

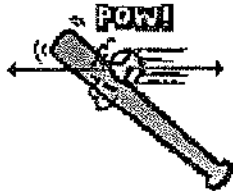
Action - Reaction force pairs



Name _____ Period _____ Date _____

Instructions

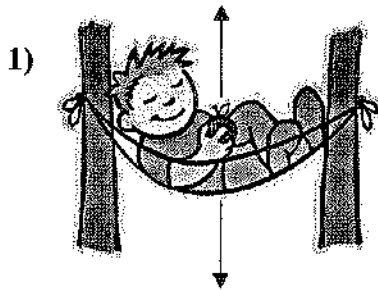
Each picture shows the two equal but opposite force pairs. One is the action force, the other is the reaction force. Label each force with an **A** or an **R** and explain the force in the space provided.



Example:

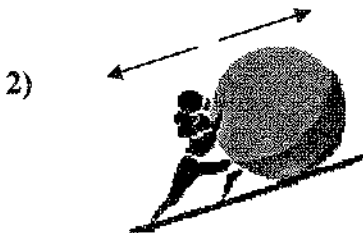
Action force : *the bat pushes the ball to the right*

Reaction force: *the ball pushes the bat to the left*



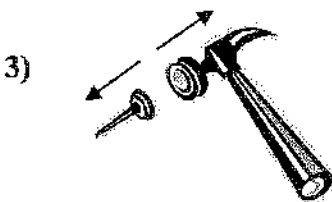
Action force: _____

Reaction force: _____



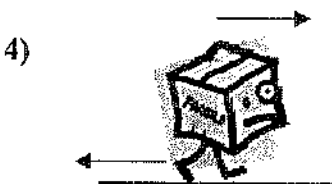
Action force: _____

Reaction force: _____



Action force: _____

Reaction force: _____



Action force: _____

Reaction force: _____

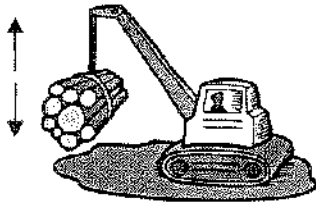
5)



Action force: _____

Reaction force: _____

6)



Action force: _____

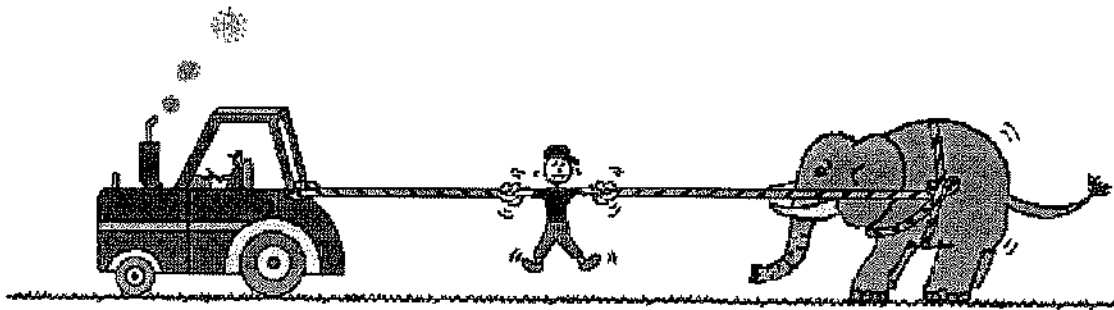
Reaction force: _____

Answer the questions

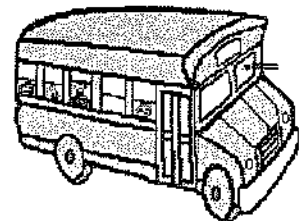
7. If the forces acting on two objects are equal, such as a cannon and a cannon ball, then why does one object accelerate more than the other?

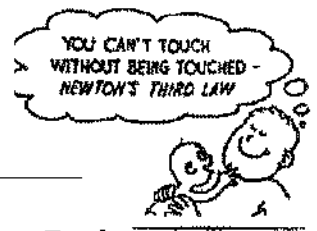
8. If the forces are equal but opposite, why don't they cancel each other out?

9. Draw 3 sets of action-reaction force pairs that are at work in this picture. Label each force arrow with **action** or **reaction** to indicate its part of the pair.



10. While driving down the road, an unfortunate bug strikes the windshield of a bus. Quite obviously, this is a case of Newton's third law of motion. The bug hit the bus and the windshield hits the bug. Which of the two forces is greater: the force on the bug or the force on the bus? Explain your reasoning. Restate Newton's 3rd Law out loud before you try to answer this question. (remember this from the "Pop Quiz!")



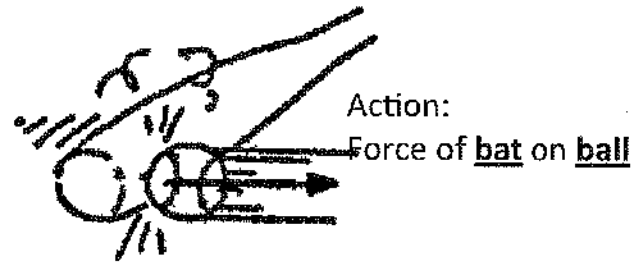
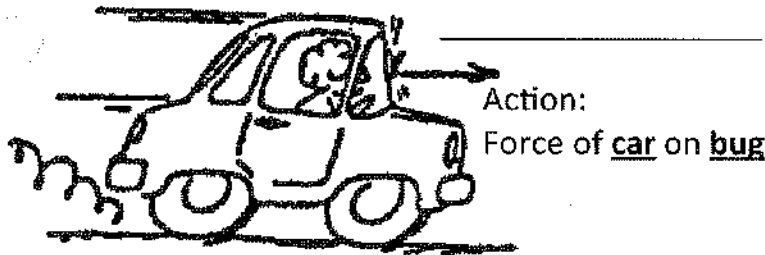
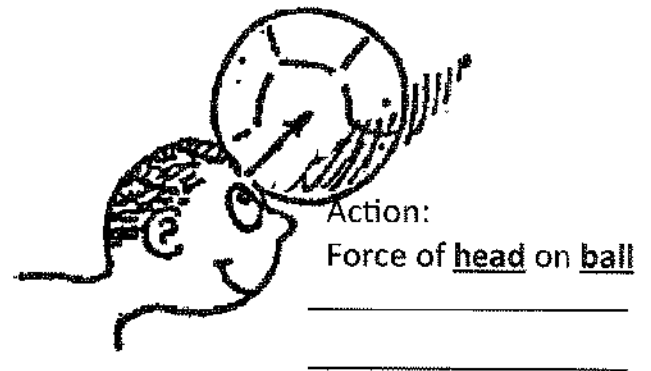
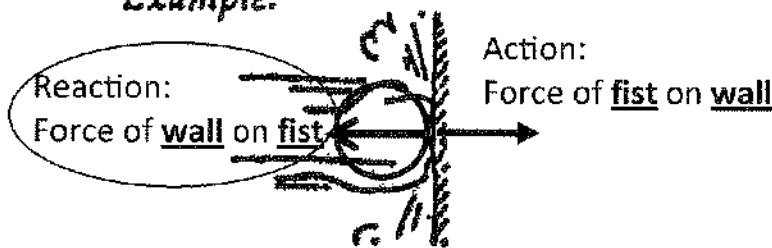


Name _____ Group _____ Center _____

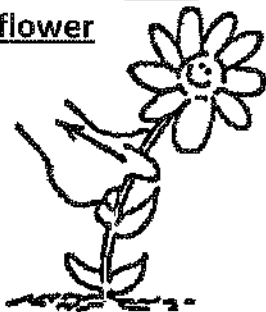
Drawing and Labeling Action Reaction Force Pairs

In the example below the action force is described and the arrow (vector) is drawn. The reaction force has been completed also. In the remaining pictures the action force is described and drawn. You are to describe the reaction force and draw the reaction arrow (arrows go tail to tail or head to head). Then draw your own action-reaction situation, describe the forces and draw the arrows. Finally, figure out the forces at each of the contact points in the final drawing.

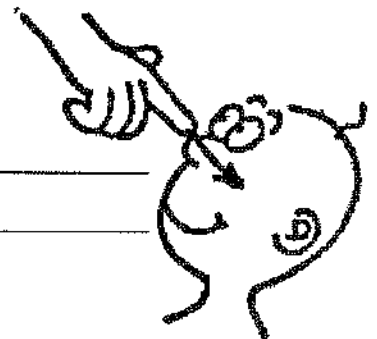
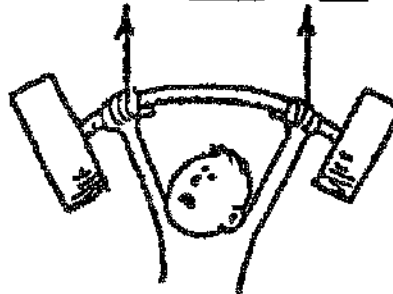
Example:



Action: Force of hand on flower



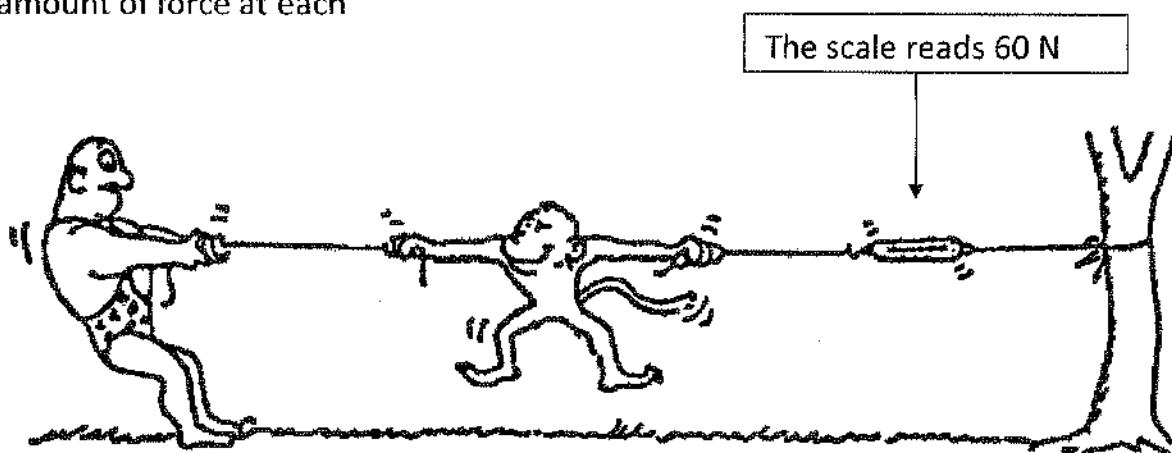
Action: Force of hand on bar



Action: Force of finger on nose

Draw and write your own here. Draw the picture, the arrows for both action and reaction and the descriptions for the action and reaction forces

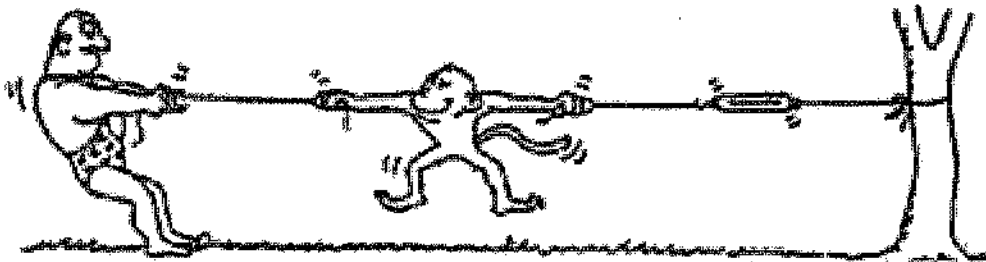
At each contact point draw the action and reaction forces and identify the amount of force at each



Name _____
Hr _____

Newton's Third Law-Worksheet #2

1. Label at least 6 action-reaction forces present in the diagram below. If you get stuck, you may consult with a person seated nearby.



2. When you jump up, does the world recoil downward? Explain.

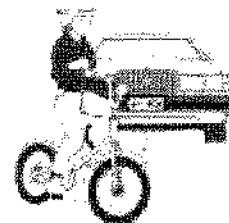
3. When a rifle is fired, how does the size of the force of the rifle on the bullet compare to the force of the bullet on the rifle?

→ How do the accelerations of the rifle and bullet compare?
Why?



4. If a bicycle and a massive truck have a head-on collision, upon which vehicle is the impact force greater?

--> Which vehicle undergoes the greater change in acceleration? Why?



5. Suppose two carts, one twice as massive as the other, fly apart when the compressed spring that joins them is released. How fast does the heavier cart roll compared to the lighter cart? Explain.



Math-Based Practice

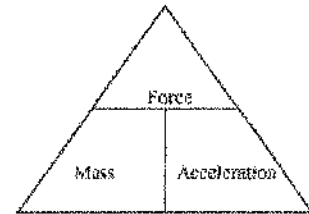
6. A semi-truck collides with a car with a force of 5000N. The semi-truck has a mass of 2000kg and the car has a mass of 500kg.

→What was the acceleration of the truck when it hit the car?

→What force did the car exert on the semi-truck at impact?

→How much did the car accelerate when it was hit?

→If the action statement is 'The semi-truck exerts a force on the car,' what is the reaction statement?



7. A sumo wrestler has a wrestling match with Spongebob. The sumo wrestler has a mass of 150kg and accelerates toward the midget at 5m/s². Spongebob has a mass of 30kg.

→What force of impact does the sumo wrestler have with Spongebob?

→What force upon impact does Spongebob have with the sumo wrestler?

→How much does Spongebob accelerate due to the impact with the wrestler?

→If the action statement is 'The sumo wrestler exerts a force on Spongebob,' what is the reaction statement?

