Physics 102 – Spring 2011 – Recitation module 3

Since matter is made of electrically charged particles, why don't we and the objects around us feel electric forces all the time?

Highway trucks can become electrically charged as they travel. How can this happen? Is this dangerous?

If the distance between two charged objects and the charges on each of the objects are all doubled, what happens to the electric force between them?

Two planets, A and B have masses 1M and 4M, respectively. They exist out in space far from other objects. How does the gravitational force exerted by planet A on planet B compare with the gravitational force exerted by planet B on planet A.

Referring to the situation in the last question, how does the gravitational field of planet A at the location of planet B compare to the gravitational field of planet B at the location of planet A?

Your TA will supply your class with a set of bathroom scales. Groups should take turns taking the scales into a nearby elevator. Note the weight of a volunteer student when:

- the elevator is at rest.
- the elevator is accelerating upward during a trip to a higher floor.
- the elevator is moving at constant speed during its trip to a higher floor.
- the elevator is slowing down during its trip to a higher floor.
- the elevator is accelerating downward during the trip to a lower floor.
- the elevator is slowing down during a trip to a lower floor.

- the elevator is moving at a constant speed during its trip to a lower floor.

Now, get bring all the groups and see if you can make sense of your observations using Newton's laws.

Velma bicycles northward at 4 m/s. Mort, standing by the side of the road, throws a ball northward at 10 m/s. What is the ball's speed and direction of motion, relative to Velma? What if Mort had instead thrown the ball southward at 10 m/s?

Velma's spaceship approaches Earth at 0.75c. She turns on a laser and points the beam toward Earth. How fast does she perceive the laser light to move away from her? How fast does an Earth-based observer see the beam approach Earth?

A spaceship moves past you moving at 0.95c. You measure its length to be 10 meters. How long would this spaceship appear to be if it were at rest next to you?

Velma passes Earth at a speed of 0.95c. She watches a video program that runs 1 hour. How long does the program run as measured by an Earth-based observer?

Velma passes Earth at a speed of 0.95c. On Earth, a person watches a video program that runs 1 hour. How long does the program run as measured by an Velma?

Can you make sense of your answers to the last two questions?