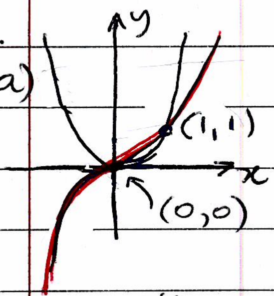
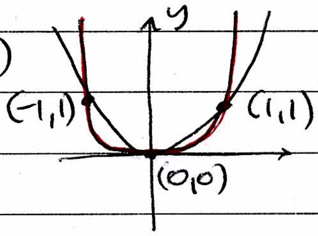
Pure 5 – Coordinate Geometry – Solutions

Section 1

1.

(a)


(b)


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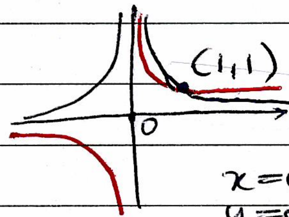

$x=0$, $y=0$ AS.

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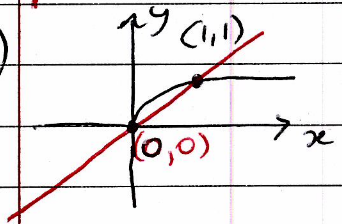
(d)


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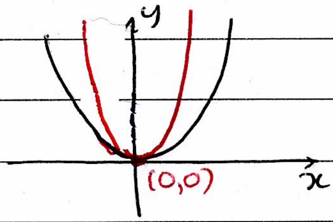

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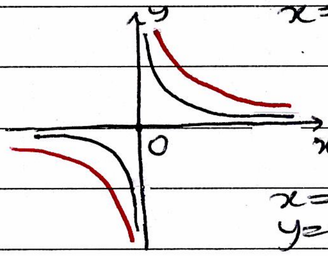
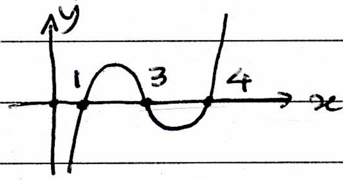


$x=0$, $y=0$ AS.

2. (a) 12 (b) $x = 1$ or 3 or 4



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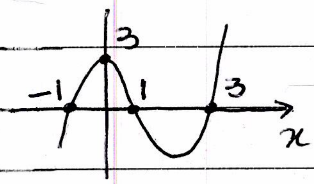

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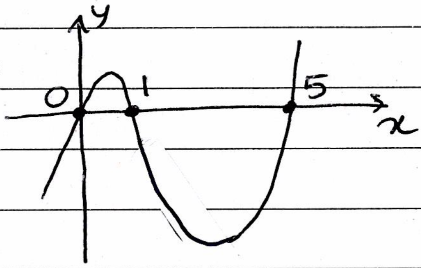

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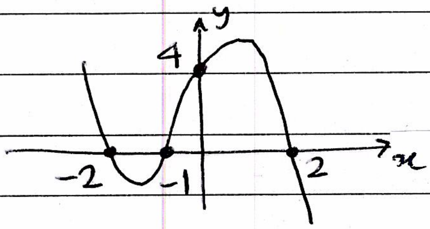

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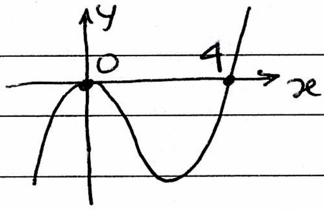
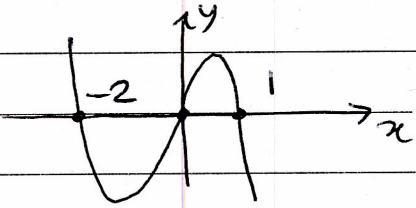


(e)


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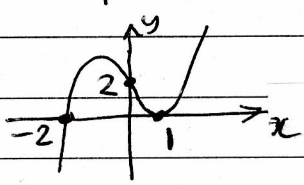

Pure 5 - Solutions:

Section 2

$\boxed{30}$

1. $A(1,-2)$ $B(3,-5)$

a) midpoint $\left(\frac{1+3}{2}, \frac{-2-5}{2}\right) \Rightarrow (2, -3.5)$

b) gradient $= \frac{y_2-y_1}{x_2-x_1} = \frac{-5-(-2)}{3-1} = \frac{-3}{2}$ (or -1.5)

c) $AB^2 = (3-1)^2 + (-5-(-2))^2 = 2^2+(-3)^2 = 4+9 = 13$

$AB = \sqrt{13}$

2. $y-1 = 2(x-5)$

$y-1 = 2x-10$ $\qquad$ $y = 2x-9$ (or rearrangement)

3. $A(5,3)$ $B(2,1)$

grad $= \frac{1-3}{2-5} = \frac{-2}{-3} = \frac{2}{3}$

equ'n. $y-1 = \frac{2}{3}(x-2)$

$3y-3 = 2x-4$

$3y = 2x-1$ or $2x-3y-1=0$.

4. $3x-5y+15=0$

when $x=0$ $\quad -5y+15=0 \Rightarrow y=3$

when $y=0$ $\quad 3x+15=0 \Rightarrow x=-5$

points are $(0,3)$ and $(-5,0)$

5. $5x+9y-12=0$

$9y = -5x+12$

$y = \frac{-5}{9}x + \frac{12}{9}$ $\qquad$ gradient $= \frac{-5}{9}$

6. $x + y = 2 \Rightarrow y = -x + 2$ $\therefore$ gradient RS is -1

$\therefore$ grad PQ $= 1$ ✓ $(1 \times -1 = -1)$

PQ goes through $P(3,-5)$ with gradient 1

$\Rightarrow y - (-5) = 1(x - 3)$ ✓

$y + 5 = x - 3$ $\Rightarrow$ $\underline{\underline{y = x - 8}}$ ✓ (or rearranged

7. $A(1, 3)$ $B(-19, -19)$

a) $AB^2 = (-19-1)^2 + (-19-3)^2$

$= (-20)^2 + (-22)^2$

$= 400 + 484 = 884$ ✓

$AB = \sqrt{884} = \underline{\underline{2\sqrt{221}}}$ ✓

b) grad $= \dfrac{-19-3}{-19-1} = \dfrac{-22}{-20} = \dfrac{11}{10}$ ✓

$y - 3 = \dfrac{11}{10}(x - 1)$ ✓

$10y - 30 = 11x - 11 \Rightarrow \underline{\underline{11x - 10y + 19 = 0}}$ ✓

8. a) $2x - 3y + 6 = 0$.

$3y = 2x + 6$

$y = \frac{2}{3}x + 2$ ✓ $\underline{\underline{\text{grad} = 2/3}}$ ✓

b) $\text{grad}(L_2) = -3/2$ ✓ & passes through $(-1, 2)$

$y = -3/2\, x + c$ ✓ $(y = mx + c)$

$2 = -3/2(-1) + c$ (sub. in $(-1, 2)$)

$2 = 3/2 + c$ $\Rightarrow c = 1/2$ ✓

$\Rightarrow \underline{\underline{y = -3/2\, x + 1/2}}$ ✓

Section 3

1. (a) grad $= -\frac{3}{2}$

(b) $x = \frac{4}{9}$, $y = 3\frac{1}{3}$

(c) $A(-\frac{1}{3}, 1)$ $B(2, 1)$ Area $\triangle ABP = \frac{1}{2}(x_B - x_A)(y_p - 1)$

Area $= \frac{1}{2} \times \frac{7}{3} \times \frac{7}{3} = \frac{49}{18}$ //

2. (a) grad $= 2\sqrt{3}$

(b) put coords of $A(1, 2\sqrt{3})$ onto the equation of L:

$y = 2\sqrt{3}x + c$

$2\sqrt{3} = 2\sqrt{3}(1) + c$, $c = 0$ $\therefore$

the line passes through $(0,0)$.

(c) straight line ⊥ to L:

grad $= -\frac{1}{2\sqrt{3}}$

$y = -\frac{1}{2\sqrt{3}}x + c$ $\quad A(\overset{x}{1}, \overset{y}{2\sqrt{3}})$

$2\sqrt{3} = -\frac{1}{2\sqrt{3}}(1) + c$

$2\sqrt{3} + \frac{1}{2\sqrt{3}} = c$

$\therefore \quad y = -\frac{1}{2\sqrt{3}}x + 2\sqrt{3} + \frac{1}{2\sqrt{3}}$ $\quad \times 2\sqrt{3}$

$2\sqrt{3}y = -x + 4(3) + 1$

$x + 2\sqrt{3}y - 13 = 0$ //