Name _____ Answer Key _____   Date _____

Physics   Measure & Math WS #5H

Period _____   Mrs. Nadworny

A

Data Collection

Directions: Read online textbook pages 6 – 9 & 15 – 16 and complete the following problems. Be sure to show ALL work.

1. Anne Teak wants to determine the effect of an object's weight on the time it takes an object to fall. Given the research question below, devise an appropriate hypothesis, identify appropriate variables, and state a plan that would enable Anne to attempt to answer her research question.

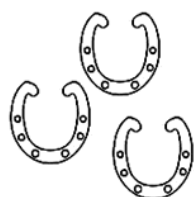   Research Question: What is the effect of weight on rate of free fall?

   a. Independent Variable: weight

   b. Dependent Variable: time

   c. Hypothesis: If weight increases, then the time it takes an object to fall (inc./dec./remains the same).

   d. Control Variable(s) / Constants: height, size of object,

   e. Plan: Anne will drop 6 objects of increasing weight from a height of 3.0 meters. She will measure the time it takes for each object to hit the ground. She will also use objects with masses greater than 5 kg to limit the effects of air resistance.

2. Brighton Early, Candance Spencer, and Jo King partake in a game of horseshoes. Under each person's results write whether they were accurate, precise, both or neither. The results are as follows:
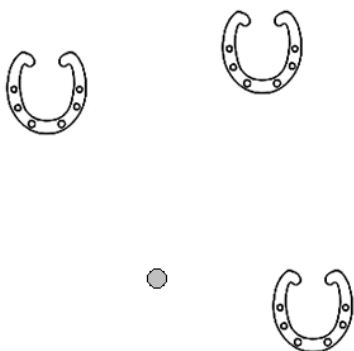
   Brighton   Candance   Jo

   Neither accurate nor precise   Precise   Both accurate & precise

In order to get full credit on this assignment, you must show all of your work. This includes writing the formula, substituting the values with units, and writing your final answer with proper significant figures and units. Simply putting an answer will earn NO credit.

3. Physics student Dessy Meter collects the following data about the height of the classroom doorway after repeated measurements.

Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
2.11 m	2.10 m	2.09 m	2.13 m	2.10 m	2.08 m

a. Calculate the range of the data.

Range = High – Low = 2.13 m – 2.08 m = 0.05 m

b. Calculate the mean (average) value for the height of the door.

$$avg = \frac{sum}{\#\,trials} = \frac{2.11m + 2.10m + 2.09m + 2.13m + 2.10m + 2.08m}{6} = \frac{12.61m}{6} = 2.10m$$

c. Calculate the uncertainty in the mean.

$$uncertainty = \frac{range}{\#\,trials} = \frac{0.05m}{6} = 0.008m$$

d. Report the average value for the height of the door with its uncertainty estimate.

2.10 m ± 0.008 m

e. According to her data, the height of the door is most reliably between what two values?

Between 2.09 m and 2.11 m

Answers in size order: 0.008, 0.05, 2.09, 2.10, 2.11