# Physics Lab

Name:_____Date:_____

## *Projectile Motion: Baseball Throw*

**_Objectives:_**
1. To determine the height and time of a softball thrown vertically into the air.
2. To determine the heights and times of a softball thrown at various angles downfield.

**_Materials:_**   baseball   stopwatch   metric tape measure

**_Procedure:_**
1. You will work in groups of 3: a _thrower_, a _timer_, and _a measurer_.
2. Go to the area outside designated by the teacher.
3. Arrange your group with the thrower at the starting point, the timer near the mid- way point, and the measurer at the landing area.
4. Record the **_time and distance_** for each of several throws. Be sure that the **_first three throws_** are vertical (straight up).
5. As time permits, partners will take turns throwing the ball, timing, and measuring.
6. Return to the classroom where the remainder of the calculations will be made.
   The calculations will be done in your Log Book, then record your results below:

## *Data Table*

| Trial | Time | Distance | Height | Angle | Initial Velocity | X-Velocity *(x component)* | Y-Velocity *(y component)* |
|-------|------|----------|--------|-------|------------------|----------------------------|----------------------------|
| | seconds | meters | meters | degrees | meters/second | meters/second | meters/second |
| | (s) | (m) | (m) | (o) | (m/s) | (m/s) | (m/s) |
| | | | | | | | |
| 1 | | 0 | | 90 | | 0 | |
| 2 | | 0 | | 90 | | 0 | |
| 3 | | 0 | | 90 | | 0 | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |

*Questions:*

1. Sketch a picture of the set-up for this experiment:

2. In general which angle resulted in the farthest distance downfield?

3. Suppose you threw a ball straight up in the air and caught it 6 seconds later. How high in the air did the ball travel? (Show your work.)

4. Suppose you throw a ball at an angle and it hits the ground 6 seconds later and 36 meters away.
   a.) How high in the air did the ball travel? (Show your work.)

   b.) How fast was the ball traveling in the horizontal direction (downfield)? (Show your work.)

   c.) How fast was the ball traveling when it hit the ground? (Show your work.)

## *Mathematics Challenge Problem:*

Show algebraically that the height of an object thrown into the air is:

$$H = 1.225\, t^2 \qquad\qquad \text{where } H = \text{height and } t = \text{time}$$