Physics 100 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Newton’s Laws Textbook Questions

Use your textbook to answer these questions. Each question is preceded by a prompt telling you where to find helpful information.

**Glossary**

1. Define “force.”

**Section 4.1**

2. The textbook’s author talks about what happens when a force is applied to an object. What does he mean when he says “the acceleration produced is *directly proportional* to the net force?”

**Section 4.2**

3. What does the textbook’s author mean when he says “the acceleration produced is *inversely proportional* to the mass?”

**Section 4.5**

4. Friction is a force. In which direction does friction always act?

5. What causes friction?

6. What is friction called when an object is rubbing against air?

**Section 4.5, “questions” on p.43**

7. In which of the following situations is friction actually affecting the outcome? Circle the letter.

1. A box is sitting a level floor. You are pushing the box sideways, but your force is too small to move the box.
2. A box is sitting a level floor. You are pushing the box sideways, causing the box to slide across the floor.
3. A box is sitting motionless on a level floor. You are not touching the box.
4. A box is sitting motionless on a tilted floor. You are not touching the box.

8. In light of the previous question, in what types of situations does friction affect the outcome?

**Section 4.7**

9. Weight is the force of gravity, and weight depends on mass. This means that gravity pulls more massive objects with greater force. If massive objects are pulled downward by more force, why does the acceleration of an object during free-fall not depend on the object’s mass? Why don’t more massive objects fall faster? Explain.

**Section 4.8** *You will not be able to “find the answer” to this one. If you don’t already know the answer, reading all of section 4.8 should give you the necessary understanding.*

10. Suppose you have a hollow plastic ball. Describe two fundamentally different ways to increase the ball’s terminal velocity.

11. Explain why each of your methods works.

**Section 5.3**

12. Identify an action force and a reaction force in each of the situations below:

* A car drives forward
* A rocket blasts forward
* A ball is in free-fall, falling to the Earth

**Section 5.4**

13. When a bullet is shot from a gun, the bullet pushes the gun in one direction, and the gun pushes the bullet in the opposite direction. Newton’s 3rd Law says that actions and reactions are equal and opposite. If the bullet moves a lot, and the gun moves a little, how are the action and reaction equal??? Explain.

**Section 6.1**

14. What is the difference between a “vector” quantity and a “scalar” quantity?

15. For each of the following, tell whether it is a vector or a scalar quantity:

* Velocity
* Speed
* Force
* Acceleration