cancel{5x^2} + \cancel{3x} \cancel{-4})}{h}$

$$\frac{f(x+h) - f(x)}{h} = \frac{10xh + 5h^2 + 3h}{h}$$

$$\frac{\cancel{h}(10x + 5h + 3)}{\cancel{h}}$$

$$\lim_{h \to 0} (10x + 5h + 3) = 10x + 3$$

Take $h \to 0$ — not quite

$$\frac{dy}{dx} = 10x + 3$$

You MUST be very precise in the mathematical language here because it is a proof

Communication needs to be a little more clear as one line links to another

2 marks maybe out of 5

Q4b 15th May 2008.

4b) $\frac{8}{x} = 8x^{-1}$

$3\sqrt{x} = 3x^{1/2}$

$y = \frac{8}{x} + 3\sqrt{x}$

becomes

$y = 8x^{-1} + 3x^{1/2}$ now differentiating gives

$\frac{dy}{dx} = -8x^{-1-1} + \frac{3}{2}x^{-1/2}$ (be careful! you lost a minus)

$\frac{dy}{dx} = {}^{-}8x^{-2} + \frac{3}{2}x^{-1/2}$

When $x = 4$

$\frac{dy}{dx} = \frac{-8}{(4)^2} + \frac{3}{2\sqrt{4}}$

$\frac{dy}{dx} = \frac{-8}{16} + \frac{3}{4}$

$\frac{dy}{dx} = \frac{-1}{2} + \frac{3}{4} = \frac{1}{4}$

The value of the GRADIENT OF THE TANGENT when $x = 4$ is a $1/4$.

5) $x^2 + 6x - 4$

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

$(x+3)^2 - 4 - 9$

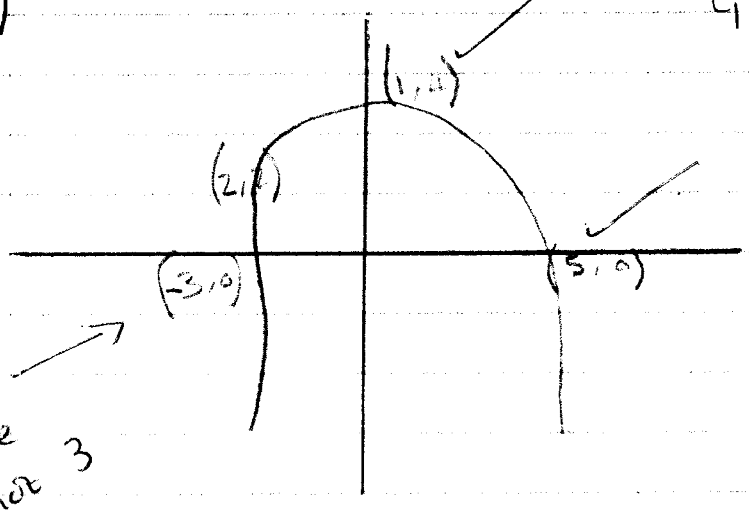
$(x+3)^2 - 13$

2marks out of 2

b) Target part (b)
Application of above in "thinking Skills"

8)

$y = f(x+2)$

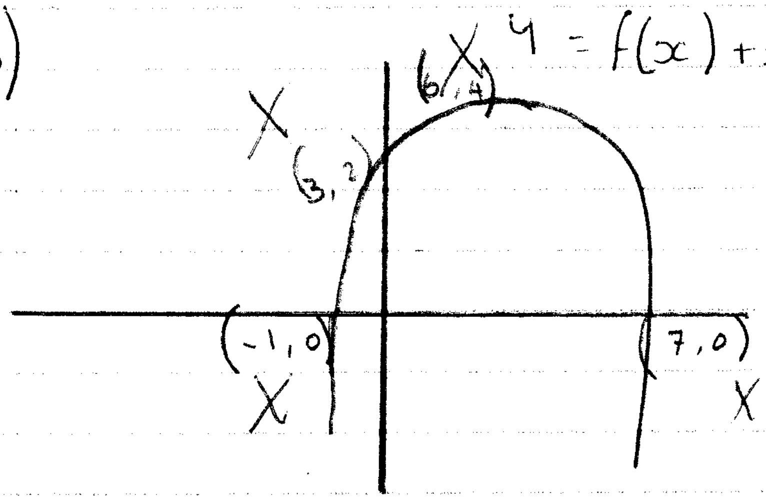


Take care -3 not 3

3 marks out of 6

b)

$y = f(x) + 3$



$f(x) + 3$ will ADD 3 to the y co-ordinate (move up 3)

$(-1, 0)$ becomes $(-1, 3)$

$(0, 2)$ becomes $(0, 5)$

$(3, 4)$ becomes $(3, 7)$

$(7, 0)$ becomes $(7, 3)$

10) Solve the inequality $2x^2 - 3x - 9 \geq 0$

$2x^2 - 3x - 9 \geq 0$

$2x^2 - 3x \geq 9$ X TARGET

① find Critical Values first.

10b) TARGET

The discriminant

If there are no Real roots

$b^2 - 4ac < 0$

no marks