

1a) $(2-3x)(2x+5) = 7$

$$4x + 10 - 6x^2 - 15x = 7$$

$$-6x^2 - 11x + 3 = 0$$

$$6x^2 + 11x - 3 = 0$$

$$x = \frac{-11 \pm \sqrt{(11)^2 - 4(6)(-3)}}{2(6)}$$

$$x = \frac{-11 \pm \sqrt{193}}{12}$$

$$x = 0.2410 \quad \text{or} \quad x = -2.074$$

$$x = 0.241 \quad \text{or} \quad x = -2.07$$

(correct to 3 sig. fig.)

b)

$$\frac{xy}{1-y} = 2x + y$$

$$xy = (1-y)(2x+y)$$

$$xy = 2x + y - 2xy - y^2$$

$$xy - 2x + 2xy = y - y^2$$

$$3xy - 2x = y - y^2$$

$$x(3y - 2) = y - y^2$$

$$x = \frac{y(1-y)}{3y-2}$$

$$1c) \frac{(2x)^3 y^{-4} z^{-2}}{4x^{-2} y^4 z^{-3}}$$

$$= \frac{8x^3 y^{-4} z^{-2}}{4x^{-2} y^4 z^{-3}}$$

$$= 2x^5 y^{-8} z$$

$$= \frac{2x^5 z}{y^8}$$

1d)

$$(i) 3^{y-6} = \left(\frac{1}{9}\right)^y$$

$$3^{y-6} = \left(\frac{1}{3^2}\right)^y$$

$$3^{y-6} = (3^{-2})^y$$

$$3^{y-6} = 3^{-2y}$$

$$y-6 = -2y$$

$$3y = 6$$

$$y = 2$$

(ii)

$$(2^{x+1})(4^{x-1}) = 32$$

$$(2^{x+1})(2^{2x-2}) = 2^5$$

$$2^{(x+1)+(2x-2)} = 2^5$$

$$3x-1 = 5$$

$$3x = 6$$

$$x = 2$$

2. (a)

$$BC = AB \text{ (ABCD is a rhombus)}$$

$$\angle LBC = \angle NBL \text{ (common angle)}$$

$$BN = BL \text{ (given)}$$

$$\therefore \triangle ABN \cong \triangle CBL \text{ (SAS)}$$

(b)

$$\frac{NC}{LN} = \frac{AM}{MN}$$

$$\frac{9}{3} = \frac{AM}{2}$$

$$AM = 6 \text{ cm}$$

$$\therefore AN = 6 + 2$$

$$= 8 \text{ cm}$$

(i)

$$\frac{\text{Area of } \triangle LMN}{\text{Area of } \triangle AMC} = \left(\frac{1}{3}\right)^2$$
$$= \frac{1}{9}$$

(ii)

$$\frac{\text{Area of } \triangle LBN}{\text{Area of rhombus ABCD}} = \frac{1}{18}$$

Note:

$$\frac{\text{Area of } \triangle LBN}{\text{Area of } \triangle ABC} = \frac{1}{9}$$

$$\begin{aligned}
 3a) \quad & \frac{5}{2x-6} - \frac{3x}{4x^2-36} \\
 & = \frac{5}{2x-6} - \frac{3x}{(2x-6)(2x+6)} \\
 & = \frac{5(2x+6) - 3x}{(2x-6)(2x+6)} \\
 & = \frac{10x + 30 - 3x}{(2x-6)(2x+6)} \\
 & = \frac{7x + 30}{4(x-3)(x+3)}
 \end{aligned}$$

$$\begin{aligned}
 b) \quad & \frac{x^2+x-6}{x^2-x-12} = \frac{3x-6}{x^2+2x-24} \\
 & = \frac{(x+3)(x-2)}{(x-4)(x+3)} = \frac{3(x-2)}{(x+6)(x-4)} \\
 & = \frac{\cancel{(x+3)}(x-2)}{\cancel{(x-4)}(x+3)} \times \frac{(x+6)(x-4)}{3(x-2)} \\
 & = \frac{x+6}{3}
 \end{aligned}$$

$$\begin{aligned}
 4a) \quad & m^2 = 8m \\
 & m^2 - 8m = 0 \\
 & m(m-8) = 0 \\
 & m = 0 \quad \text{or} \quad m - 8 = 0 \\
 & \quad \quad \quad \quad \quad \quad m = 8
 \end{aligned}$$

$$4b) \quad 4\left(\frac{1}{3x} - 1\right) = 3\left(\frac{1}{9x} - 2\right)$$

$$\frac{4}{3x} - 4 = \frac{1}{3x} - 6$$

$$\frac{4}{3x} - \frac{1}{3x} = -6 + 4$$

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

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

$$-2x = 1$$

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

$$c) \quad \frac{1}{y-8} = \frac{1}{y+4} = 3$$

$$\frac{y+4 - (y-8)}{(y-8)(y+4)} = 3$$

$$y+4 - y+8 = 3(y-8)(y+4)$$

$$12 = 3(y^2 - 4y - 32)$$

$$12 = 3y^2 - 12y - 96$$

$$3y^2 - 12y - 108 = 0$$

$$y^2 - 4y - 36 = 0$$

$$y = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-36)}}{2(1)}$$

$$y = \frac{4 \pm \sqrt{160}}{2}$$

$$y = -4.324 \quad \text{or} \quad y = 8.324$$

$$y = -4.32 \quad \text{or} \quad y = 8.32$$

(correct to 2 dec. pl.) //

5. a) Smallest value of pq

$$= (-4)(9)$$

$$= -36 "$$

b) Smallest value of $p^2 + q^2$

$$= 0^2 + 5^2$$

$$= 25 "$$

c) Largest value of $q-p$

$$= 9 - (-4)$$

$$= 13 "$$

d) Largest value of $\frac{p}{q}$

$$= \frac{3}{5} "$$

6a) $2(2-x) < 3-x-4(x+2)$

$$4-2x < 3-x-4x-8$$

$$3x < -9$$

$$x < -3$$

b) $\frac{1}{2}(x+7) > \frac{1}{6}(2x+5) \geq \frac{1}{3}(3x-1)$

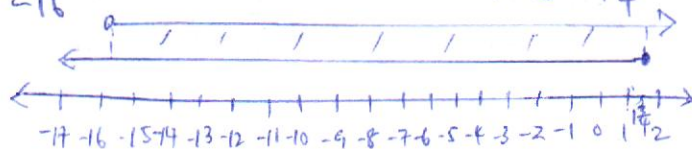
$$\frac{1}{2}x + \frac{7}{2} > \frac{1}{3}x + \frac{5}{6} \quad \text{and} \quad \frac{1}{3}x + \frac{5}{6} \geq x - \frac{1}{3}$$

$$\frac{1}{6}x > -\frac{8}{3}$$

$$-\frac{2}{3}x \geq -\frac{7}{6}$$

$$x > -16$$

$$x \leq 1\frac{3}{4}$$



$$-16 < x \leq 1\frac{3}{4} "$$

7a)

When $y=0$,

$$(2x+3)(8-x)=0$$

$$x = -\frac{3}{2} \text{ or } x=8$$

When $x=0$,

$$y = (3)(8)$$

$$y = 24$$

$\therefore A(-\frac{3}{2}, 0), B(8, 0), C(0, 24)$

b)

line of symmetry:

$$x = \frac{-\frac{3}{2} + 8}{2}$$

$$x = 3\frac{1}{4}$$

The equation is $x = 3\frac{1}{4}$.

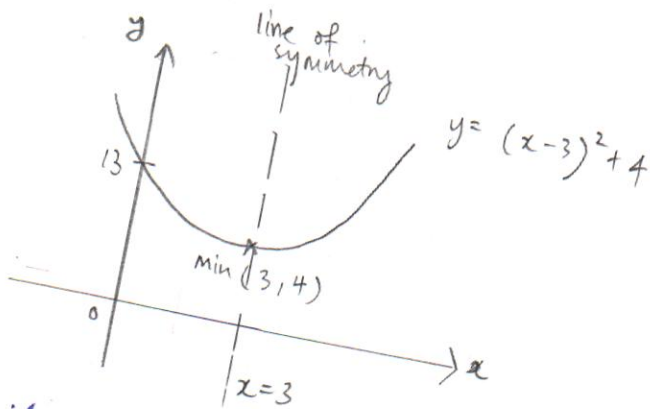
8.

(a)

$$y = (x-p)^2 + q$$

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

(b)



when $x=0$,
 $y=13$

9. a) No. of kilograms he bought

$$= \frac{300}{x} \text{ kg}$$

b) Sum of money he received from sales

$$= \$ \left(\frac{300}{x} - 3 \right) (2+x)$$

$$= \$ \left[\frac{600}{x} + 294 - 3x \right]$$

c) $\left(\frac{300}{x} - 3 \right) (2+x) - 300 = 132$

$$\frac{600}{x} + 300 - 6 - 3x - 300 = 132$$

$$\frac{600}{x} - 6 - 3x - 132 = 0$$

$$\frac{600}{x} - 138 - 3x = 0$$

$$600 - 138x - 3x^2 = 0$$

$$x^2 + 46x - 200 = 0 \quad (\text{shown})$$

d)

$$x^2 + 46x - 200 = 0$$

$$(x+50)(x-4) = 0$$

$$x = -50 \text{ or } x = 4$$

(N.A.)

e)

No. of kilograms he sold

$$= \frac{300}{4} - 3$$

$$= 72 \text{ kg}$$