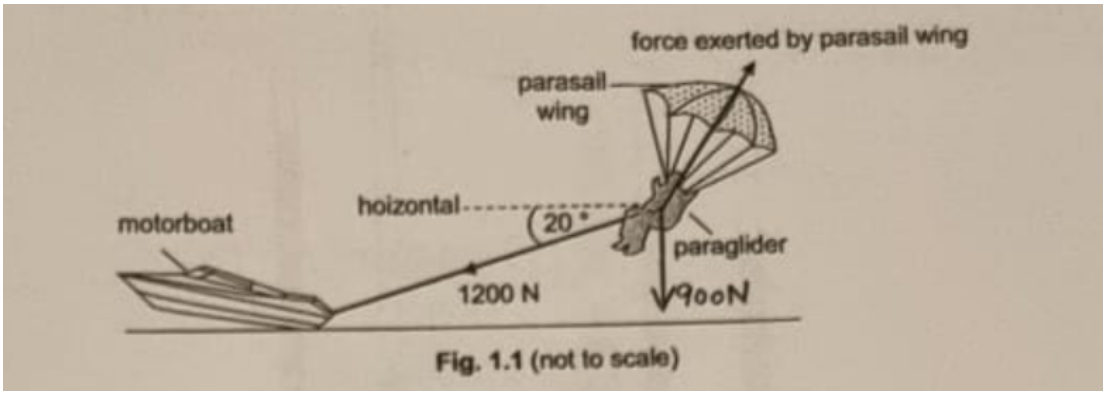
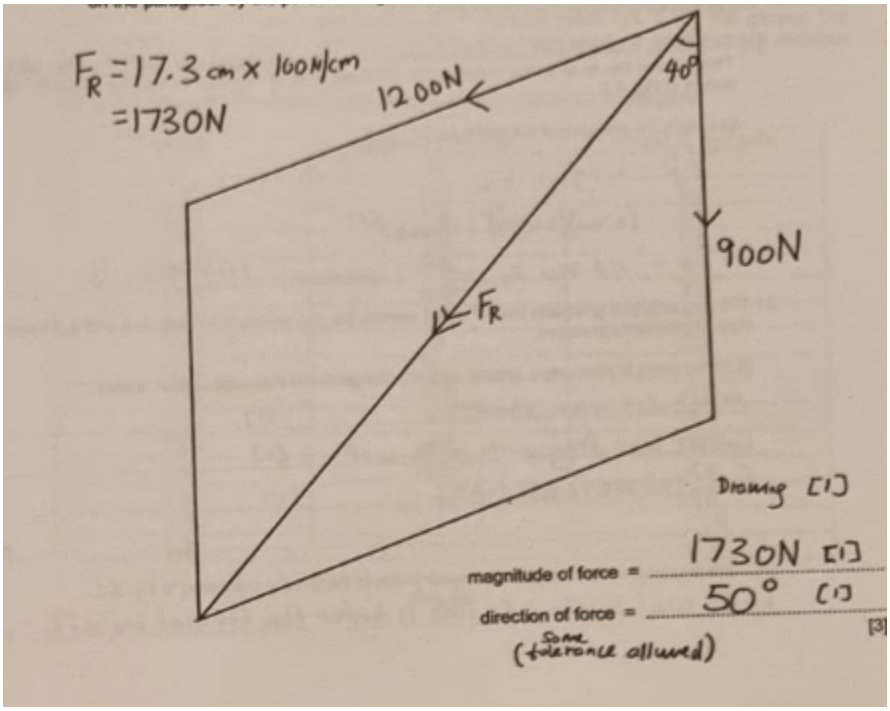
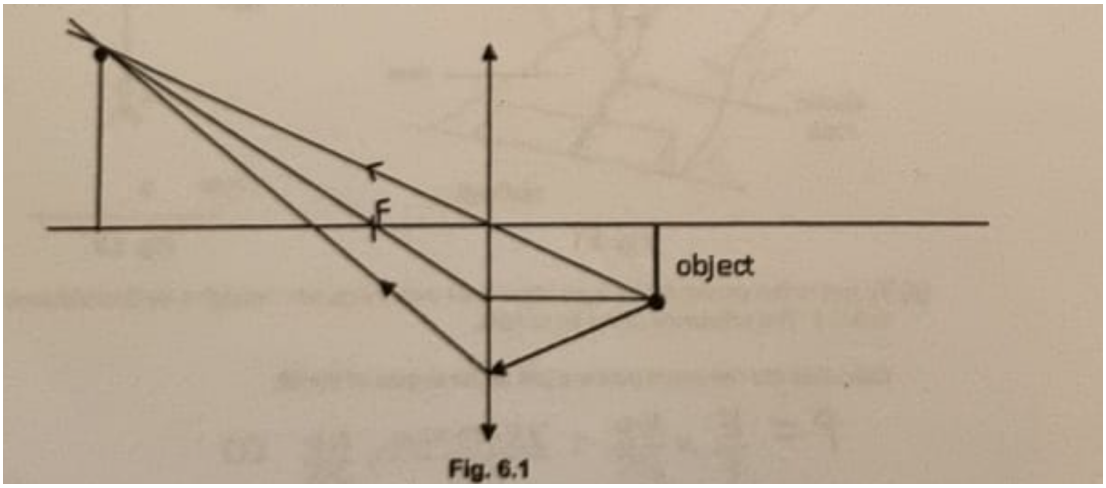
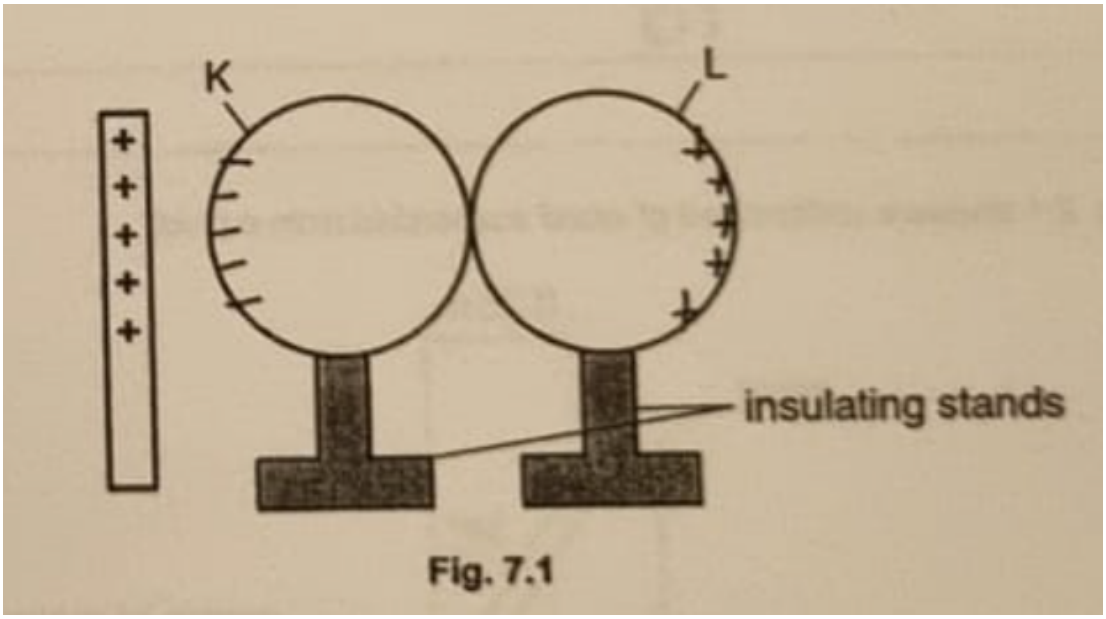
SECTION A (50 MARKS)

1a)	 Fig. 1.1 (not to scale)
1b)	
2a)	Product of **force [1]** and **perpendicular distance [1]** to point
2bi)	W = mg W = (0.080)(10) **W = 0.80N [1]**
2bii)	$F \times 0.75 = 0.8 \times 0.25$ **[1]** $F = 0.27N$ **[1]**
2c)	Perpendicular distance from pivot of F **decreases/is less than 0.75m [1]** **OR** Perpendicular distance from pivot of W **increases/is more than 0.75m, hence**

	increased/greater force F (for greater moment) **[1]**
3a)	$P = \frac{E}{t} \times \frac{100}{85} = \frac{75 \times 10 \times 100}{8.5} \times \frac{100}{85}$ **[1]** $= 1.04 \times 10^4 W$ **[1]**
3b)	$\frac{1}{2} \times 75 \times v^2 = 75 \times 10 \times 41$ **[1]** $v = 28.6 m/s$ **[1]**
3ci)	**Gravitational Potential Energy + Kinetic Energy [1]** → **Elastic Potential Energy (+ heat energy in rope) [1]**
3cii)	Gain in G.P.E = Loss in K.E = $75 \times 10 \times 73$ = **54800J [1]**
4a)	$P = h\rho g + P_{atm}$ P = **(0.400)(1000)(10) + 100000** **[1] [1]** P = **104000 Pa**
4bi)	- Molecules **move slower [1]** - Collide **less frequently [1]** with wall - Force on wall **decreases [1]**
4bii)	**Water level on left side is higher than level on the right [1]**
5a)	$Q = mc\Delta\theta$ Q = **(0.2)(4600)(65-10) [1]** Q = **50600J [1]**
5b)	$m \times 2.2 \times 10^6 + [m \times 4200 \times (100 - 65)] = 50600$ **[1] [1]** m = **0.0216 kg [1]**
5c)	Steam contains **more (latent) heat energy [1]** than water Specific latent heat of vaporisation **is much greater than [1]** specific heat capacity of water
6a)	Point at which rays converge that were initially parallel to principal axis of lens **[1]**

6bi) 6bii)	 Fig. 6.1
6c)	Less than focal length **OR** between point F and lens **[1]**
6d)	Converging
7ai)	 Fig. 7.1
7aii)	Electrons **are attracted and move towards the rod [1]** and cluster on the left side of K since unlike charges attract, leaving behind **induced positive charges on the right side of L. [1]**
7bi)	Electrons move and redistribute themselves **[1]**
7bii)	Neutralised **[1]**
7c)	Place it over intense flame **[1]**

8a)	Work done to drive a unit charge across an entire circuit **[1]**
8bi)	$\varepsilon = \frac{E}{Q} = \frac{1.6\times10^{5}}{1.8\times10^{4}}$ ε **= 8.9V [1]**
8bii)	$I = \frac{Q}{t} = \frac{1.80\times10^{5}}{1.3\times10^{5}}$ I **= 0.14A [1]**
8ci)	$E = \frac{15}{45} \times 1.1 \times 10^{5}$ **[1]** $E = 3.7 \times 10^{4} J$ **[1]**
8cii)	Extra resistance in circuit from wires, ammeters, cells **[1]**

SECTION B (30 MARKS)

9a)	- Equal in magnitude and opposite in direction **[1]** - On escaping gas from rocket **[1]**
9b)	The velocity of the rocket increases/accelerates from 0 to 0.80s. This shows that the resultant force is upwards, **hence lift is present and greater than weight. [1]** After 0.8s, **acceleration is negative [1]**. Hence, resultant force is downward, **due to weight only and thus there is no lift. [1]**
9c)	- Since rocket 2 has higher acceleration, **it is likely to have a smaller mass.** - $F_{net} = Lift\ force - weight$ and if lift force is the same, **then** F_{net} **and acceleration will be larger. [1]**
9di)	1.40s **[1]**
9dii)	$h_{max} = \frac{1}{2} \times 10 \times (2.4 - 1.4)$ **[1]** $h_{max} = 5.0m$ **[1]**
10ai)	(imaginary) line on a wave that joins all peaks of a wave **[1]**
10aii)	Transfer of energy from one point to another **through vibrations [1] without transferring matter. [1]** The direction of wave motion **is perpendicular to the direction of vibration of water molecules. [1]**
10bi)	Difference: **Different amplitude [1]** Similarity: **Same frequency [1]**

10bii)	**1.** $f = \frac{1}{T} = \frac{1}{300\times10^{-3}}$ **[1]** **f =** 3.33Hz **[1]** **2.** $v = f\lambda$ $0.20 = 3.33\lambda$ **[1]** $\lambda = 0.0601m$ **[1]**
11ai)	The magnetic field of the magnets and magnetic field of current in wire interact and produce a force. **[1]**
11aii)	**Fleming's left hand rule.** Direction of force **by thumb,** direction of magnetic field **by index finger** and direction of current **by second (middle) finger** are perpendicular to one another. **[3]**
11b)	- **There is no force F** or it **disappears/becomes equal to 0 [1]** - **Wire is magnetically screened/shielded by iron tube [1]**
11ci)	- Currents in vertical sides **in opposite directions [1]** - Forces on vertical sides **in opposite directions resulting in moments acting on coil [1]**
11cii)	Current **reverses direction in the coil every half a rotation.** The force acting on each side of the coil **reverses too, to keep the direction of the moment the same. [2]**