

W-GP Chapter 5 - 9 Pre-Test

1.) (5 pts) Briefly explain all three Newton's Laws of Motion.

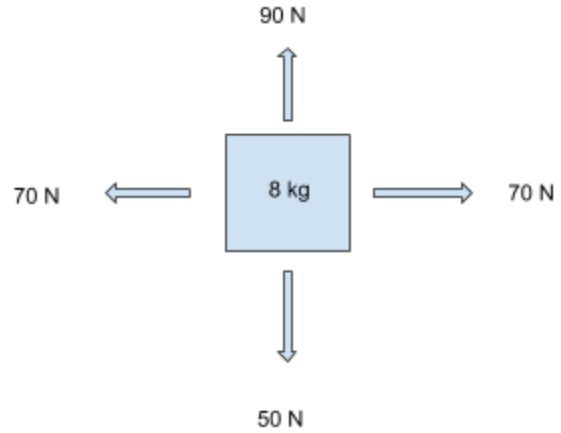
2.) (10 pts total, 5 pts each) **Draw each of the following free body diagrams.** Use the diagram to answer the question.

a) An airplane weighing 25,000 kg is flying at a relatively low altitude at a constant velocity. What is the net force acting on the plane?

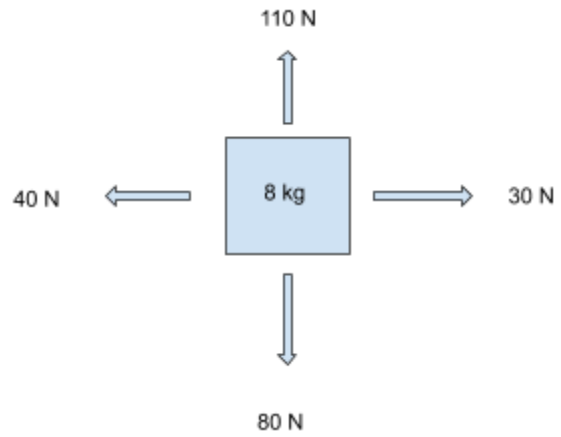
b) A block is being pushed along a surface with friction at constant speed. What must be true of the applied and frictional forces?

3.) (10 pts total, 5 pts each) Find the net force applied on each of the free body diagrams.
Please make sure to find the resultant and direction.

a) What is the F_{net} ?



b) What is the acceleration?



4.) (15 pts total) A 120 kg block is resting on a frictionless incline at an angle of 60° . Draw the corresponding free body diagram.

a) (10 pts) Find the normal force, resulting gravitational force, and the frictional force if $\mu = 0.245$.

b) (5 pts) Based on your diagram, will the block move down the incline. If so, what is its acceleration?

5.) (10 pts) In a world without pain or injury, a 75 kg person is struck by a 4,350 kg automobile traveling 45 m/s. What is the resulting velocity of this cartoon person?

6.) (5 pts) What is the impulse of a puck when struck by a hockey stick exerting a constant force of 5,500 N for 0.04 s?

7.) (5 pts) Define both elastic and perfectly inelastic collisions. Highlights the two major differences between the two.

8.) (10 pts) A 2,400 kg inflatable banana travelling at 96 m/s 30° above horizontal collides with a 3,500 kg Hello Kitty doll travelling 72 m/s 60° above horizontal. If the collision is perfectly inelastic, find the resulting velocity.

9.) (10 pts) Stewart is also dragging a motionless... ummm... everything bagel. The bagel tied 50° from the horizontal (on level ground) and is being pulled with a force of 230 N. If Stewart pulls this tasty bagel 2500 meters, how much work is he doing on the object?

- 10.) (10 pts total, 5 pts each) A particle moving in the xy plane undergoes a displacement $\Delta \mathbf{r} = (4.0\mathbf{i} + 5.0\mathbf{j})$ m as a constant force $\mathbf{F} = (2.0\mathbf{i} + 3.0\mathbf{j})$ N acts on the particle.
- a) (5 pts) Calculate the magnitudes of the displacement and the force.

- b) (5 pts) Calculate the work done by \mathbf{F} .

11.) (10 pts) A 150 kg stuffed Tampy doll is pushed off of a 720 m building. Assuming no wind or air resistance, what is Tampy's velocity just prior to impact?