

BODMAS
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$$1) W = 1 + \frac{1}{v}$$

$$a) W-1 = 1 + \frac{1}{v} - 1$$

$$= W-1 = \frac{1}{v}$$

$$= \frac{1}{W-1} = v$$

$$W = 0.5$$

$$\frac{1}{0.5-1} = \frac{1}{-0.5} = -2$$

$$b)i) 3x + 5 = 7x - 7$$

$$3x + 5 - 3x = 7x - 7 - 3x$$

$$= 5 + 7 = 7x - 7 + 7$$

$$= 12 = 4x$$

$$= \frac{12}{4} = \frac{4x}{4} = 3 = x$$

$$\underline{\underline{x = 3}}$$

B)

$$\text{ii)} \quad \frac{x+3}{2} = \frac{x-3}{4}$$

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

$$4x+12 = 2x-6$$

$$4x+12-2x = 2x-6-2x$$

$$2x+12 = -6$$

$$2x+12-12 = -6-12$$

$$2x = -18$$

$$\frac{2x}{2} = \frac{-18}{2}$$

$$\underline{\underline{x = -9}}$$

$$\text{iii)} \quad \frac{1}{x-1} = \frac{5}{2}$$

$$1 \times 2 = 5(x-1)$$

$$2 = 5x-5$$

$$2+5 = 5x-5+5$$

$$7 = 5x$$

$$\underline{\underline{x = \frac{7}{5}}}$$

c) (a) (b) (c)
 i) $2x^2 + 12x + 15 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-12 \pm \sqrt{144 - (4 \times 2 \times 15)}}{2a}$$

$$= \frac{-12 \pm \sqrt{144 - 120}}{4}$$

$$= \frac{-12 \pm \sqrt{24}}{4}$$

$$= \frac{-12 + 4.899}{4} \quad \text{or} \quad = \frac{-12 - 4.899}{4}$$

$$= \frac{-7.101}{4} \quad \text{or} \quad = \frac{-16.899}{4}$$

$$= \underline{\underline{-1.78}} \quad \text{or} \quad = \underline{\underline{-4.22}}$$

ii) $x^2 - 16 = 6x$

$$\begin{array}{r} 1 \quad -16 \\ 2 \quad -8 \\ 4 \quad -4 \end{array}$$

$$x^2 - 6x - 16 = 0$$

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

$$= x^2 - 2x + 8x - 16$$

$$\underline{\underline{x \text{ is } +8 \text{ or } -2}}$$

c)
iii)

$$x^2 = 12 - x$$

$$1 - 12$$

$$2 - 6$$

$$3 - 4$$

$$-3 \ 4$$

$$x^2 + x - 12 = 0$$

$$(x+3)(x-4) = x^2 - 4x + 3x - 12$$

$$(x-3)(x+4) = x^2 + 4x - 3x - 12$$

$$x = \underline{\underline{+3 \text{ or } -4}}$$

D)

i) $3z^2 + 13z = -4$

$$3z^2 + 13z + 4 = 0$$

$$(3z+4)(z+1) = 3z^2 + 12z + z + 4$$

$$-48 + 52 + 4 = 0$$

$$z = \underline{\underline{-4}}$$

ii) $x^2 - y^2 \quad x^2 - xy + xy - y^2$

$$(x-y)(x+y)$$

D)

iii) $ay - bx + by - ax$

$$a(y-x) + b(y-x)$$

$$ay - ax + by - bx$$

$$\underline{\underline{(y-x)(a+b)}}$$

E)

i) ① $2x + 5y = 39$

② $4x + y = 33$

① $\times 2$ $4x + 10y = 78$

② $4x + y = 33$

$$9y = 45$$

$$\frac{9y}{9} = \frac{45}{9}$$

$$\underline{\underline{y = 5}} \quad \underline{\underline{x = 7}}$$

ii) ① $3x - y = -5$

② $-7x + 3y = 15$

① $\times 3$ $9x - 3y = -15$

② $-7x + 3y = 15$

$$2x = 0$$

$$\underline{\underline{x = 0}}$$

$$\underline{\underline{y = +5}}$$

$$E) \quad (a) \quad (b) \quad (c) \\ \text{iii) } x^2 - 7x + 3 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-7 \pm \sqrt{49 - (4 \times 1 \times 3)}}{2 \times 1}$$

$$= \frac{-7 \pm \sqrt{49 - 12}}{2}$$

$$= \frac{-7 \pm \sqrt{37}}{2}$$

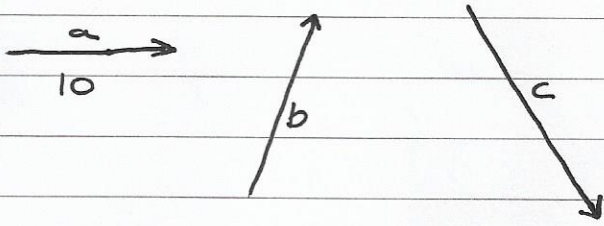
$$= \frac{-7 \pm 6.083}{2}$$

$$= \frac{-7 + 6.083}{2} \quad \text{or} \quad \frac{-7 - 6.083}{2}$$

$$= \frac{-0.917}{2} \quad \text{or} \quad \frac{-13.083}{2}$$

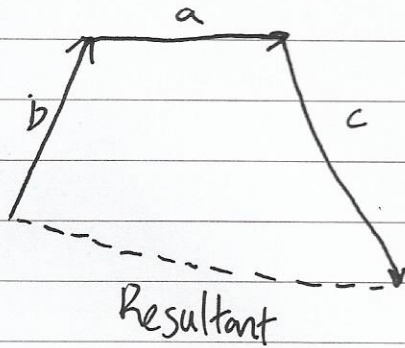
$$= -0.46 \quad \text{or} \quad -6.54$$

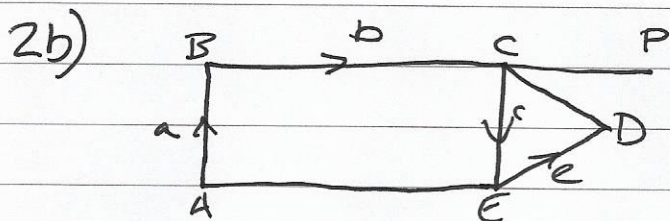
2)
a)
i)



ii)

iii)





i) $\vec{AD} = \underline{a + b + c + e}$

ii) $\vec{EB} = \underline{-c - b}$

iii) $\vec{AP} = \underline{a + 1.5b}$

2c)

i) $F_1 = \text{Force} \times \sin \times \theta(\text{degree})$ $F_2 = \text{Force} \times \sin \times \theta(\text{degree})$
 $F_1 = F \sin \theta$ $F_2 = F \cos \theta$

ii) $F_1 = 220 \sin 30 = \underline{110\text{N}}$
 $F_2 = 220 \cos 30 = \underline{190.53\text{N}}$

3a) (amps) (Coulombs)

i) $\text{Current} = \frac{\text{Charge}}{\text{Time (seconds)}}$

Quantity of Charge = current $\times$ time

ii) $I = \frac{V}{R}$ $V = IR$ $R = \frac{V}{I}$

$V = IR = 0.2^{-3} \times 0.25 = 0.05\text{mV}$

iii) Voltage pushes the current around the circuit measured in volts (V). (Potential Differences)

3b)

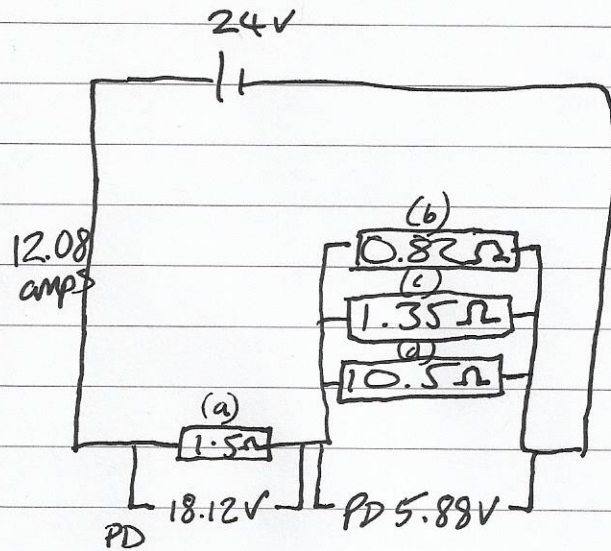
i) The total resistance

$$R_T = \frac{1}{0.82} + \frac{1}{1.35} + \frac{1}{10.5}$$

$$= 0.4865 \Omega$$

$$+ 1.5 \Omega$$

$$= \underline{\underline{1.987 \Omega}}$$



ii) The battery current

$$I = \frac{V}{R} = \frac{24}{1.987} = 12.08 \text{ amp}$$

iii) $PD = \Omega \times \text{amp} = 12.08 \times 1.5 = 18.12 \text{ volts}$

iv) (a) $1.5 \Omega \quad I = \frac{V}{R} = \frac{18.12}{1.5} = 12.08 \text{ amp}$

(b) $0.82 \Omega \quad I = \frac{V}{R} = \frac{5.88}{0.82} = 7.17 \text{ amp}$

(c) $1.35 \Omega \quad I = \frac{V}{R} = \frac{5.88}{1.35} = \underline{\underline{4.36 \text{ amp}}}$

(d) $10.5 \Omega \quad I = \frac{V}{R} = \frac{5.88}{10.5} = 0.36 \text{ amp}$

v) The 1.5Ω resistor transfers the most energy.