

## Objectives for Unit #5: Newton's 3 Laws

You should be able to do the following:

1. Clearly state each of Newton's three laws.
2. When a golf club strikes a golf ball, identify four forces that would be acting on the golf ball at the time of impact. (See figure 6.2) Describe the net force that would be acting on the golf ball.
3. In physics, what does "Hit the ball" really mean?
4. Describe the two "natural" states of motion.
5. Describe the effect on an object motion's with the net force is zero; describe the effect on an object's motion when the net force acting on an object is not equal to zero.
6. Using either an ice hockey puck or basketball, make up and describe a situation where the net force acting on the puck or basketball is NOT zero.
7. Choose two different objects and compare the sizes of their inertias. How are mass and inertia related?
8. Explain how Newton's First Law applies to the following demonstrations and situations:
  - a. Hoop and chalk
  - b. Spinning raw and hard boiled eggs
  - c. Penny and eraser on a card (fast and slow motion of the card)
  - d. Books or a person on a moving cart that suddenly stops
  - e. Egg drop into beaker of water
  - f. Tower of blocks ("Jenga")
  - g. Air puck movement/ human hovercraft movement with ropes in various directions
9. Given a bowling ball and a pingpong ball, compare the force each would need to get it moving to the same speed.
10. You should be able to solve problems asking to calculate the net force such as that described on textbook pg. 140.
11. State the three major ideas of Newton's second law.
12. Tell the relationship between unbalanced forces acting on an object and acceleration of that object.
13. Recognize that changes in both SPEED and/or DIRECTION results in an object's acceleration.
14. Draw a graph of the relationship between
  - a. Force on an object and it's acceleration when mass is constant
  - b. Mass of an object and it's acceleration when force is constant
15. Tell whether your graphs above indicate a direct or an indirect relationship.
16. Tell the relationship between the direction of the net force on an object and the direction of acceleration.
17. Define what one Newton of force represents.
18. Describe the relationship between mass, inertia, and acceleration of an object.
19. State the mathematical relationship (formula) between force, mass and acceleration.
20. You should be able to solve problems using Newton's second law such as that described on textbook pg. 146.
21. You and an elephant are both on skateboards. The one whose skateboard moves the fastest wins. You and the elephant push against each other. Explain who will always win this contest and WHY.
22. Given various situations of two objects, identify action and reaction pairs.
23. The first and second laws apply to how many objects at a time? The third law applies to how many objects at a time? Why don't action and reaction forces cancel each other out?
24. Use your understanding of action and reaction pairs to explain and solve situations like those described on text pg. 151.
25. **Describe the purpose and analyze the results of all of our lab experiments** (Bowling Ball Grand Prix, Balanced vertical and horizontal forces, Newton & Me, Force & Acceleration, Mass & Acceleration, Who exerts a greater force?, Forces in a collision, Carts & Newton's Third Law).
26. NOTE: Pages 152-153 describe momentum and the conservation of momentum. We will **NOT** be studying this topic this year. These pages will not be on your test.

Your textbook has many useful practice problems at the end of each chapter. Use this table to practice for your test. I have selected the questions appropriate for your test.

| Section                 | Chapter 6  |
|-------------------------|------------|
| Vocabulary              | #1-5       |
| Concepts                | #1-15      |
| Problems                | #1-14(a)   |
| Applying your Knowledge | #1-3, 6, 9 |

Don't forget to try and review the section reviews (6.1, 6.2 and 6.3) for the pages we have read. (Most of these have been assigned, so try again to check yourself.) Don't do questions about momentum.