

**Gateway Science Physics A**

**J249/01 Physics A P1-P4 and P9 (Foundation Tier)**

**Question Set 24**

A student rubs a balloon against a scarf.



Removal of electrons from the scarf results in positively charged scarf.

- (a)\* ① Describe how the balloon becomes charged.  
 ② Suggest how you could show that the balloon is charged.  
 What would you expect to see and why?

- ① when you rub the balloon against the scarf, all the electrons from the scarf move from the scarf to the balloon. The balloon now has a negative charge due to all the electrons that have moved across. [6]
- ② you can show that the balloon has been charged by holding it up to a positively charged object. Opposites attract therefore our balloon should be attracted to this positively charged object showing that it is negatively charged.

or use a gold leaf electroscope. - when the charged balloon touches the plate, gold leaf rises because the charge moves down to the leaf through metal plate causing repulsion between the leaf and metal plate (since they have same charge)

[6]

(b) Current is the rate of flow of electrical charge in a circuit.

A current of 40 mA transfers a charge of 3.6 C.

Calculate the time to transfer this charge.

Show your working.

$$Q = It$$

$$3.6 = 40 \times 10^{-3} t$$

$$t = \frac{3.6}{40 \times 10^{-3}} = 90$$

Answer = .....<sup>90</sup>..... seconds

[3]

**Total Marks for Question Set 24: 9**

## Equations in physics

$$(\text{final velocity})^2 - (\text{initial velocity})^2 = 2 \times \text{acceleration} \times \text{distance}$$

$$\text{change in thermal energy} = \text{mass} \times \text{specific heat capacity} \times \text{change in temperature}$$

$$\text{thermal energy for a change in state} = \text{mass} \times \text{specific latent heat}$$

$$\text{energy transferred in stretching} = 0.5 \times \text{spring constant} \times (\text{extension})^2$$

$$\text{potential difference across primary coil} \times \text{current in primary coil} = \text{potential difference across secondary coil} \times \text{current in secondary coil}$$

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