Unit 6 Projectile Motion Study Sheet Name _____ #:____

Pythagorean Theorem → $c^2 = a^2 + b^2$ $g = 9.81\ m/s^2$ **SOH CAH TOA**

1) An Alaskan rescue plane drops a package of emergency rations to a stranded party of explorers. The plane is traveling horizontally at _____ at a height of _____above the ground.

a) How long does it take for the package to reach the ground?

Drawing **Formula:** **Set-Up with Units:**

Answer = _____

b) What horizontal distance does the package travel before striking the ground?

Formula: Set-Up with Units:

Answer = _____

2) Find the magnitude and the direction of the package just before it hits the ground.

First, determine the vertical velocity.

Formula: Set-Up with Units:

Answer = _____

Second, use Pythagorean to determine the total velocity.

Formula: Set-Up with Units:

Answer = _____

Third, use $\mathbf{V_y}$ and $\mathbf{V_x}$ to determine the angle below the horizon.

Formula: Set-Up with Units:

Answer = _____

3) During a thunderstorm, a tornado lifts a car to a height of _____ above the ground. Increasing in strength, the tornado flings the car horizontally with an initial speed of _____.

a) How long does it take the car to reach the ground?

Drawing **Formula:** **Set-Up with Units:**

Answer = _____

b) What horizontal distance does it travel during this time?

Formula: Set-Up with Units:

Answer = _____

4) Streams of water in a fountain shoot from one level to the next. A particle of water in a stream takes _____to travel between the first and second level. The receptacle on the second level is a horizontal distance of _____away from the spout on the first level. If the water is projected at an angle of **33^0**, what is the initial speed of the particle?

Drawing **Formula:** **Set-Up with Units:**

Answer = _____

5) The fastest recorded pitch in Major League Baseball, thrown by Nolan Ryan in 1974, was clocked at _____. If a pitch were thrown horizontally with this velocity, how far would the ball fall vertically by the time it reached home plate, _____away?

Set-Up:

a) What is the speed in m/s?

Answer = _____

b) How long does it take to reach home plate?

Drawing **Formula:** **Set-Up with Units:**

Answer = _____

c) What is the vertical drop from the point of release?

Formula: Set-Up with Units:

Answer = _____

6) A person standing at the edge of a seaside cliff kicks a stone over the edge with a speed of _____. The cliff is _____ above the water's surface.

a) How long does it take to strike the ground?

Drawing **Formula:** **Set-Up with Units:**

Answer = _____

b) What is the vertical component of the speed?

Formula: Set-Up with Units:

Answer = _____

c) What is the total velocity of the rock?

Formula: Set-Up with Units:

Answer = _____