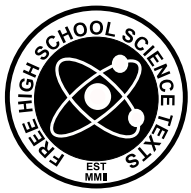

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The Free High School Science Texts: Textbooks for High School Students Studying the Sciences Physics Grades 10 - 12

Version 0
November 9, 2008

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Contents

Part V

Exercises

Chapter 32

Exercises

The exercises included in this chapter span over multiple chapters or are no longer required by the syllabus.

1. [SC 2002/11 SG] Which one of the following combinations contains one SCALAR and one VECTOR quantity?

   A momentum and force

   B displacement and acceleration

   C potential difference and electric field strength

   D resistance and electric current

2. [DOE 2005/11 SG1] Which one of the following pairs consists of two vector quantities?

   A time, acceleration

   B velocity, displacement

   C electric field strength, charge

   D momentum, kinetic energy.

3. [IEB 2004/11 HG1] Which one of the following is not equivalent to the SI unit of energy?

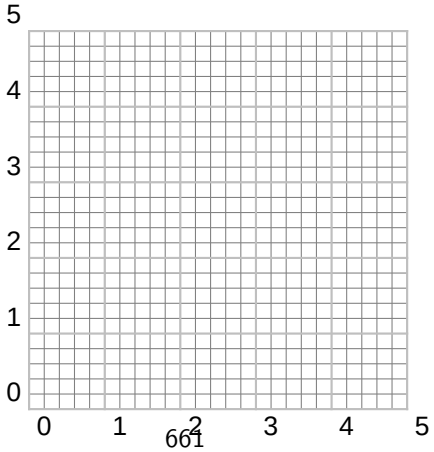
   A N.s

   B N.m

   C V.C

   D W.s

4. [IEB 2002/11 HG1 - Electrostatics] **Millikan's Oil Drop Experiment**
   The diagram below represents the apparatus used to measure the charge carried by oil droplets. The droplets are sprayed above the top plate and eventually a single droplet finds its way through a small hole into the space between the plates.



The mass of the droplet is m and it carries a negative charge of magnitude q. The distance between the plates is d. The oil droplet between the two plates is stationary.

A Use expressions for the electric field intensity and weight to derive a formula for the charge carried by the oil droplet.

B In one particular experiment, a student reported that, while using a voltage of 400 V between the plates, she had obtained a value of $4{,}8 \times 10^{-19}$ C for the charge on the oil droplet. Another student said that he had repeated the same experiment with the same oil droplet but that he had used 800 V to keep the oil droplet stationary. If this were true, what would be the charge on the oil droplet, and why would you doubt what he had reported?

5. [IEB 2004/11 HG1] An electric motor lifts a load of mass m through a vertical height h at a steady speed of v. It is connected to a power supply of potential difference V, and it draws a current I. Assume that 90% of the energy input is transferred to useful work done, and that the load comes to rest at the top of this height h.

   Which expression correctly relates the power input to the power output for this system?

   A $VI = (0{,}9)mgh$

   B $VI = (0{,}9)mgv$

   C $(0{,}9)VI = mgh$

   D $(0{,}9)VI = mgv$

Appendix A

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