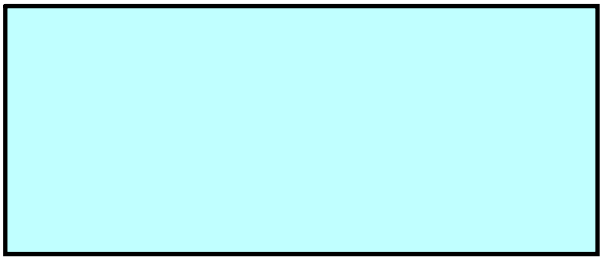
Solve Absolute Value Equations:

Absolute Deviation and Absolute Error

Absolute deviation:



The absolute deviation of x from 7.6 is 5.2. What are the values of x that satisfy this requirement?

$$|x-7.6|=5.2$$

$$x-7.6=5.2 \text{ or } x-7.6=-5.2$$

$$x=12.8 \text{ or } x=2.4$$

Five times the absolute deviation of $2x$ from -9 is 15.

$|x - \text{given value}|$

$$\frac{5|2x-(-9)|}{5} = \frac{15}{5}$$

$$|2x+9| = 3$$

$2x+9=3$ or $2x+9=-3$

$-9 \quad -9 \qquad -9 \quad -9$

$\frac{2x}{2} = \frac{-6}{2}$ or $\frac{2x}{2} = \frac{-12}{2}$

$x = -3$ or $x = -6$

GUARDRAILS A safety regulation requires that the height of a guardrail be 42 inches with an absolute deviation of 3 inches. Find the minimum and maximum heights of a guardrail.

$$|x-42| = 3$$

$x-42=3$ or $x-42=-3$

$+42 \quad +42 \qquad +42 \quad +42$

$x = 45$ inches or $x = 39$ inches

max min.

CHEERLEADING A cheerleading team is preparing a dance program for a competition. The program must last 4 minutes with an absolute deviation of 5 seconds. Find the least and greatest possible times (in seconds) that the program can last.

$|x-240|=5$

$60 \times 4 = 240$ sec

$x-240=5$ or $x-240=-5$

$+240+240$ $+240+240$

$x=245$ sec or $x=235$ sec

Absolute Error - the absolute deviation of a measured value from an accepted value.

$$\text{Absolute error} = |\text{Measured} - \text{Accepted}|$$

set standard value

The diameter of a billiard ball must be 2.25 inches with an absolute error of 0.005 inch. What is the maximum possible diameter that a billiard ball can have?

Absolute error = | Measured − Accepted |

$0.005 = |x - 2.25|$

max

$0.005 = x - 2.25$

$+2.25 \quad +2.25$

$2.255 = x$

max diameter

2.255 in