

Pit and Pendulum

Standard Deviation After Day 12

- Find the standard deviation for the set of numbers given below. Work carefully. You may use your calculator to do calculations. Data: 37, 43, 36, 40, 39

Data	Difference	(Difference) ²
Sum		
Mean of Sum		

The standard deviation is _____. Now sketch a normal curve and put in the correct values for the mean and one and two standard deviations from the mean.

- Now, using your graphing calculator, let your calculator compute the standard deviation for this same set of data. Record the value given for σ : _____

Quiz THE PIT AND THE PENDULUM

Five students were chosen randomly from the two IMP 1 classes. Their averages are shown below. For each class find the mean and the standard deviation accurate to 2 decimal places. **You must show your work for credit.** You may use a scientific calculator, but not a graphing calculator, to find square root or to check your math. Then fill in the five numbers indicated on the normal curve shown.

Period 2: 78, 76, 64, 81, 70

Mean: _____ σ : _____

Period 5: 87, 76, 74, 81, 77

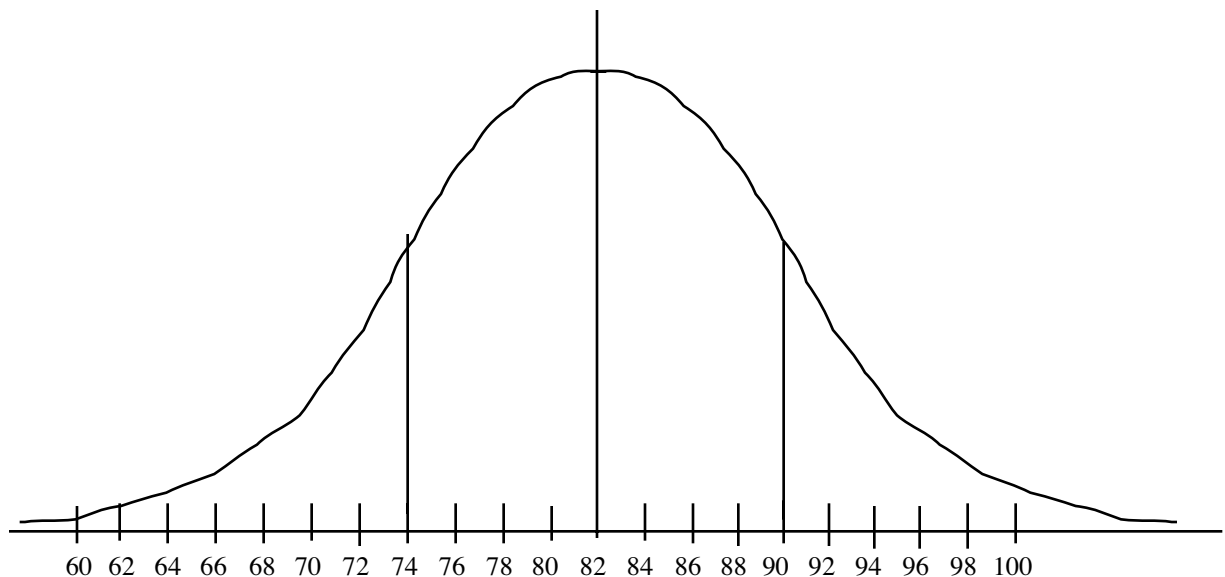
Mean: _____ σ : _____

1. For which class are the grades most spread out? To receive credit, you must correctly explain how you know. _____

2. In which class would a grade of 72 be a “normal” grade? _____
3. What value(s) would signify a “usual” grade for period 2? (Note: all grades are whole numbers.) _____
4. For period 5, what would be the lowest whole number grade that would be “normal” ? _____

PIT AND THE PENDULUM After DAY 14

1. The mode, the median, and the _____ are called the measures of center. We have been studying the measures of _____ in this unit. To compare the spread of different data sets we calculate the _____. The lower case Greek letter, _____, is used to represent this statistic. Statisticians usually consider data significant if it is within _____ of the mean. One standard deviation from the mean contains _____% of the data if the data follows a _____ curve. The % of data considered very rare is _____%.



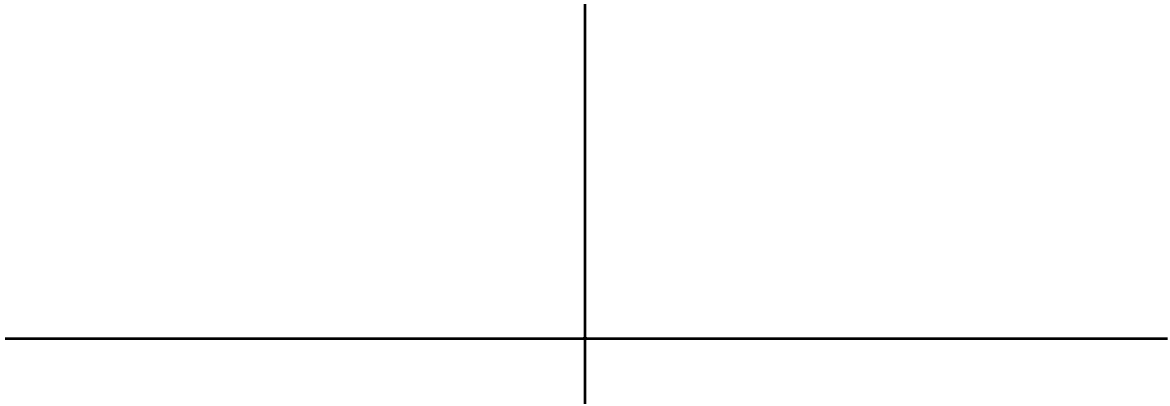
2. The normal curve above represents students' grades on a math test. The mean and **first standard deviation lines** have been drawn in.
- Very carefully and accurately, draw in the second deviation lines in their appropriate places on the curve.
 - What percent of the class scored better than 90? _____
 - What percent of the class scored below 82? _____
 - What percent of the class scored between 66 and 90? _____

Normal Distribution & Standard Deviation – Quiz page 2

3. A budding guitarist keeps track of the number of minutes practiced each day last week: $x_1 = 30$ $x_2 = 2$ $x_3 = 68$ $x_4 = 30$ $x_5 = 90$ $x_6 = 210$ $x_7 = 45$

- a) What is the range of minutes spent practicing? _____
- b) To the nearest whole minute, find the mean of minutes practiced each day.

- c) Find the standard deviation. _____
- d) Sketch a graph of the distribution of the above data.



Pit and Pendulum

Does Amplitude Matter?

You will be investigating the effect of the amplitude on the period of a pendulum. You will do 3 experiments--each experiment with a different angle. Every group will do 30 degrees. All other variables in the experiment will remain the same as with the Standard Pendulum, i.e., 2 feet in length and one washer.

Each experiment will consist of 5 trials. A trial will be the average of 12 complete swings; record the time for the 12 swings inside the parentheses(); record the average on the ____.

For each experiment you are to find the mean and standard deviation of your five averages, which should be recorded on this sheet also.

Experiment #1
Angle: 30 degrees

Trial 1 () ____

Trial 2 () ____

Trial 3 () ____

Trial 4 () ____

Trial 5 () ____

Mean ____

S. D. ____

Experiment #2
Angle: ____

Trial 1 () ____

Trial 2 () ____

Trial 3 () ____

Trial 4 () ____

Trial 5 () ____

Mean ____

S. D. ____

Experiment #3
Angle: ____

Trial 1 () ____

Trial 2 () ____

Trial 3 () ____

Trial 4 () ____

Trial 5 () ____

Mean ____

S. D. ____

Looking at your data, do you think amplitude matters? _____

Members of your group:

Pit and Pendulum

Does Weight Matter?

You will be investigating the effect of the weight of the bob on the period of a pendulum. You will do 3 experiments--each experiment with a different number of washers. Every group will do 5 washers. All other variables in the experiment will remain the same as with the Standard Pendulum, i.e., 2 feet in length and 20 degrees.

Each experiment will consist of 5 trials. A trial will be the average of 12 complete swings; record the time for the 12 swings inside the parentheses(); record the average on the ____.

For each experiment you are to find the mean and standard deviation of your five averages, which should be recorded on this sheet also.

Experiment #1
of washers: 5

Trial 1 () ____

Trial 2 () ____

Trial 3 () ____

Trial 4 () ____

Trial 5 () ____

Mean ____

S. D. ____

Experiment #2
of washers: ____

Trial 1 () ____

Trial 2 () ____

Trial 3 () ____

Trial 4 () ____

Trial 5 () ____

Mean ____

S. D. ____

Experiment #3
of washers: ____

Trial 1 () ____

Trial 2 () ____

Trial 3 () ____

Trial 4 () ____

Trial 5 () ____

Mean ____

S. D. ____

Looking at your data, do you think weight of the bob matters? _____

Members of your group:

Pit and Pendulum

Does Length Matter?

You will be investigating the effect of length on the period of a pendulum. You will do 3 experiments--each experiment with a different length. Every group will do 4 feet. All other variables in the experiment will remain the same as with the Standard Pendulum, i.e., one washer and 20 degrees.

Each experiment will consist of 5 trials. A trial will be the average of 12 complete swings; record the time for the 12 swings inside the parentheses(); record the average on the ____.

For each experiment you are to find the mean and standard deviation of your five averages, which should be recorded on this sheet also.

Experiment #1
Length: 4 feet

Trial 1 () ____

Trial 2 () ____

Trial 3 () ____

Trial 4 () ____

Trial 5 () ____

Mean ____

S. D. ____

Experiment #2
Length: ____

Trial 1 () ____

Trial 2 () ____

Trial 3 () ____

Trial 4 () ____

Trial 5 () ____

Mean ____

S. D. ____

Experiment #3
Length: ____

Trial 1 () ____

Trial 2 () ____

Trial 3 () ____

Trial 4 () ____

Trial 5 () ____

Mean ____

S. D. ____

Looking at your data, do you think length matters? _____

Members of your group:

QUIZ Data vs Family of Curves

For each set of data, determine if the graph seems to be a parabola, radical, line, or none of these.

1.

IN	OUT
4	27
5	22
7	12
3	32
6	17

2.

IN	OUT
2	3
5	19
8	17
3	9
6	29

3.

IN	OUT
1	4
4	76
5	140
3	36
2	14

4.

IN	OUT
0	1
4	9
8	17
3	7
9	19

5.

IN	OUT
4	51
5	70
8	187
3	22
2	7

6.

IN	OUT
11	2
16	3
8	1
32	5
23	4

7.

IN	OUT
11	5
39	9
23	7
59	11
3	3

8.

IN	OUT
0	3
5	28
8	67
3	12
6	39

IN-CLASS Assessment for THE PIT AND THE PENDULUM

I.

Steve works in a hobby shop. He was looking at the relationship between the length of certain models and the amount of paint they require.

Here are some estimates he came up with:

Length of Model (in feet)	Amount of Paint (in ounces)
1	2
2	6
3	14
5	40

- Construct a graph using this data.
- Find the curve of best fit.
- Assuming that this pattern continue, estimate how much paint would be needed for a model that is 10 feet long.
- Explain your reasoning.

II. An IMP 4 class was doing a research project and collected data on their heights as follows: 59, 59.5, 60, 61, 61.5, 62, 63, 64, 65, 65, 65, 66, 69, 70, 70, 71.

Since it has been a while since they have used the Standard Distribution Curve, they have requested your help to:

- On the back, **Show them** how to calculate, to the nearest tenth, the Mean and Standard Deviation for this data.
Mean = _____ Standard Deviation = _____
- What would be the largest and the smallest heights that would still be within the “Normal Range”? Largest = _____ Smallest = _____
- Sketch a graph of the this distribution data on the back , showing the mean, and $\pm 2\sigma$.