**Data Analysis**   A consumer testing service obtained the following mileages (in miles per gallon) in five test runs performed with three types of compact cars.

|          | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|----------|-------|-------|-------|-------|-------|
| **Car A:** | 28 | 32 | 28 | 30 | 34 |
| **Car B:** | 31 | 29 | 31 | 29 | 31 |
| **Car C:** | 29 | 32 | 28 | 32 | 30 |

(a) The manufacturer of Car A wants to advertise that its car performed best in this test. Which measure of central tendency—mean, median, or mode—should be used for its claim? Explain your reasoning.

(b) The manufacturer of Car B wants to advertise that its car performed best in this test. Which measure of central tendency—mean, median, or mode—should be used for its claim? Explain your reasoning.

(c) The manufacturer of Car C wants to advertise that its car performed best in this test. Which measure of central tendency—mean, median, or mode—should be used for its claim? Explain your reasoning.

Sample Solution

## CAR A

The **mean** is the sum of all values divided by the number of values:

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{28 + 32 + 28 + 30 + 34}{5} = \frac{152}{5} = 30.4$$

Order the data values from smallest to largest:

28, 28, 30, 32, 34

The **median** is the middle value of the sorted data set.

$$\text{Median} = 30$$

The **mode** is the data value that occurs the most often in the data set. If there are no data values that are repeated, then the mode does not exist.

$$\text{Mode} = 28$$

## CAR B

The **mean** is the sum of all values divided by the number of values:

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{31 + 29 + 31 + 29 + 31}{5} = \frac{151}{5} = 30.2$$

Order the data values from smallest to largest:

29, 29, 29, 31, 31

The **median** is the middle value of the sorted data set.

$$\text{Median} = 29$$

The **mode** is the data value that occurs the most often in the data set. If there are no data values that are repeated, then the mode does not exist.

$$\text{Mode} = 29$$

## CAR C

The **mean** is the sum of all values divided by the number of values:

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{29 + 32 + 28 + 32 + 30}{5} = \frac{151}{5} = 30.2$$

Order the data values from smallest to largest:

$28, 29, 30, 32, 32$

The **median** is the middle value of the sorted data set.

$$\text{Median} = 30$$

The **mode** is the data value that occurs the most often in the data set. If there are no data values that are repeated, then the mode does not exist.

$$\text{Mode} = 32$$

(a) The manufacturer of Car A wants to advertise that Car A performed the best in the test, thus the manufacturer should then use a measure of central tendency in which Car A performed highest. Car A has a higher mean than the other cars (which is not true for the median and mode) and thus the manufacturer should use the mean.

(b) The manufacturer of Car B wants to advertise that Car B performed the best in the test, thus the manufacturer should then use a measure of central tendency in which Car B performed highest. Car B has a higher median than the other cars (which is not true for the mean and mode) and thus the manufacturer should use the median.

(c) The manufacturer of Car C wants to advertise that Car C performed the best in the test, thus the manufacturer should then use a measure of central tendency in which Car C performed highest. Car C has a higher mode than the other cars (which is not true for the mean and median) and thus the manufacturer should use the mode .

Rubrics:

- Part A (2 points): 1 point for finding mean mode and median of Car A and 1 point for reasoning behind choosing the mean for Car A
- Part B (2 points): 1 point for finding mean mode and median of Car B and 1 point for reasoning behind choosing the median for Car B
- Part C (2 points): 1 point for finding mean mode and median of Car C and 1 point for reasoning behind choosing the mode for Car C

- Genesis Convert Table

| Task Point | Genesis Score |
|------------|---------------|
| 0 | 55 |
| 1 | 59 |
| 2 | 69 |
| 3 | 79 |
| 4 | 89 |
| 5 - 6 | 100 |