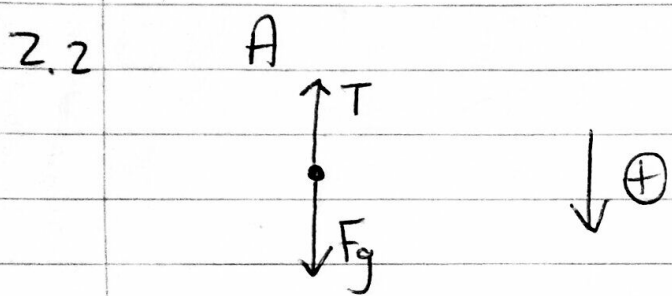


Gr. 12 Science Test Feb, 2020

- 1.1 D ✓✓
- 1.2 B ✓✓
- 1.3 D ✓✓
- 1.4 B ✓✓

2.1. If a net force acts on an object, it will accelerate ✓ in the direction of the force. The acceleration is directly prop to net force and inversely prop to mass ✓



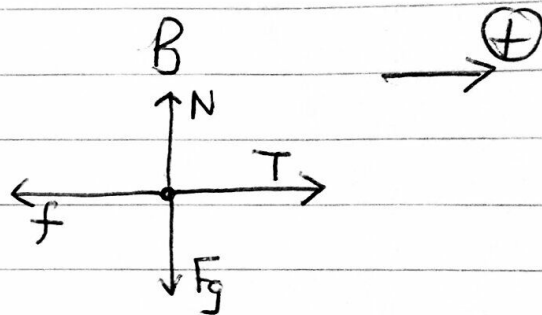
$$F_{net} = ma \checkmark$$

$$F_g - T = ma \checkmark$$

$$6(9,8) - T = 6a \text{ ---- } \textcircled{1}$$

$$6(9,8) - 4a - 32,53 = 6a \checkmark \leftarrow \text{Subst } T \text{ into } \textcircled{1}.$$

$$a = 2,63 \text{ m}\cdot\text{s}^{-2} \checkmark$$



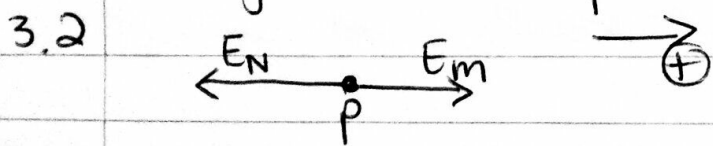
$$F_{net} = ma$$

$$T - f = ma$$

$$T - 32,53 = 4a \checkmark$$

$$T = 4a + 32,53 \checkmark$$

3.1 Force per unit positive charge at that point. ✓✓



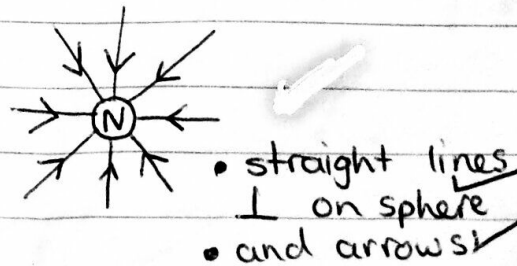
$$E_{net} = E_M - E_N \checkmark$$

$$= \frac{kQ_M}{r^2} - \frac{kQ_N}{r^2} \checkmark$$

$$\checkmark - 5,2 \times 10^5 = \frac{9 \times 10^9 Q_M}{(0,03)^2} - \frac{9 \times 10^9 (6 \times 10^{-9})}{(0,03)^2} \checkmark$$

$$Q_M = 2 \times 10^{-9} \text{ C} \checkmark$$

3.3.



3.4 B ✓✓

4.1.1. $1,5 \text{ V} \checkmark$

4.1.2. gradient $= \frac{-1}{r} \checkmark$
 $\frac{0 - 1,8}{1,5 - 0} \checkmark = \frac{-1}{r}$

$r = 0,83 \Omega \checkmark$

Note:

$$\begin{aligned} \mathcal{E} &= IR + Ir \\ &= V + Ir \end{aligned}$$

$$\begin{aligned} -Ir &= V - \mathcal{E} \\ I &= \frac{V}{-r} - \frac{\mathcal{E}}{r} \end{aligned}$$

$$I = \frac{1}{-r} V + \frac{\mathcal{E}}{r}$$

(ie $y = mx + c$)

4.2 rheostat \checkmark

4.3.1 $V = 4 \times 1,5 = 6 \text{ V} \checkmark \checkmark$

4.3.2 (a) $V = IR \checkmark$
 $2 = I(4) \checkmark$
 $I = 0,5 \text{ A} \checkmark$

(b) $\mathcal{E} = I(R + r) \checkmark$

$$6 \checkmark = 0,5 [R_p \checkmark + 4 \checkmark + 4(0,25) \checkmark]$$

$$R_p = 7 \Omega$$

$$R_p = \frac{R_1 \times R_2}{R_1 + R_2} \checkmark$$

$$7 = \frac{14 \times R_x}{14 + R_x} \checkmark$$

$$R_x = 14 \Omega \checkmark$$