Name _____ Date _____

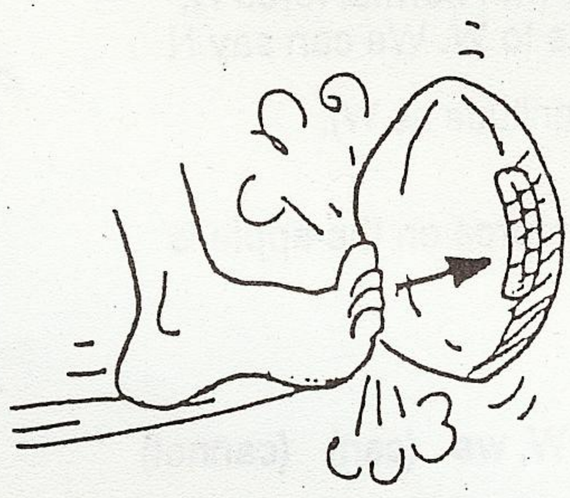
CONCEPTUAL **Physical Science** PRACTICE SHEET

Chapter 2: Newton's Laws of Motion
Newton's Third Law

Your thumb and finger pull on each other when you stretch a rubber band between them. This pair of forces, thumb on finger and finger on thumb, make up an action-reaction pair of forces, both of which are equal in magnitude and oppositely directed. Draw the reaction vector and state in words the reaction force for each of the examples a through g. Then make up your own example in h.

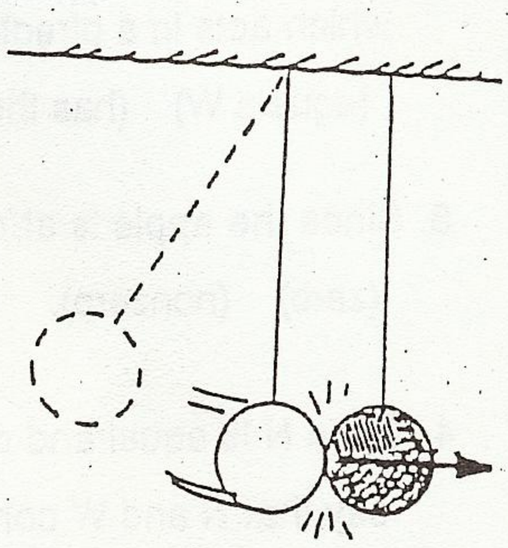
Thumb pulls finger

Finger pulls thumb



Foot hits ball

a _____

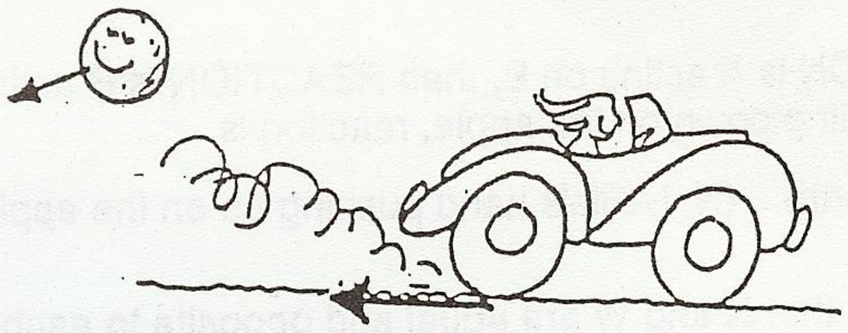


White ball strikes black ball

b _____

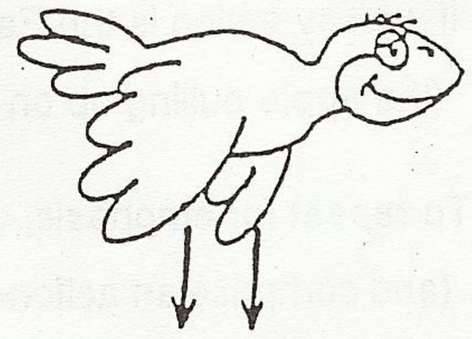
Earth pulls on moon

c _____



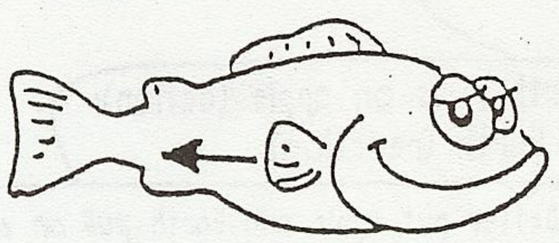
Tires push backward on road

d _____



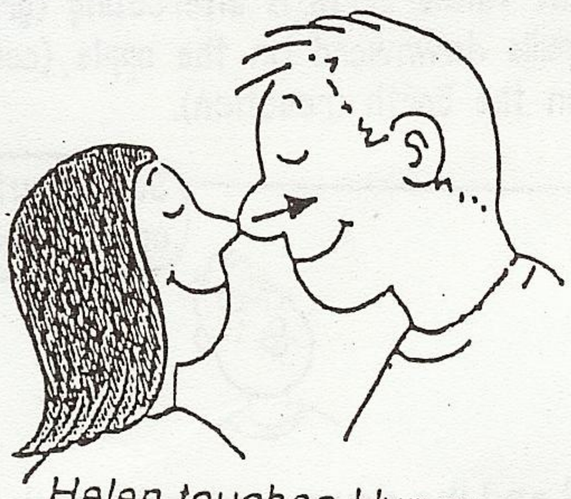
Wings push air downward

e _____



Fish pushes water backward

f _____

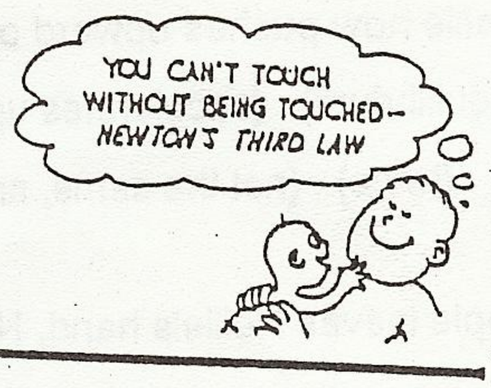


Helen touches Hyrum

g _____

h _____

_____

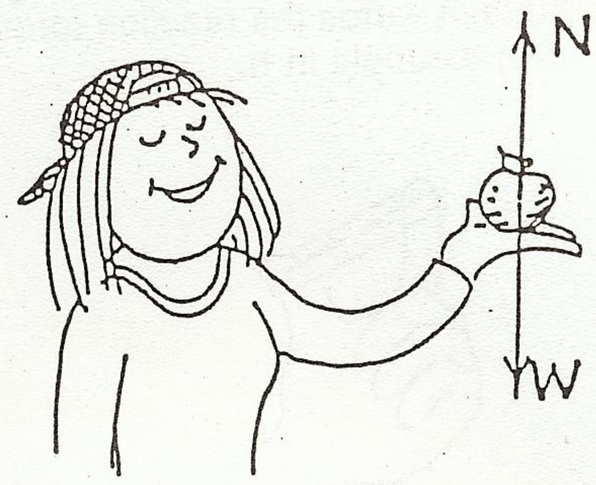


Nellie and Newton's Third Law

Nellie Newton holds an apple weighing 1 newton at rest on the palm of her hand. *Circle the correct answers:*

1. To say the weight (W) of the apple is 1 N is to say that a downward gravitational force of 1 N is exerted on the apple by

   (the Earth) (her hand).



2. Nellie's hand supports the apple with normal force N, which acts in a direction opposite to W. We can say N

   (equals W) (has the same magnitude as W).

3. Since the apple is at rest, the net force on the apple is

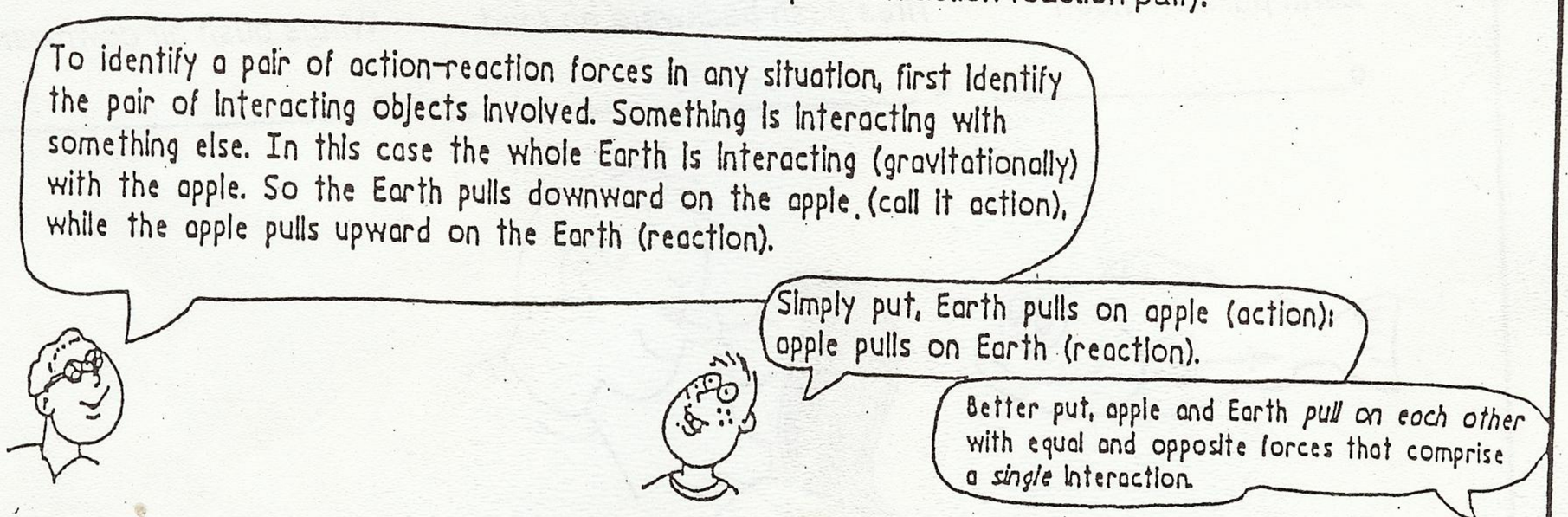
   (zero) (nonzero).

4. Since N is equal and opposite to W, we (can) (cannot) say that N and W comprise an action-reaction pair. The reason is because action and reaction (act on the same object) (act on different objects), and here we see N and W (both acting on the apple) (acting on different objects).

5. In accord with the rule, "If ACTION is A acting on B, then REACTION is B acting on A," if we say action is the Earth pulling down on the apple, reaction is

   (the apple pulling up on the Earth) (N, Nellie's hand pushing up on the apple).

6. To repeat for emphasis, we see that N and W are equal and opposite to each other (and comprise an action-reaction pair) (but do *not* comprise an action-reaction pair).



7. Another pair of forces is N [shown] and the downward force of the apple against Nellie's hand [not shown]. This pair of forces (is) (isn't) an action-reaction pair.

8. Suppose Nellie now pushes upward on the apple with a force of 2 N. The apple (is still in equilibrium) (accelerates upward), and compared with W, the magnitude of N is (the same) (twice) (not the same, and not twice).

9. Once the apple leaves Nellie's hand, N is (zero) (still twice the magnitude of W), and the net force on the apple is (zero) (only W) (still W - N, which is a negative force).