Name:

Date:
Science p. ___
Teacher:

Conclusion: Summary Questions for Measuring Changes in Motion Investigation

Directions: Write your answers on the lines under the question.

1. What two pieces of data do you need to know in order to state the velocity of any of the balls?

   speed and direction

2. Describe what happened to the time it took the ball to roll an *equal* distance as it moved farther from the ramp.

   The amount of time it took for the ball to roll an equal distance as it moved farther from the ramp increased.

3. Did the speeds in this investigation remain constant or change? Use data to support your answer.

   The speeds in this investigation did not remain constant. In each trial the ball's speed was faster for "distance A" than it was for distance "B." This is because friction and gravity were forces acting on the ball to slow it down.

4. Your teacher states that the ball accelerated as it rolled from the bottom of the ramp toward the wall. Explain why your teacher is correct.

   Acceleration is a change in an object's velocity. That means an increase OR decrease in speed and/or a change in direction. Since the ball's speed decreased as it rolled toward the end of our test area, it's velocity changed. Therefore, it accelerated.

5. Explain how the velocity of a moving object could change even if the speed does not.

   If an object's direction changes, it's velocity changes. This can be independent of speed.

6. How do you think changes in the motion of the ball and gravity are related?

   Gravity is a force. The force of gravity is working upon the kinetic energy of the ball. As gravity pulls down on the ball, the ball and the floor create friction, which slows the ball down.
   (Kinetic energy transfers to heat energy)

FORMATIVE ASSESSMENT

Summary Calculations for Measuring Changes in Motion Investigation

Directions: Show all calculations for the questions below. Be sure to label your answers.

The formula for speed is: $\frac{D}{T}$ = $\frac{\text{Distance}}{\text{Average Time}}$ = **(Also written as Distance ÷ Time)**

1. What is the speed of the ball for distance A (the first meter)?

$S = \frac{D}{T}$ $S = \frac{1 \text{ meter}}{0.54 \text{ sec}}$ $S = 1.85$ meters per sec.

2. What is the speed of the ball for distance B (the second meter)?

$S = \frac{D}{T}$ $S = \frac{1 \text{ meter}}{0.73 \text{ sec.}}$ $S = 1.37$ meters per sec.

3. What is the average speed for the ball as it travels distance C (the total distance)?

$S = \frac{D}{T}$ $S = \frac{2 \text{ meters}}{1.28 \text{ sec.}}$ $S = 1.56$ meters per sec.

4. Label and graph the speed for distance C. ✓

5. What do you notice about speed C in comparison to speed A and B?

Speed C is in between the slowest speed and the fastest speed of the ball. It is an average of the speeds for Distance A and distance B.

The formula for acceleration is: $\frac{\text{Final velocity – Original velocity}}{\text{Time of change}}$

6. If the original velocity of the ball at the bottom of the ramp was 0.8 m/s, and the final velocity of the ball was 0.5 m/s, what was the ball's acceleration if it took 2.5 seconds to travel the two meters?

$A = \frac{F.V. - O.V.}{T} \rightarrow A = \frac{0.5 \text{ m/s} - 0.8 \text{ m/s}}{2.5 \text{ sec.}} \rightarrow A = \frac{-0.3 \text{ m/s}}{2.5 \text{ sec.}} =$

$A = -.12 \text{ m/s}^2$

7. If the original velocity of the ball at the top of the ramp was 0 m/s and the final velocity of the ball at the bottom of the ramp was 0.9 m/s, what was the ball's acceleration if it took 0.45 seconds to travel down the ramp?

$A = \frac{F.V. - O.V.}{T} \rightarrow A = \frac{0.9 \text{ m/s} - 0 \text{ m/s}}{0.45 \text{ sec.}} \rightarrow A = \frac{0.9 \text{ m/s}}{0.45 \text{ sec.}} =$

$A = 2 \text{ m/s}^2$