Name: _____ **Date:** _____

Answer Key: Zig-Zag and Velocity: A Kindergarten Kinematics Challenge

Can you predict a marble's path? Analyze change in direction and speed through complex marble runs and obstacle courses.

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1. Imagine a marble rolling down a straight track and another marble rolling down a zig-zag track. If they both start at the same time and height, which one has to change its direction more often?

Answer: B) The marble on the zig-zag track

A zig-zag path requires the marble to shift its velocity by changing direction at every turn, unlike a straight path.

2. If a toy car is moving at a steady speed but it starts turning in a circle, its motion is changing.

Answer: A) True

In kinematics, changing direction is a change in motion (velocity), even if the speed stays the same.

3. A penguin slides down an icy hill. At the top, it moves slowly. At the bottom, it moves very fast. We call this 'speeding up' or _____.

Answer: B) Acceleration

Acceleration describes the rate at which an object increases its velocity as it moves down a slope.

4. You throw a paper plane and it suddenly catches a gust of wind that pushes it sideways. What part of its motion changed the most?

Answer: C) Its direction

A sideways push alters the plane's trajectory, which is a key component of analyzing displacement and velocity.

5. Two squirrels race to a tree. Squirrel A runs in a straight line. Squirrel B runs in big loops. Even if they run at the same speed, Squirrel ___ will reach the tree first.

Answer: C) Squirrel A

The straight line is the shortest displacement between two points, meaning less distance to travel.

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6. To describe exactly how a ball moved, you only need to know how fast it went, not which way it went.

Answer: B) False

Kinematics requires knowing both speed and direction (velocity) to fully evaluate an object's change in position.

7. A feather and a rock are dropped at the same time. The rock hits the ground first. Why does the rock have a different motion than the feather?

Answer: A) The rock accelerated faster

In this scenario, the rock increases its downward velocity more quickly than the air-resistant feather.

8. A train slows down as it gets closer to the station. This change in motion where it loses speed is called _____.

Answer: B) Deceleration

Deceleration is a specific type of acceleration where the velocity of an object decreases over time.

9. Look at a clock's second hand. It moves around and around. Is its position changing even if it stays attached to the center?

Answer: B) Yes, its tip is in a new place every second

Position is relative; because the tip of the hand moves to a new point in space, its displacement is constantly updating.

10. If you walk 3 steps forward and 3 steps backward, your ending position is the same as your starting position.

Answer: A) True

This demonstrates zero total displacement, as the final position matches the initial starting point.