# QUIZ 03: CONSTANT ACCELERATION

Answer the questions using your clicker. If there are no multiple choices, the question is true/false. Use the T and F keys to respond. Please do not mark on this quiz paper. Each question is worth 3 points.

The table on the right summarizes data collected for the basketball in free fall.

1. Calculate the **average slope**, and answer with **two** significant digits. **avg = 9.64 m/s²**

2. If the known value of g = 9.8 m/s², what is the **percent error** in this average value?
   A) 0%   C) 0.023%   E) 2.3%
   B) 0.016%   **D) 1.6%**

Bounce	Slope (m/s²)
1	9.45
2	9.66
3	9.51
4	9.93

The graph below was recorded for the basketball on the ramp.
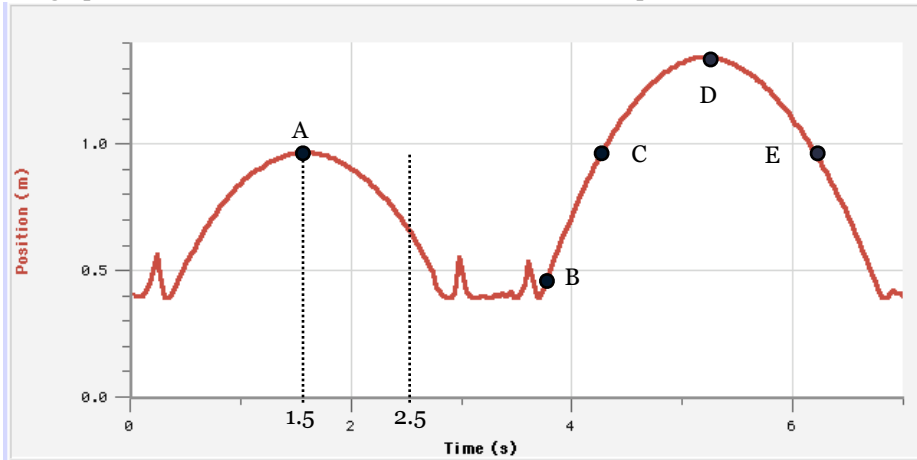
3. At which of the labeled points shown is the ball rolling down the ramp? **E**

4. Between the time t_1 = **1.5** seconds and t_2 = **2.5** seconds,
   A) the ball is rolling down the ramp, speeding up.
   B) the ball rolls down the ramp, slowing down.
   C) the ball is rolling up the ramp, slowing down
   D) the ball is rolling up the ramp, speeding up.
   E) the ball is at rest because the curve is pretty close to linear.

5. At point A, the ball is
   A) at rest at the top of the ramp, just about to roll back down.
   B) at rest at the bottom of the ramp, waiting to be pushed back up.
   C) moving with maximum speed, about halfway up the ramp.

6. The point labeled B on the position vs time graph corresponds to which of the labeled points on the velocity vs time graph? **A**
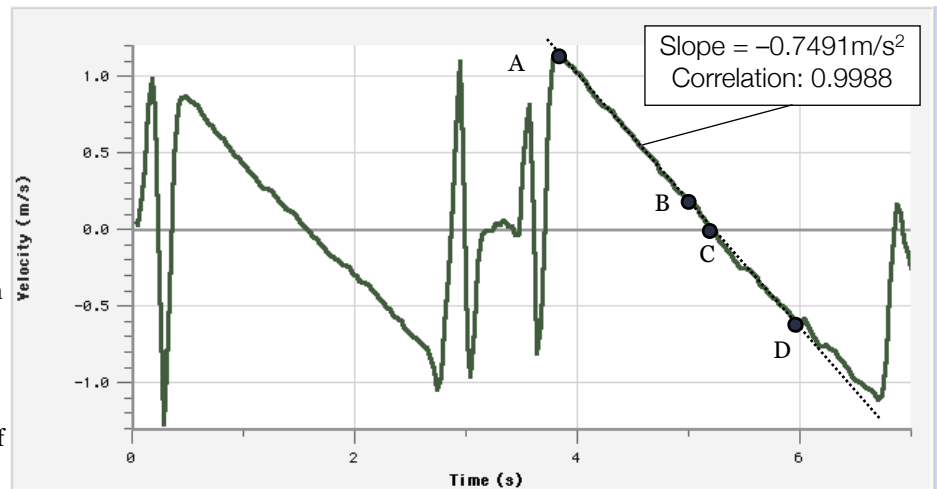
7. The ramp angle was measured to be 5°. Predict the **acceleration** of the ball based on the assumption that only gravity is acting on the ball. Answer with **three** sig figs. **a = (9.8m/s²)sin5° = 0.854 m/s²**

Slope = −0.7491m/s²
Correlation: 0.9988

8. The slope of the time interval between about 4 and 6 seconds is shown on the graph. Why is the slope negative?
   A) It's a mistake. The slope should be positive, because the ball experiences only positive acceleration on the ramp.
   B) The motion sensor assumes that away from it is the positive direction. This sign convention results in (+) being the direction up the ramp. The acceleration of the ball is always directed down the ramp, so it is negative.
   C) The sensor assumes that motion *toward* it is positive. This causes the acceleration to positive as the ball rolls down the ramp, but negative as it rolls up the ramp. That specific part of the graph just corresponds to the ball rolling up the ramp, not down it.

9. Use the slope shown on the graph to calculate the experimental value of **g**. Answer with **three** sig figs (**no negative!**).
   g = (slope)/sin5° = 8.59 m/s²

10. Why doesn't the value of g calculated on the ramp match the known value of g?
    A) The value of g is not constant. It was probably less than 9.8m/s² when the experiment was performed.
    B) The ramp: the higher the angle, the more random error will affect the value. It might make our value too big or too small, just in this case it is smaller than the known value.
    C) The ramp is not friction free, and as a result, the ball will accelerate more slowly.
    D) Because the correlation coefficient is not = 1; it must be = 1 for the experimental value to match the known value.