

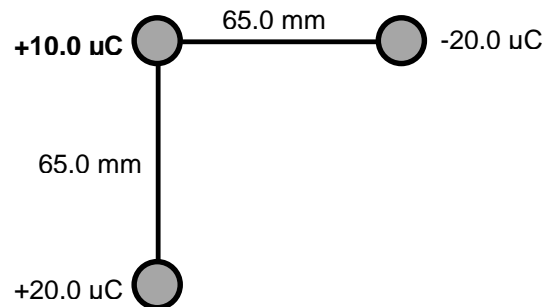
Physics 30 Equivalency *Readiness Check*

These questions have been created to help you to assess your readiness for this test. You do not need to report the results of this test. It is for your use ONLY.

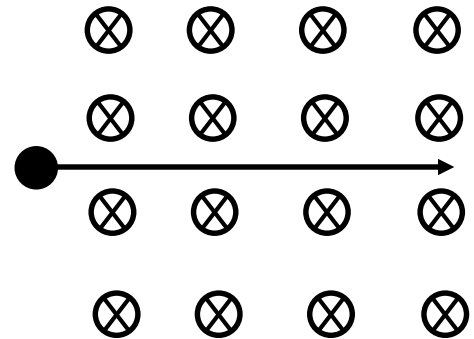
* If you score less than 50% on this test, we recommend you email upgrading@nait.ca for advisement.

1. Car A, having a mass of 1.30×10^3 kg is travelling at 60.0 km/h due east when it collides with car B, having a mass of mass 1.70×10^3 kg traveling at 40.0 km/h due west. If the collision is totally inelastic, find the final velocity of car B.

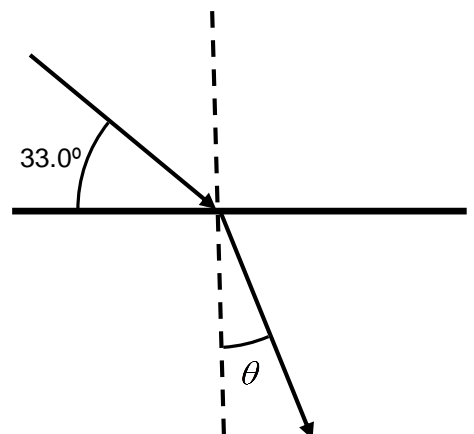
2. Three charges are arranged as shown in the diagram to the right. Find the magnitude and direction of the net force on the $+10.0 \mu\text{C}$ charge.



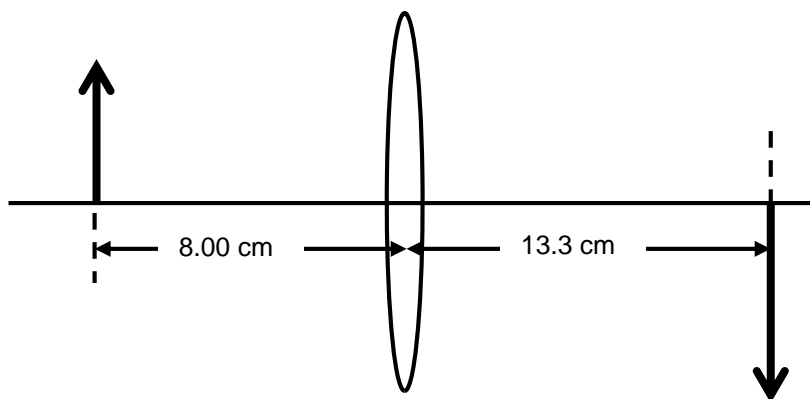
3. A charge of $-10.0 \mu\text{C}$ is traveling at a speed of 5.00×10^7 m/s when it enters a region containing a magnetic field of strength 3.00 mT directed into the page as indicated in the diagram. The magnetic force on the charge will be:



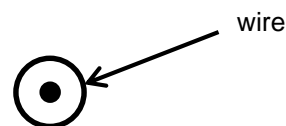
4. Light traveling through air ($n = 1$) is incident on a piece of glass. The ray makes an angle of 33.0° with the surface of the glass. The glass has an index of refraction of $n = 1.45$. Find the angle of refraction θ .



5. An object is placed 8.00 cm from a lens as illustrated in the diagram to the right. An inverted image of the object is formed on the opposite side of the lens at a distance of 13.3 cm from the lens. Determine the focal length of the lens.



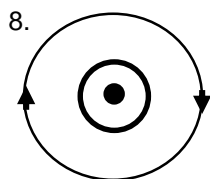
6. The energy of a photon in electron-volts is 1.91 eV. Calculate the wavelength of the photon in nm.
7. It is observed in a photoelectric effect experiment, that electrons will be released from a metal surface only when the frequency of the incident light is greater than 125 nm (ultraviolet light). What is the value of the work function of the metal? Express your answer in eV.
8. An electron current is flowing in a wire and is directed out of the page as indicated in the diagram to the right. Sketch the magnetic field that exists outside the wire.



9. An electric charge of 5.00 C is moved from point A where the electric potential is 400 V, to point B where the electric potential is 200 V. Calculate the change in the electric potential energy of the charge in moving from point A to point B.
10. Two straight wires are aligned parallel to one another. A conventional current of 10.0 A is sent through both wires in the same direction. Describe the resulting forces between the wires.

ANSWERS

1. 3.33 km/h east
2. 602 N \swarrow 45.0°
3. 1.50 N directed down
4. 35.3°
5. 5.00 cm
6. 650 nm
7. 9.95 eV



9. -1000 J
10. There is an attractive force between the wires.