

## 7.5: Central Limit Theorem - Pocket Change (Worksheet)

Name: \_\_\_\_\_

Section: \_\_\_\_\_

Student ID#: \_\_\_\_\_

*Work in groups on these problems. You should try to answer the questions without referring to your textbook. If you get stuck, try asking another group for help.*

### Student Learning Outcomes

- The student will demonstrate and compare properties of the central limit theorem.

#### NOTE

This lab works best when sampling from several classes and combining data.

### Collect the Data

- Count the change in your pocket. (Do not include bills.)
- Randomly survey 30 classmates. Record the values of the change in [Table](#).

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

- Construct a histogram. Make five to six intervals. Sketch the graph using a ruler and pencil. Scale the axes.

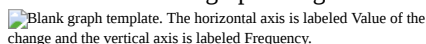


Figure 7.5.1.

- Calculate the following ( $n = 1$ ; surveying one person at a time):

1.  $\bar{x} =$  \_\_\_\_\_

2.  $s =$  \_\_\_\_\_

- Draw a smooth curve through the tops of the bars of the histogram. Use one to two complete sentences to describe the general shape of the curve.

### Collecting Averages of Pairs

Repeat steps one through five of the section [Collect the Data](#). with one exception. Instead of recording the change of 30 classmates, record the average change of 30 pairs.

- Randomly survey 30 **pairs** of classmates.
- Record the values of the average of their change in [Table](#).

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

- Construct a histogram. Scale the axes using the same scaling you used for the section titled [Collect the Data](#). Sketch the graph using a ruler and a pencil.


 This is a blank graph template. The horizontal axis is labeled Value of the change and the vertical axis is labeled Frequency.

Figure 7.5.2.

- Calculate the following ( $n = 2$ ; surveying two people at a time):

- $\bar{x} =$  \_\_\_\_\_
- $s =$  \_\_\_\_\_

- Draw a smooth curve through tops of the bars of the histogram. Use one to two complete sentences to describe the general shape of the curve.

## Collecting Averages of Groups of Five

Repeat steps one through five (of the section titled [Collect the Data](#)) with one exception. Instead of recording the change of 30 classmates, record the average change of 30 groups of five.

- Randomly survey 30 **groups of five** classmates.
- Record the values of the average of their change.

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

- Construct a histogram. Scale the axes using the same scaling you used for the section titled [Collect the Data](#). Sketch the graph using a ruler and a pencil.


 This is a blank graph template. The horizontal axis is labeled Value of the change and the vertical axis is labeled Frequency.

Figure 7.5.3.

- Calculate the following ( $n = 5$ ; surveying five people at a time):

- $\bar{x} =$  \_\_\_\_\_
- $s =$  \_\_\_\_\_

- Draw a smooth curve through tops of the bars of the histogram. Use one to two complete sentences to describe the general shape of the curve.

## Discussion Questions

- Why did the shape of the distribution of the data change, as  $n$  changed? Use one to two complete sentences to explain what happened.
- In the section titled [Collect the Data](#), what was the approximate distribution of the data?  $X$  \_\_\_\_\_ (\_\_\_\_\_, \_\_\_\_\_)
- In the section titled [Collecting Averages of Groups of Five](#), what was the approximate distribution of the averages?  $\bar{X}$  \_\_\_\_\_ (\_\_\_\_\_, \_\_\_\_\_)
- In one to two complete sentences, explain any differences in your answers to the previous two questions.

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