

Name: _____

Date: _____

SAMPLES OF TWO POPULATIONS N-GEN[®] MATH 7



In statistics, we almost always use **samples** of **populations** to try to tell us something about the population. Very often, we want to compare **two populations** by comparing **two samples drawn** from the populations.

Exercise #1: Julian is trying to answer the following statistical question:

“Are children who are 15 years old taller than children that are 8 years old?”

Explain why Julian would need to use samples to answer this question instead of the populations involved.

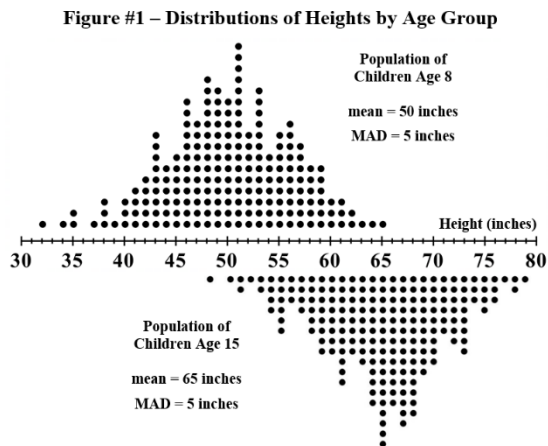
For this lesson, we want to explore how different samples Julian might take from the two populations might tell us information about the population. For this lesson, we created two **hypothetical (made up) populations**, each with 200 members. The **population distributions** are shown in Figure #1.

Exercise #2: Use Figure #1 to answer the following questions about our **populations**.

- How much greater is the mean height of children who are 15 than the height of children who are 8?
- How does the difference between the two means compare to the mean absolute deviations (MADs) of the two populations?
- Are there any children who are 8 years old that are taller than children that are 15 years old? Explain how you can tell from the dot plot.



Exercise #3: If we took a sample of 20 heights from each distribution, would it be possible to find a sample of 8 year olds that had a greater mean height than a sample of 15 year olds? Explain.



You saw in our last lesson how a random sample can be taken from a population. This sampling process is time consuming, so we did it for you in this lesson. We took 10 random samples of 20 students from each age group and found the sample mean for each.

Exercise #4: The following table shows the results from 10 random samples of size 20 each.

Trial #	Mean of Sample #1 (8 years old)	Mean of Sample #2 (15 years old)	Difference (mean #2 – mean #1))
1	49.7	64.9	
2	46.7	62.4	
3	49.8	68.0	
4	52.1	65.6	
5	49.3	67.4	
6	50.7	65.3	
7	50.3	65.7	
8	51.8	65.5	
9	48.9	65.1	
10	51.1	66.6	

- Fill in the last column with the difference between the two sample means.
- How do the numbers in the final column of the table support the idea that children who are 15 years old are taller, on average, than children who are 8 years old?



Exercise #5: Tessa would like to answer the following question:

“Are people who go to drama movies older than people who go to action movies?”

Why must samples be used in this situation instead of the populations?

As with the prior statistical question, we created two hypothetical populations from which we will draw our samples from. The distributions of the two populations are shown in Figure #2.

Exercise #6: Use Figure #2 to answer the following questions about the **two populations**.

(a) How much greater is the mean age for those who attend drama films compared to action films?

(b) How does the difference in (a) compare to the mean absolute deviation of the two populations?

Exercise #7: As with our initial two populations, we again took 10 random samples from each population and compared the sample means from each. The results are shown below. Fill in the final column of the table. Be careful to always do the difference in the specified order.

Trial #	Mean of Sample #1 (Action Movies)	Mean of Sample #2 (Drama Movies)	Difference (mean #2 – mean #1)
1	50.5	53.7	
2	49.8	52.2	
3	45.3	52.8	
4	53.2	52.1	
5	47.3	55.4	
6	51.8	50.4	
7	51.2	56.4	
8	53.2	52.8	
9	50.1	55.8	
10	47.9	55.1	



Exercise #8: Look at the differences in the sample means (the final column of the table).

- (a) Do all of the values in the final column support the idea that the average age of people going to drama movies is greater than the average age of people going to action movies? Explain.

- (b) Would any of the trials lead you to believe that the mean age of those attending action movies is greater than the mean age of those attending drama movies? If so, which and how many?

- (c) Why do you think taking samples from these two populations leads to less conclusive results than in the first study we looked at in this lesson?

Exercise #9: In each scenario, a study is described along with results from two samples. State whether you believe that the sample results are **significant enough** to justify making an **inference** about the populations.

- (a) Malik is trying to answer the question “Are travel times greater for students who walk to school than students who ride a school bus to school?” He takes a sample of 30 students from each group and finds a mean time of 18 minutes for those who walk and a mean time of 14 minutes for those who ride the bus. The mean absolute deviation for both sets was 7 minutes.

- (b) Skylar is trying to answer the question “Do lemons weigh more than limes?” She takes a sample of 25 lemons and 25 limes and weighs them. She finds the lemons have a mean weight of 98 grams and the limes have a mean weight of 65 grams. The mean absolute deviation for both samples was 8 grams.



Figure #1 – Distributions of Heights by Age Group

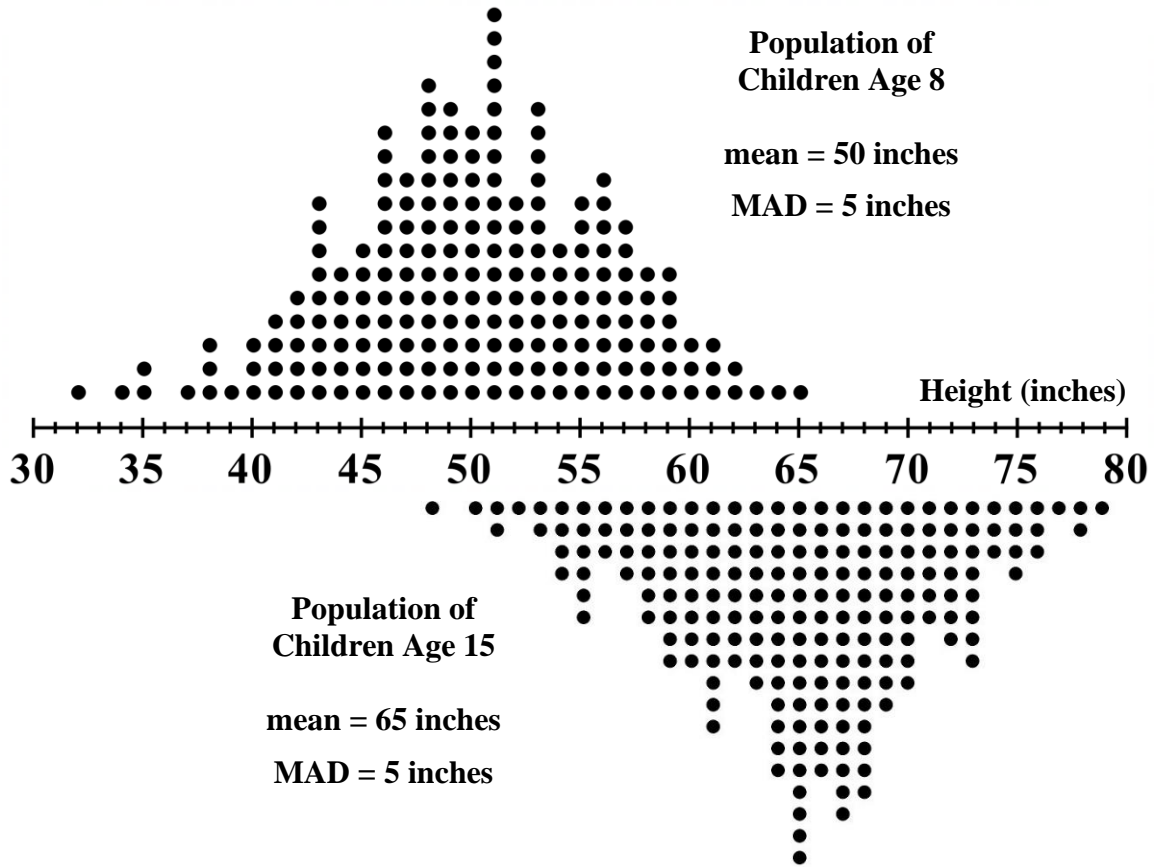
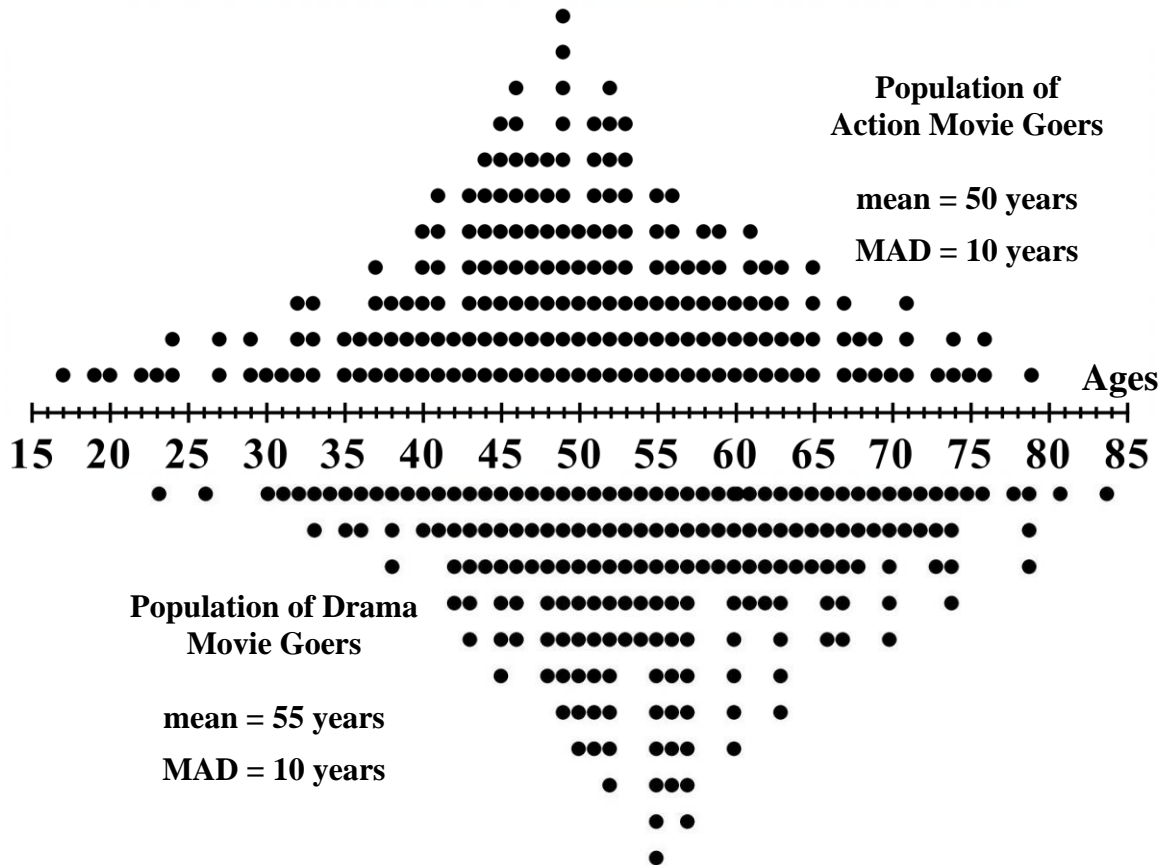


Figure #2 – Distributions of Ages by Movie Type





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SAMPLES OF TWO POPULATIONS N-GEN MATH[®] 7 HOMEWORK

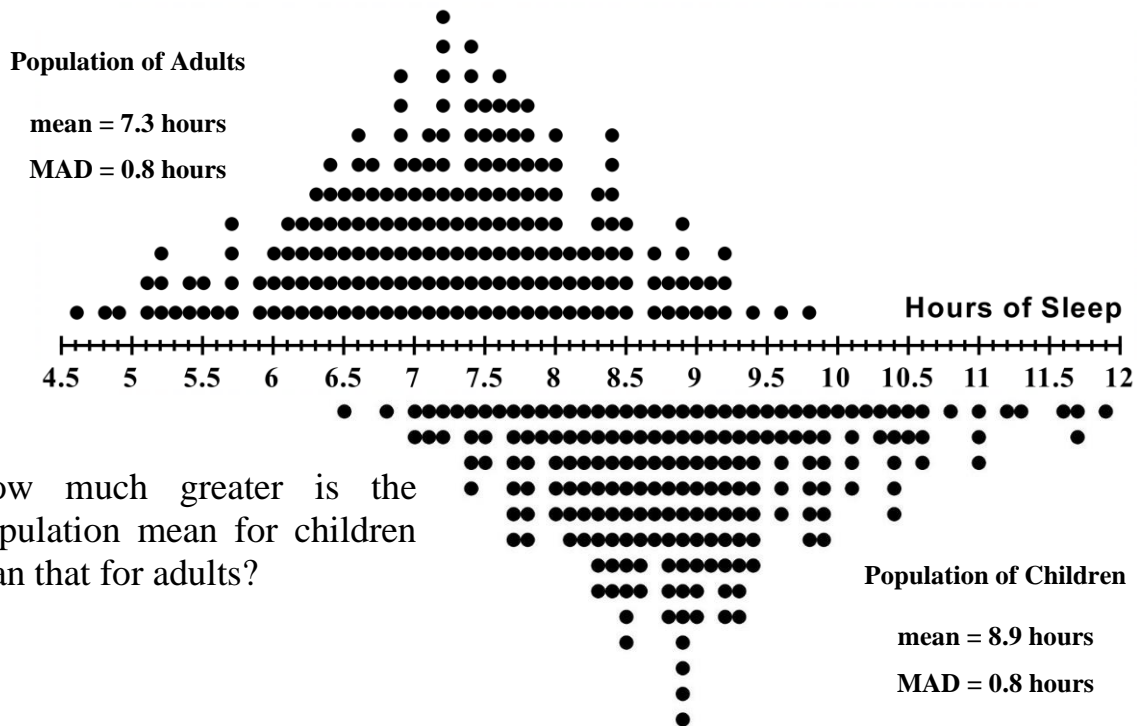
USING YOUR MATH

1. Jade is trying to answer the question:

“Do children sleep less than adults?”

Why would it be necessary for Jade to use samples to answer this question instead of populations?

2. Two hypothetical **populations** are shown below for adults and children and the number of hours of sleep they get per night.



(a) How much greater is the population mean for children than that for adults?

(b) How does the difference in (a) compare to the MAD for both populations?



3. Random samples were taken (of size 20) from each population and sample means were calculated for each trial. The results are shown below.

Trial #	Mean of Sample #1 (Adult Sleep Hours)	Mean of Sample #2 (Child Sleep Hours)	Difference (mean #2 – mean #1)
1	7.3	8.6	
2	7.2	9.1	
3	7.0	8.8	
4	6.8	9.7	
5	7.2	8.9	
6	7.0	9.5	
7	7.4	9.0	
8	7.3	9.3	
9	7.7	8.9	
10	7.3	9.1	

- (a) Fill in the final column of the table with the differences in the sample means.
- (b) Would the results from the samples allow us to infer (conclude) that the average amount of sleep children get is greater than the average amount that adults get? Explain.
- (c) Why in this case are the sample results all consistent?

