

Name: \_\_\_\_\_  
Date: \_\_\_\_\_ Period: \_\_\_\_\_

## Guided Reading Notes: NEWTON'S THIRD LAW

Start on page 74, §6.1 "Forces & Interactions" and answer the following questions as you read:

1. In the simplest sense, a force is a \_\_\_\_\_ or a \_\_\_\_\_.
2. However, Newton realized that a force is not a \_\_\_\_\_ in itself but part of a mutual action, an \_\_\_\_\_, between one thing and another.
3. Refer to Figure 6.1 and write the caption below:

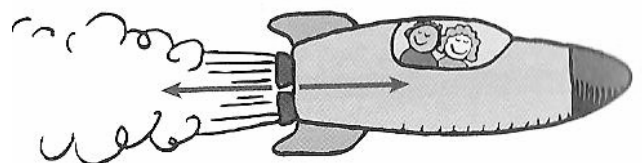
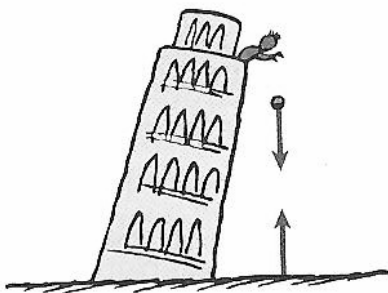
Continue to page 75, §6.2 "Newton's Third Law" and answer the following questions as you read:

4. **Newton's Third Law** states:
5. The action and reaction forces are \_\_\_\_\_ in strength and \_\_\_\_\_ in direction.
6. Forces always appear in \_\_\_\_\_.
7. When you walk, you \_\_\_\_\_ against the floor and the floor simultaneously \_\_\_\_\_ against you.
8. When you swim, you \_\_\_\_\_ the water \_\_\_\_\_ and the water \_\_\_\_\_ you \_\_\_\_\_.
9. Refer to Figure 6.3 and answer the question in the caption below:

Continue to page 75, §6.3 "Identifying Action and Reaction" and answer the following questions as you read:

10. The action and reaction forces can then be stated in the form:  
*Action:* Object A exerts a force on object B.  
*Reaction:* \_\_\_\_\_
11. If the *action* force on a falling boulder is Earth's gravitational force on the boulder, what is the reaction force?

12. For each picture below, identify the action and reaction forces:



13. Action and reaction forces act \_\_\_\_\_.

Continue to page 77, §6.4 “Action and Reaction on Different Masses” and answer the following questions as you read:

14. The boulder pulls up on Earth with \_\_\_\_\_ force as the Earth pulls down on the boulder.

15. The pair of forces between the boulder and the Earth are the same, but the masses are \_\_\_\_\_. Because Earth has a \_\_\_\_\_ mass, we don't sense the small \_\_\_\_\_.

16. What happens to the cannon after a cannonball is fired from it?

17. The acceleration of the cannonball and cannon are:

Cannonball:  $\underline{F} =$                       Cannon:  $\underline{F} =$

18. A given force exerted on a small mass produces a \_\_\_\_\_ acceleration than the same force on a \_\_\_\_\_ mass.

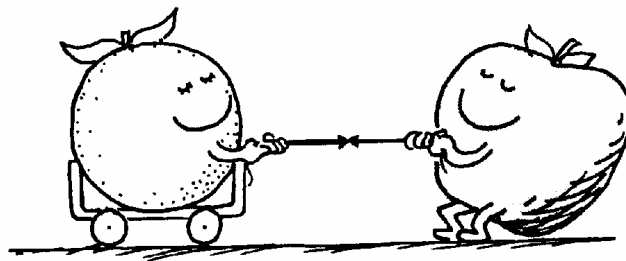
19. Referring to Figure 6.8, each molecule of exhaust gas acts like a tiny molecular \_\_\_\_\_ shot from the balloon.

20. For a helicopter, the whirling blades are shaped to force air particles downward (\_\_\_\_\_) and the air forces the blades upward (\_\_\_\_\_). This upward reaction force is called \_\_\_\_\_.

21. How do birds fly?

Continue to page 78, §6.5 “Do Action and Reaction Forces cancel?” and answer the following questions as you read:

22. Draw the system or frame of reference around the orange:



23. The apple is applying that for to the \_\_\_\_\_ and the system \_\_\_\_\_.

24. Explain why the force from the orange on the apple doesn't cancel out the force from the apple on the orange with the system you've drawn:

25. If the action and reaction forces are \_\_\_\_\_ to the system, they cancel each other and produce \_\_\_\_\_ acceleration of the system.

*Read the comic on page 81 and explain how the cart is finally able to move:*

*Continue to page 82, §6.7 “Action equals Reaction” and answer the following questions as you read:*

26. Refer to Figure 6.14, what happened to hurt his hand?
27. Why couldn't the heavy weight champion of the world strike the paper with 200 N (45 pounds) in mid air?
28. For every interaction between things, there is always a pair of \_\_\_\_\_ directed forces that are \_\_\_\_\_.

## **GRAVITY ON THE MOON?**

One of the forces that we use most often is the force of gravity on Earth. Apollo astronauts were the first to walk on the moon. Answer the questions #1-3 by choosing the best answer and writing an answer *in complete sentences* for #4:

1. If you're standing on the Moon holding a pen, and you let go, it will:
  - a. float away
  - b. float where it is
  - c. fall to the ground
2. If you are standing on the Moon, and holding a rock, and you let it go, it will:
  - a. float away
  - b. float where it is
  - c. move sideways
  - d. fall to the ground
  - e. none of the above.
3. When the Apollo astronauts were on the Moon, they did not fall off because:
  - a. the Earth's gravity extends to the Moon
  - b. they wore heavy boots
  - c. they had safety ropes
  - d. the Moon has gravity
  - e. they had spiked boots
4. You've seen films of the Apollo astronauts walking around on the Moon; why didn't they fall off?  
*Remember to write in complete sentences!*