Some examples – Newton’s laws of motion

1. A single force of 1.5 N pulls a 3 kg object from rest across a surface.

(a) What is the acceleration of the object?

(b) How far does the object move in 4 seconds?

2. A 3-kg object accelerates from 2 m/s right to 7 m/s right in 2.5 seconds. A force of 10 N produces this acceleration. What is the friction on the object during this time?

3. A 50-kg object is hanging by a cable from a motor. What force must the motor exert on the object if the object:

(a) is motionless?

(b) is moving upward at a constant speed?

(c) has an upward acceleration of 3 m/s2?

4. A 10-kg object is moving downward at 6 m/s. I pull upward on the object with a force of 120 N.

How many seconds will it take for the object to come to a stop?

5. A 50-kg person (person L) and a 20-kg person (person R) are standing on slippery ice.

The 50-kg person pushes the 20-kg person right with a force of 10 N.

(a) What is the magnitude and direction of the acceleration of the 20-kg person?

(b) What is the magnitude and direction of the force the 50-kg person experiences?

(c) What is the magnitude and direction of the acceleration of the 50-kg person?

6. A 10-kg object is sliding across a rough surface. A force ***F*** of 50 N pulls

***F***

25o

V

on the object at an upward angle of 25o. The force pulls the

object from rest to a speed of 10 m/s in 4 seconds.

(a) What is the X-component of the force?

(b) What is the Y-component of the force?

(c) What is the acceleration of the object?

(d) What is the magnitude and direction of the NET force

on the object?

(e) What is the magnitude of the friction on the object?

(f) What is the magnitude of the normal force on the object?

7. A person holds a 10-kg object on a 37o inclined, frictionless ramp.

(a) What is the weight of the object?

(b) What is the magnitude and direction of the person’s force?

***The object is released and the object slides down the ramp.***

(c) What is the NET force on the object while the object slides down the ramp?

(d) What is the acceleration of the object while the object slides down the ramp?

8. Object A has a mass of 20 kg and object B has a mass of 5 kg.

A

B

The objects are held motionless.

(a) What is the tension in the connecting rope?

***When released, object A moves a distance of 9 meters in 3 seconds.***

(b) What is the acceleration of object A?

(c) What is the acceleration of object B?

(d) What is the NET force on object A?

(e) What is the NET force on object B?

(f) What is the tension in the connecting rope while object A moves?