

- 13 The surface of a balloon can become charged by rubbing it against clothing. The charge on the surface of the balloon can be assumed to act as if it was concentrated at the balloon's centre.

Two balloons are suspended by cotton threads so that they just touch each other as shown in diagram 1. The two balloons are then given an equal negative charge and repel as shown in diagram 2. The dots represent the centre of each balloon.

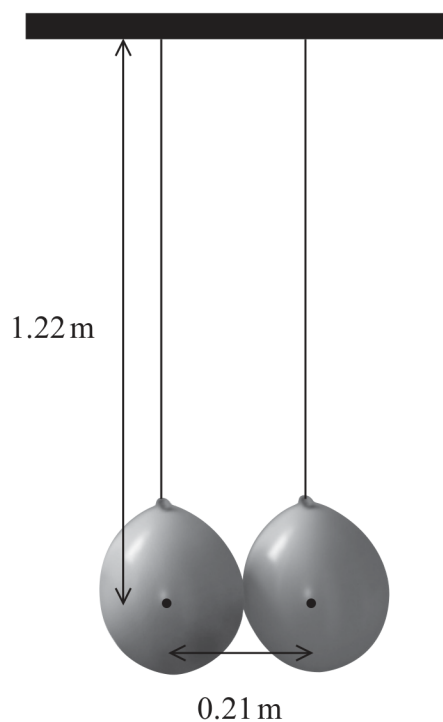


Diagram 1

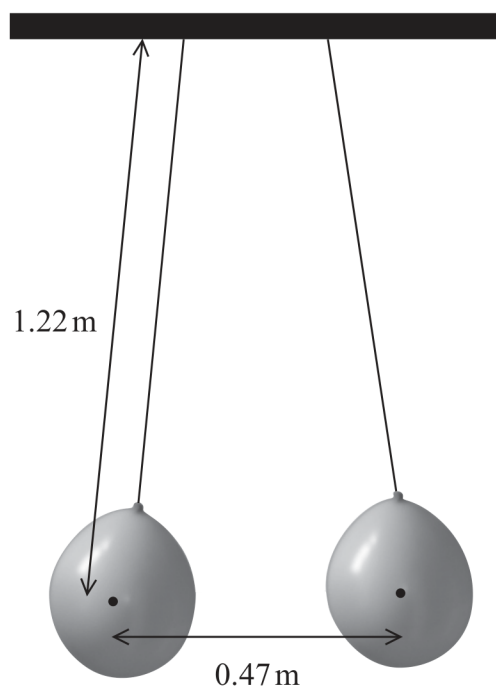


Diagram 2

- (a) (i) Show that the force of repulsion between the balloons in diagram 2 is about $1 \times 10^{-3} \text{ N}$.

mass of each balloon = 1.1 grams

(4)

(ii) Show that the charge on each balloon is about $2 \times 10^{-7} \text{ C}$.

(2)

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(b) One balloon is removed and the remaining balloon returns to its original position.

Calculate the electric potential at a distance of 0.30 m from the centre of the remaining balloon.

(2)

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Electric potential =

(Total for Question 13 = 8 marks)

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