**One Dimensional Kinematics Problems Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Displacement**

1. A rock is thrown straight upward off the edge of a balcony that is 5 m above the ground. The rock rises 10 m, then falls all the way down to the ground below the balcony. What is the rock's displacement?
2. A child walks 5 m east, then 3 m north, then 1 m east.
3. What is the magnitude of the child's displacement?
4. What is the distance travelled?

1. An athlete runs exactly once around a circular track with a total length of 400 m.
2. Find the runner's displacement for the race.

**Speed and Velocity**

1. If the child from problem 2 completes his journey in 20 seconds, what is the magnitude of his average velocity?
2. If the runner from problem 3 runs the lap in 1 minute 18 seconds, find his/her average speed.
3. a.) Is it possible to move with constant speed but not constant velocity?

b.) Is it possible to move with constant velocity but not constant speed?

**Acceleration**

1. A car drives in a straight line at a constant speed of 60 miles per hour for 5 seconds. Find its acceleration.
2. A remote control car is driven along a straight track at 2 m/s. The child controlling the car then activates the toy's turbo mode so that, 3 seconds later, the car's speed is 3.2 m/s. Find its average acceleration.
3. Shortly after, the remote control car in the previous example exits turbo mode, slowing from 3.2 m/s back to 2 m/s in 2 seconds. Find the car's average acceleration over this interval.

**Constant Acceleration**

1. A particle moves along the x-axis with an initial velocity of 4 m/s and constant acceleration. After 3 seconds, its velocity is 14 m/s. How far did it travel during this interval
2. A car is initially moving at 10 m/s and accelerates at a constant rate of 2 m/s2 for 4 seconds, in a straight line. How far did the car travel during this time?
3. A rock is dropped from a cliff that is 80 m above the ground. If the rock hits the ground with a velocity of 40 m/s, what acceleration did it undergo?