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## Traveling Washer in One Dimension

This activity is designated to point out the difference among the position of an object, the distance traveled by an object, and the displacement of an object.

1. Place a washer on the number line below with the center of the washer at the position marked zero. Draw a circle around the inside of the washer. Mark the center of this circle with the letter "I" for the "Initial" position of the washer. Move the center of the washer 5.0 centimeters to the right......STOP......Label this circle "F" for the "Final" position of the washer.

A) What was the initial position of the washer? $\qquad$
B) What is the final position of the washer? $\qquad$
C) What is the distance traveled by the washer?
D) What is the displacement of the washer? $\qquad$
E) Which of the underlined quantities (e.g. final position, distance traveled, and displacement) are numerically equal? $\qquad$
2. Place a washer on the number line below with the center of the washer at the position marked zero. Draw a circle around the inside of the washer. Mark the center of this circle with the letter "I" for the "Initial" position of the washer.


Move the center of the washer in the manner listed below:
Move 7.0 centimeters to the right, and then
Move 2.0 centimeters to the left, and then
STOP...... Label this circle "F" for the "Final" position of the washer.
A) What was the initial position of the washer? $\qquad$
B) What is the final position of the washer? $\qquad$
C) What is the distance traveled by the washer? $\qquad$
D) What is the displacement of the washer? $\qquad$
E) Which of the underlined quantities are numerically equal?
3. Place a washer on the number line below with the center of the washer at the position marked three. Draw a circle around the inside of the washer. Mark the center of this circle with the letter "I" for the "Initial" position of the washer.


Move the center of the washer 5.0 centimeters to the right......STOP......
Label this circle "F" for the "Final" position of the washer.
A) What was the initial position of the washer? $\qquad$
B) What is the final position of the washer?
C) What is the distance traveled by the washer?
D) What is the displacement of the washer?
E) Which of the underlined quantities are numerically equal? $\qquad$
4. Place a washer on the number line below with the center of the washer at the position marked three. Draw a circle around the inside of the washer. Mark the center of this circle with the letter "I" for the "Initial" position of the washer.


Move the center of the washer in the manner listed below:
Move 7.0 centimeters to the right, and then
Move 2.0 centimeters to the left, and then
STOP...... Label this circle "F" for the "Final" position of the washer.
A) What was the initial position of the washer? $\qquad$
B) What is the final position of the washer? $\qquad$
C) What is the distance traveled by the washer?
D) What is the displacement of the washer?
E) Which of the underlined quantities are numerically equal? $\qquad$
5. Given the following commentary about a football game: The ball is placed on the five-yard line to begin the play. The quarterback receives the ball from the center. The quarterback runs straight up field for twenty-five yards, but then retreats straight back ten yards. The quarterback is then tackled. The announcer states that fifteen yards were gained on the play.
A) What was the initial position of the football? $\qquad$
B) What was the final position of the football? $\qquad$
C) What was the distance traveled by the football? $\qquad$
D) What was the displacement of the football? $\qquad$
6. Since physicists use measurements to describe the world, they must be very careful with the meaning of the terms that are used to represent ideas. In the space below, write an explanation of the difference among position, distance traveled and displacement, as used by physicists to describe where an object is located and the motion it has undergone. Also, state when final position, distance traveled, and/or displacement can be represented by the same numerical value.

