

2.4E: Measures of the Location of the Data (Exercises)

Exercise 2.4.10

Listed are 29 ages for Academy Award winning best actors *in order from smallest to largest*.

18; 21; 22; 25; 26; 27; 29; 30; 31; 33; 36; 37; 41; 42; 47; 52; 55; 57; 58; 62; 64; 67; 69; 71; 72; 73; 74; 76; 77

- Find the 40th percentile.
- Find the 78th percentile.

Answer

- The 40th percentile is 37 years.
- The 78th percentile is 70 years.

Exercise 2.4.11

Listed are 32 ages for Academy Award winning best actors *in order from smallest to largest*.

18; 18; 21; 22; 25; 26; 27; 29; 30; 31; 31; 33; 36; 37; 37; 41; 42; 47; 52; 55; 57; 58; 62; 64; 67; 69; 71; 72; 73; 74; 76; 77

- Find the percentile of 37.
- Find the percentile of 72.

Exercise 2.4.12

Jesse was ranked 37th in his graduating class of 180 students. At what percentile is Jesse's ranking?

Answer

Jesse graduated 37th out of a class of 180 students. There are $180 - 37 = 143$ students ranked below Jesse. There is one rank of 37.

$$x = 143 \text{ and } y = 1. \frac{x + 0.5y}{n}(100) = \frac{143 + 0.5(1)}{180}(100) = 79.72. \text{ Jesse's rank of 37 puts him at the 80}^{\text{th}} \text{ percentile.}$$

Exercise 2.4.13

- For runners in a race, a low time means a faster run. The winners in a race have the shortest running times. Is it more desirable to have a finish time with a high or a low percentile when running a race?
- The 20th percentile of run times in a particular race is 5.2 minutes. Write a sentence interpreting the 20th percentile in the context of the situation.
- A bicyclist in the 90th percentile of a bicycle race completed the race in 1 hour and 12 minutes. Is he among the fastest or slowest cyclists in the race? Write a sentence interpreting the 90th percentile in the context of the situation.

Exercise 2.4.14

- For runners in a race, a higher speed means a faster run. Is it more desirable to have a speed with a high or a low percentile when running a race?
- The 40th percentile of speeds in a particular race is 7.5 miles per hour. Write a sentence interpreting the 40th percentile in the context of the situation.

Answer

- For runners in a race it is more desirable to have a high percentile for speed. A high percentile means a higher speed which is faster.
- 40% of runners ran at speeds of 7.5 miles per hour or less (slower). 60% of runners ran at speeds of 7.5 miles per hour or more (faster).

Exercise 2.4.15

On an exam, would it be more desirable to earn a grade with a high or low percentile? Explain.

Exercise 2.4.16

Mina is waiting in line at the Department of Motor Vehicles (DMV). Her wait time of 32 minutes is the 85th percentile of wait times. Is that good or bad? Write a sentence interpreting the 85th percentile in the context of this situation.

Answer

When waiting in line at the DMV, the 85th percentile would be a long wait time compared to the other people waiting. 85% of people had shorter wait times than Mina. In this context, Mina would prefer a wait time corresponding to a lower percentile. 85% of people at the DMV waited 32 minutes or less. 15% of people at the DMV waited 32 minutes or longer.

Exercise 2.4.17

In a survey collecting data about the salaries earned by recent college graduates, Li found that her salary was in the 78th percentile. Should Li be pleased or upset by this result? Explain.

Exercise 2.4.18

In a study collecting data about the repair costs of damage to automobiles in a certain type of crash tests, a certain model of car had \$1,700 in damage and was in the 90th percentile. Should the manufacturer and the consumer be pleased or upset by this result? Explain and write a sentence that interprets the 90th percentile in the context of this problem.

Answer

The manufacturer and the consumer would be upset. This is a large repair cost for the damages, compared to the other cars in the sample. INTERPRETATION: 90% of the crash tested cars had damage repair costs of \$1700 or less; only 10% had damage repair costs of \$1700 or more.

Exercise 2.4.19

The University of California has two criteria used to set admission standards for freshman to be admitted to a college in the UC system:

- Students' GPAs and scores on standardized tests (SATs and ACTs) are entered into a formula that calculates an "admissions index" score. The admissions index score is used to set eligibility standards intended to meet the goal of admitting the top 12% of high school students in the state. In this context, what percentile does the top 12% represent?
- Students whose GPAs are at or above the 96th percentile of all students at their high school are eligible (called eligible in the local context), even if they are not in the top 12% of all students in the state. What percentage of students from each high school are "eligible in the local context"?

Exercise 2.4.20

Suppose that you are buying a house. You and your realtor have determined that the most expensive house you can afford is the 34th percentile. The 34th percentile of housing prices is \$240,000 in the town you want to move to. In this town, can you afford 34% of the houses or 66% of the houses?

Answer

You can afford 34% of houses. 66% of the houses are too expensive for your budget. INTERPRETATION: 34% of houses cost \$240,000 or less. 66% of houses cost \$240,000 or more.

Use Exercise to calculate the following values:

Exercise 2.4.21

First quartile = _____

Exercise 2.4.22

Second quartile = median = 50th percentile = _____

Answer

4

Exercise 2.4.23

Third quartile = _____

Exercise 2.4.24

Interquartile range (*IQR*) = _____ - _____ = _____

Answer

$$6 - 4 = 2$$

Exercise 2.4.25

10th percentile = _____

Exercise 2.4.26

70th percentile = _____

Answer

6

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