

## 2.4.1: Measures of the Location of the Data (Exercises)

### ? Exercise 2.4.1.10

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 40<sup>th</sup> percentile.
- Find the 78<sup>th</sup> percentile.

#### Answer

- The 40<sup>th</sup> percentile is 37 years.
- The 78<sup>th</sup> percentile is 70 years.

### ? Exercise 2.4.1.11

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 2.4.1.12

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

#### Answer

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

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

### ? Exercise 2.4.1.13

- 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 20<sup>th</sup> percentile of run times in a particular race is 5.2 minutes. Write a sentence interpreting the 20<sup>th</sup> percentile in the context of the situation.
- A bicyclist in the 90<sup>th</sup> 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 90<sup>th</sup> percentile in the context of the situation.

### ? Exercise 2.4.1.14

- 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 40<sup>th</sup> percentile of speeds in a particular race is 7.5 miles per hour. Write a sentence interpreting the 40<sup>th</sup> 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 2.4.1.15

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

### ? Exercise 2.4.1.16

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

#### Answer

When waiting in line at the DMV, the 85<sup>th</sup> 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 2.4.1.17

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

### ? Exercise 2.4.1.18

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 90<sup>th</sup> percentile. Should the manufacturer and the consumer be pleased or upset by this result? Explain and write a sentence that interprets the 90<sup>th</sup> 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 2.4.1.19

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 96<sup>th</sup> 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 2.4.1.20

Suppose that you are buying a house. You and your realtor have determined that the most expensive house you can afford is the 34<sup>th</sup> percentile. The 34<sup>th</sup> 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 2.4.1.21**

First quartile = \_\_\_\_\_

**? Exercise 2.4.1.22**

Second quartile = median = 50<sup>th</sup> percentile = \_\_\_\_\_

**Answer**

4

**? Exercise 2.4.1.23**

Third quartile = \_\_\_\_\_

**? Exercise 2.4.1.24**

Interquartile range (*IQR*) = \_\_\_\_\_ - \_\_\_\_\_ = \_\_\_\_\_

**Answer**

$6 - 4 = 2$

**? Exercise 2.4.1.25**

10<sup>th</sup> percentile = \_\_\_\_\_

**? Exercise 2.4.1.26**

70<sup>th</sup> percentile = \_\_\_\_\_

**Answer**

6

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