

Name: KEY
Date: _____

- I. The average snowfall at BWI Marshall Airport is 22", with a standard deviation of 1.2".
Use this information to answer questions Ia – Ii.

- a. What percent of years had snowfall that was 2 standard deviations **below** average?

$$z = \frac{19.6 - 22}{1.2}$$

$$z = -2$$

$$P(z < -2) = \boxed{2.28\%}$$

- b. What percent of years had snowfall that was 2 or more inches below the mean?

$$z = \frac{20 - 22}{1.2}$$

$$z = -1.67$$

$$P(z < -1.67) = \boxed{4.75\%}$$

- c. Snowfall above 25" is considered "unusually snowy." What percent of years had snowfall above 25"? (1pt)

$$z = \frac{25 - 22}{1.2}$$

$$z = 2.5$$

$$P(z > 2.5) = 100\% - 99.38\% = \boxed{0.62\%}$$

- d. How many inches of snow fell in the least-snowy 10% of years?

$$P(z = ?) = 0.10$$

$$z = -1.25$$

$$-1.25 = \frac{x - 22}{1.2}$$

$$\boxed{x = 20.5 \text{ inches}}$$

e. What percent of years had more than 21" of snow?

$$Z = \frac{21 - 22}{1.2}$$

$$P(Z > -0.83) = 100\% - 20.33\% = \boxed{79.67\%}$$

$$Z = -0.83$$

f. Find the third quartile (75th percentile) for snowfall.

$$P(Z = ?) = .75$$

$$0.67 = \frac{x - 22}{1.2}$$

$$Z = 0.67$$

$$\boxed{x = 22.804 \text{ inches}}$$

g. What percent of people years had snowfall between 20" and 23"?

$$Z = \frac{20 - 22}{1.2}$$

$$Z = \frac{23 - 22}{1.2}$$

$$Z = -1.67$$

$$Z = 0.83$$

$$P(Z = -1.67) = 4.75\%$$

$$P(Z = 0.83) = 79.67\%$$

$$\begin{array}{r} 79.67\% \\ - 4.75\% \\ \hline \boxed{74.92\%} \end{array}$$

h. What is the range of snowfall for the **middle 80%** of years?

$$P(Z) = .10$$

$$P(Z) = .90$$

$$Z = -1.25$$

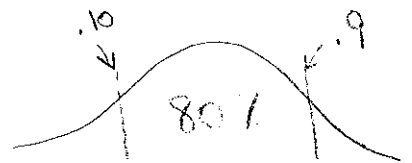
$$Z = 1.25$$

$$-1.25 = \frac{x - 22}{1.2}$$

$$1.25 = \frac{x - 22}{1.2}$$

$$x = 20.5 \text{ inches}$$

$$x = 23.5$$



$$\boxed{20.5 \text{ in to } 23.5 \text{ in}}$$

i. What is the range of snowfall for the **middle 50%** of years?

$$P(Z) = .25$$

$$P(Z) = .75$$

$$Z = -.67$$

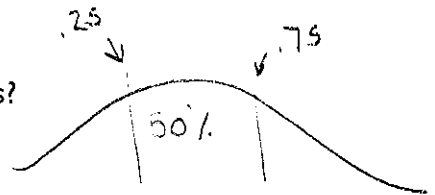
$$Z = .67$$

$$-.67 = \frac{x - 22}{1.2}$$

$$.67 = \frac{x - 22}{1.2}$$

$$x = 21.196$$

$$x = 22.804$$



$$\boxed{21.196 \text{ in to } 22.804 \text{ in}}$$

Statistics

Normal Distribution Test REVIEW V2

2. 2009 – 2010 had two snowstorms back-to-back. That winter, 77 inches of snow fell at the BWI Marshall Airport. Is this snowfall unusual compared to what is described by the Normal model? Explain.

$$z = \frac{77 - 22}{1.2}$$

$$z = 45.8\bar{3}$$

This winter was 45 standard deviations above average. This amount of snowfall has a probability of almost 0% occurrence!

3. SAT math scores are normally distributed. For males, the mean is 527, with a standard deviation of 124. For females, the mean is 496 with a standard deviation of 115.

- a. Which group, males or females, are **more consistent** in their scores? (More consistent means **less varied**.)

Females are more consistent because their standard deviation is smaller.

- b. What percent of girls scored **higher than** the average boys' score of 527?

$$z = \frac{527 - 496}{115}$$

$$z = 0.27$$

$$P(Z > 0.27) = 100\% - 60.64\% = \boxed{39.36\%}$$

- c. Which is more unusual, a girl who scores 546 or a boy who scores 577?

$$\text{Girl: } z = \frac{546 - 496}{115}$$

$$z = .43$$

$$\text{Boys: } z = \frac{577 - 527}{124}$$

$$z = .40$$

It is more unusual for a girl to score that high. She would have scored more standard deviations above average than did the boy.

4. SAT scores are normally distributed with a mean of 500 and a standard deviation of 100. The creators of the SAT are distressed by the difference in scores for various ethnicities. They want to change the standard deviation in order to make the results more consistent. Should they increase or decrease the standard deviation?

They should decrease the standard deviation in order to make it more consistent.