Name Answer Key
Honors Physics
Period _______

A

Date ____________
Vectors/Projectiles WS #9H
Mrs. Nadworny

MORE Horizontal Projectiles

Directions - Solve the following problems using the GUESS method. Show ALL work neatly using proper units and sig figs. Remember the chart is your givens and unknowns (include units).

1. A ball is thrown horizontally from the top of a building with an initial velocity of 15 meters per second. At the same instant, a second ball is dropped from the top of the building. The two balls have the same

   A) path as they fall
   B) initial horizontal velocity
   C) final velocity as they reach the ground
   D) initial vertical velocity

2. The flight time of a horizontal projectile is dependent upon all of the following EXCEPT

   A) initial horizontal velocity
   B) gravity
   C) height
   D) air resistance

3. A ball is rolled down a ramp and projected horizontally from a height of 1.6 meters. It lands 2.3 meters away. Calculate its initial speed. [Hint: You will need to solve for time first.]

$$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2(1.6m)}{9.81\frac{m}{s^2}}} = 0.57s$$

$$v_{ix} = \frac{d_x}{t} = \frac{2.3m}{.57s} = 4.0\frac{m}{s}$$

	x	y
d	2.3 m	1.6 m
t		
a	0 m/s²	- 9.81 m/s²
v_i	?	0 m/s
v_f		

4. The ball from question 4 is now raised to a height of 2.0 meters. Where is it going to land? [Hint: The initial velocity does not change with a height change, but the time does. This is also a two step question.]

$$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2(2.0m)}{9.81\frac{m}{s^2}}} = .64s$$

$$d_x = v_{ix}t = 4.0\frac{m}{s}(.64s) = 2.6m$$

	x	y
d	?	2.0
t		
a	0 m/s²	- 9.81 m/s²
v_i	4.0 m/s	0 m/s
v_f		

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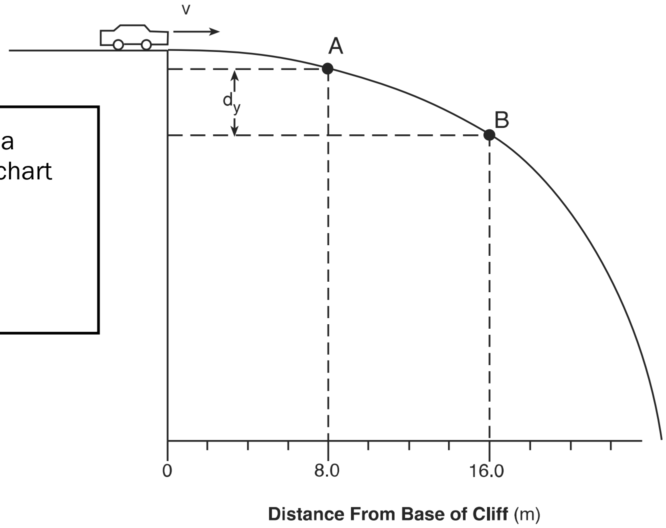
1. The path of a stunt car driven horizontally off a cliff is represented in the diagram below. After leaving the cliff, the car fall freely to point A in 0.50 second and to point B in 1.00 second.

Hint – You may want to make a separate Givens & Unknowns chart for each question below.
- Start to point B
- Start to point A
- Point A to point B.



a. Determine the magnitude of the horizontal component of the velocity of the car at point B. [Neglect friction.]

$$v_x = \frac{d_x}{t} = \frac{16.0\text{ m}}{1.00\text{ s}} = 16.0\text{ m/s}$$

b. Determine the magnitude and direction of the vertical velocity of the car at point A.

$$v_{fy} = v_i + at$$
$$v_{fy} = 0\text{ m/s} + (-9.81\text{ m/s}^2)(0.50\text{ s})$$
$$v_{fy} = -4.905\text{ m/s}$$
$$v_{fy} = 4.9\text{ m/s down}$$

c. Calculate the magnitude and direction of the vertical displacement, d_y, of the car from point A to point B. [Neglect friction.]

$$d_y = v_i t + 1/2\, at^2$$
$$d_y = (-4.9\text{ m/s})(0.50\text{ s}) + 1/2\,(-9.81\text{ m/s}^2)(0.50\text{ s})^2$$
$$d_y = -2.45\text{ m} + (-1.23\text{ m})$$
$$d_y = -3.68\text{ m}$$
$$d_y = 3.7\text{ m down}$$

Answers in size order: 2.6, 3.7, 4.0, 4.9, 16.0