Name $\qquad$ Answer Key
Honors Physics
Period $\qquad$

Date $\qquad$
Vectors/Projectiles WS \#9H
Mrs. Nadworny

## Projectiles Challenge Question

Directions: Solve the following problems using the GUESS method. Show ALL work neatly using proper units and significant figures.

1. A basketball is thrown from a height of 1.85 meters with an initial speed of 15.7 meters per second at an angle of 50.0 degrees. It misses the basket and lands on the floor.
a. Calculate the flight time of the basketball.

$$
\begin{aligned}
& v_{i x}=v_{i} \cos \theta=\left(15.7 \frac{\mathrm{~m}}{\mathrm{~s}}\right)\left(\cos 50.0^{\circ}\right)=10.1 \frac{\mathrm{~m}}{\mathrm{~s}} \\
& v_{i y}=v_{i} \sin \theta=\left(15.7 \frac{\mathrm{~m}}{\mathrm{~s}}\right)\left(\sin 50.0^{\circ}\right)=12.0 \frac{\mathrm{~m}}{\mathrm{~s}}
\end{aligned}
$$

$$
\begin{aligned}
& d=v_{i} t+\frac{1}{2} a t^{2} \\
& -1.85 m=\left(12.0 \frac{\mathrm{~m}}{\mathrm{~s}}\right) t+\frac{1}{2}\left(-9.81 \frac{\mathrm{~m}}{\mathrm{~s}^{2}}\right)\left(t^{2}\right)
\end{aligned}
$$

Quadratic Equation!

$$
\begin{aligned}
& 4.9 t^{2}-12 t-1.85=0 \\
& t=\frac{-(-12) \pm \sqrt{(-12)^{2}-4(4.9)(-1.85)}}{2(4.9)} \\
& t=2.59 \mathrm{~s} \text { and }-0.146 \mathrm{~s}
\end{aligned}
$$

b. Calculate the horizontal distance traveled by the ball.

$$
\begin{aligned}
& d=v_{i} t+\frac{1}{2} a t^{2} \\
& d=\left(10.1 \frac{m}{s}\right)(2.59 \mathrm{~s}) \\
& d=26.2 m
\end{aligned}
$$

