2

Names:_____

_____

Period: _____

ISOTOPES OF PENNIES LAB

PART 1: GATHERING DATA

1. Obtain a sample of ten pennies marked "Sample A"
2. Mass the old (pre-1982) pennies and record the *average mass of **one***: _____ g
3. Mass the new (post-1982) pennies and record the *average mass of **one***: _____ g
4. Do ***not*** put your pennies on the balance. **Calculate** (mathematically) how much mass three old pennies plus seven new pennies should have. Show your work below, including your answer in the box.

   _____ g
5. Divide your answer from question number 4 by **ten** (since you used 10 pennies) to find the ***weighted average mass*** of the pennies in the sample containing three old plus seven new pennies. Show your work and your answer below.

   _____ g
6. Now use the triple-beam balance to measure the mass of your sample of three old and seven new pennies. Record the mass.

   _____ g
7. Divide your answer for number six by 10 to find the weighted average mass of a penny in your sample.

   _____ g
8. Compare your answer for number 5 to your answer for number 7. Are they equal?
9. Is the weighted average mass closer to the mass of an old penny or a new penny? ***Why?***
10. How is the weighted average related to the atomic mass of an element?

PART 2: PRACTICING CALCULATIONS

1. Using the mass of an old penny and a new penny that you recorded in Part 1, **calculate** (without the balance) the ***weighted average mass*** of six old pennies and four new pennies. You need to find the mass of all ten pennies and divide by ten to find the ***weighted average mass***. Show your work and answer below.

_____ g

2. Return your "Sample A" and retrieve "Sample B" only after completing question one. This sample contains six old pennies and four new pennies.

3. Now use the balance to record the mass of the entire "Sample B" below.

_____ g

4. Divide the mass of your total "Sample B" by ten to find the actual average mass of a penny in this sample. Show your work below.

_____ g

5. Compare your answer from question 1 to your answer from question 4. Are they equal? Why or why not?

6. Is the weighted average mass of this sample closer to the mass of an old penny or a new penny? Why?

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Names: _____

_____

Period: _____

ISOTOPES OF PENNIES LAB

PART 3: UNKNOWN SAMPLE DATA

1. Return all your penny samples to the teacher and collect a "mystery sample" of ten pennies. ***Do Not Open*** this mystery sample of pennies.
2. Record your canister's identifying number: Mystery Canister Number: _____
3. Write down the mass of the empty film canister which is written on the canister label.

   _____ g
4. Record the mass of the sealed film canister containing the ten mixed pennies.

   _____ g
5. Return the canister to your teacher.

UNKNOWN SAMPLE CALCULATIONS

Calculate the number of old pennies and new pennies in your canister using the procedure below. ***Read the procedure carefully and follow the directions and you will be able to find your answer.***

1. Since the total number of pennies is ten, we can say that there are X old pennies and (10-X) new pennies.
2. The total mass of the pennies (canister with pennies minus mass of canister) will be needed soon. Calculate it below.

   _____ g
3. X times the average mass of an old penny (from part A) plus (10-X) times the average mass of a new penny (from part 1) equals the total mass of the pennies in the canister. **Set up an equation and solve for "X"**. Then you will know the value of X which is equal to how many old pennies are in your canister. Subtract "X" from ten to get your number of new pennies. *Show all math below.*

Try #1	Try #2	Try #3

4. How many *old pennies* are in your canister?
5. How many *new pennies* are in your canister?