The generous CEO of Starbuzz Coffee wants to give all his employees a pay rise. He's not sure whether to give everyone a straight $2,000 raise, or whether to increase salaries by 10%. The mean salary is $50,000, the median is $20,000, and the mode is $10,000.

a) What happens to the mean, median, and mode if everyone at Starbuzz is given a $2,000 pay raise?

Mean: If x represents the original wages, and n the number of employees,

$$\mu = \frac{\sum(x + 2000)}{n}$$

$$= \frac{\sum x}{n} + \frac{\sum 2000}{n}$$

The original mean

There are n lots of 2000.

$$= 50{,}000 + \frac{2000\,n}{n}$$

$$= £52{,}000$$

Adding £2,000 to everyone's salary increases the mean, median, and mode by £2,000.

Median: Every wage has £2,000 added to it, and this includes the middle value—the median. The new median is £20,000 + £2,000 = £22,000.

Mode: The most common wage or mode is £10,000, and with the £2,000 pay raise, this becomes £10,000 + £2000 = £12,000.

b) What happens to the mean, median, and mode if everyone at Starbuzz is given a 10% pay raise instead?

This time, all of the wages are multiplied by 1.1 (which is 100% + 10%).

Mean: $\mu = \frac{\sum(1.1x)}{n}$

$$= \frac{1.1\sum x}{n}$$

Increasing everyone's salary by 10% increases the mean, median, and mode by 10%.

$$= 1.1 \times 50{,}000$$

$$= £55{,}000$$

Median: Every wage is multiplied by 1.1, and this includes the middle value—the median. The new median is £20,000 × 1.1 = £22,000.

Mode: The most common wage or mode is £10,000, and if we multiply this by 1.1, it becomes £10,000 × 1.1 = £12,000.

c) Which sort of pay raise would you prefer if you were earning the mean wage? What about if you were on the same wage as the mode?

If you earn the mean wage, you'll get a larger pay increase if you get a 10% pay raise. If you earn the mode wage, you'll get more money if you ask for the straight £2,000 pay increase.