AP Stat Handout: Sample Means Name _____

Ch 9.3: Sample Means

EQ:

- Penny Activity

1. Use a small cup and select pennies from the class collection. At your desk, count out 25 pennies from your cup. Return the remaining pennies to the class collection.
2. Without looking at your pennies, sketch the density curve that you **think best shows the shape of the distribution of ages** of the pennies you have selected.

3. Complete the following frequency table and determine the **age of your 25 pennies from this year**.

Yr of Coin	Age	Freq	Yr of Coin	Age	Freq

4. Put your pennies in a cup and **randomly** select 5 pennies. Calculate $\bar{x}$. Replace the pennies and repeat for 4 more trials.

T1: $\bar{x}$ (5) = _____T2: $\bar{x}$ (5) = _____T3: $\bar{x}$ (5) = _____ T4: $\bar{x}$ (5) = _____T5: $\bar{x}$ (5) = _____

5. Repeat step #5, except this time randomly select 10 pennies.

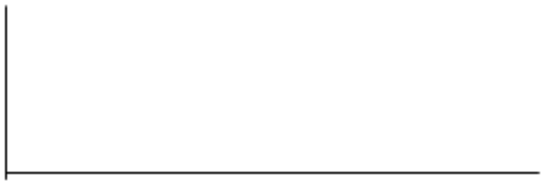
T1: $\bar{x}$ (10) = _____T2: $\bar{x}$ (10) = _____T3: $\bar{x}$ (10) = _____ T4: $\bar{x}$ (10) = _____T5: $\bar{x}$ (10) = _____

6. Repeat step #5, except this time select all 25 pennies.

T1: $\bar{x}$ (25) = _____

7. **Creating dot plots to show shape of our sampling distributions:** Go to the board and place a dot at the age for each of your pennies. Use the correct color marker to plot your five means for penny samples of size 1, size 5, and size 10 and your one mean for sample size 25. After everyone has done this, sketch the shape of each histogram below.

   RECALL: Shape of distribution of population of pennies.



$\bar{x}$ (n = 5)

$\bar{x}$ (n = 10)

$\bar{x}$ (n = 25)

❖ **CONCLUSION:**

Our original population distribution was not described as Normal nor was it bell-shaped. In fact it was _____.

However, as we increased the _____, the distribution got close and

closer to a _____ curve and could be approximated using a

_____ _____. This property is called the

_____.

- Sample Means --- _____ of observations
- Sample Means are _____ than _____.
- Sample Means have a _____ than _____.

RECALL: ***Sampling Proportions***

_____ = _____ _____ = _____

The sampling distribution of _____is _____ under what condition?

___ and ____ satisfy the conditions _____ ≥ 10 _____ ≥ 10

_____

What about *Sampling Means*? Suppose _____is the _____of an _____ of size _____

drawn from a _____ with mean _____ and standard deviation _____.

_____ ⇒ _____ _____ ⇒ _____

_____ from _____ behaves like _____:

1. _____ estimator of _____
2. _____ for larger _____
3. Use Standard Error if _____ ≥ _____(_____) Independence

❖ **Behavior of Sampling Means:**

True no matter what _____of the _____.

- **Central Limit Theorem** ---SRS of size _____taken from population with mean _____ and standard deviation _____:

When _____ **≥** _____ _____ is _____to **N(**_____, _____**)**

- **Law of Large Numbers** --- draw observations at _____from any _____

with finite mean _____: As observations ↑, _____ ⇒ _____

_____ **≠** _____

↑ ↑

[ ] [ ]

❖ **SPARK NOTES FOR THIS SECTION:**

[1] The _____ is always _____ the

_____ from which the samples were drawn.

[2] The _____ is always _____ the

_____ divided by the _____.

[3] [***And the most amazing part!!***] The _____ will increasingly

_____ as the _____.

❖ **Assignment:** Worksheet: Sample Means; p. 595 - 596 #31 – 34 ; p. 601 - 602 #35 – 40