

Lesson 10: Percentiles and Cumulative Distribution

Daily Data Collection

How many books did you read this summer?

Percentile Rank

If you are trying to find the percentile corresponding to a certain score x :

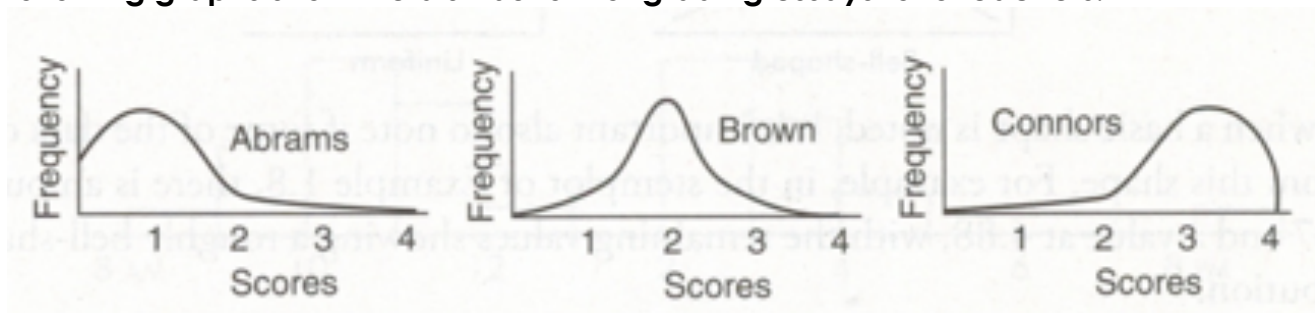
$$\text{Percentile} = \frac{\text{number of scores} < x}{\text{total number of scores}} \cdot 100$$

Percentiles are used often when reporting academic scores such as SAT scores. Let's say you get a 620 on the math portion of the SAT. It might also indicate that you are in the "78th percentile". That means that you scored better than 78% of all students taking that particular SAT.

Cumulative Frequency:

- The number of times a value occurs plus all the smaller values that have occurred. This graph is also called an **ogive graph**.

The following graphs show the distribution for grading essays for 3 teachers.

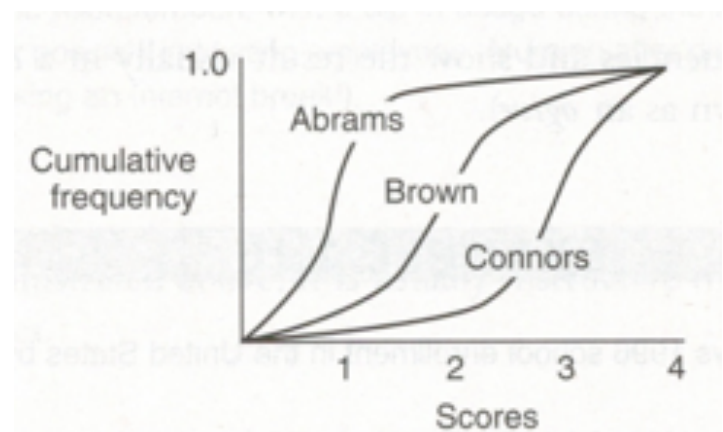


Describe each teacher's distribution:

Abrams

Brown

Connors



Class Data – Books Read This Summer

Fill in the table below:

Books	frequency	Relative frequency	Percentile
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12+			

Find your percentile rank and explain the meaning:

Draw a dot-plot and describe the distribution:

Create a cumulative distribution graph:

Guided Practice

Mr. Pryor's First Test

Finding percentiles

PROBLEM: Use the scores on Mr. Pryor's first statistics test to find the percentiles for the following students:

- (a) Norman, who earned a 72.
- (b) Katie, who scored 93.
- (c) The two students who earned scores of 80.

6	7
7	2 3 3 4
7	5 7 7 7 8 9 9
8	0 0 1 2 3 3 3 4
8	5 6 9
9	0 3

CHECK YOUR UNDERSTANDING

1. *Multiple choice: Select the best answer.* Mark receives a score report detailing his performance on a statewide test. On the math section, Mark earned a raw score of 39, which placed him at the 68th percentile. This means that

- (a) Mark did better than about 39% of the students who took the test.
- (b) Mark did worse than about 39% of the students who took the test.
- (c) Mark did better than about 68% of the students who took the test.
- (d) Mark did worse than about 68% of the students who took the test.
- (e) Mark got fewer than half of the questions correct on this test.

2. Mrs. Munson is concerned about how her daughter's height and weight compare with those of other girls of the same age. She uses an online calculator to determine that her daughter is at the 87th percentile for weight and the 67th percentile for height. Explain to Mrs. Munson what this means.

Questions 3 and 4 relate to the following setting. The graph displays the cumulative relative frequency of the lengths of phone calls made from the mathematics department office at Gabalot High last month.

- 3. About what percent of calls lasted less than 30 minutes? 30 minutes or more?
- 4. Estimate Q_1 , Q_3 , and the IQR of the distribution.

