

Solutions

1. Evaluate.

$$\begin{aligned} \text{a) } |9| \\ = 9 \end{aligned}$$

$$\begin{aligned} \text{b) } |0| \\ = 0 \end{aligned}$$

$$\begin{aligned} \text{c) } |-7| \\ = 7 \end{aligned}$$

$$\begin{aligned} \text{d) } |-4.728| \\ = 4.728 \end{aligned}$$

$$\begin{aligned} \text{e) } |6.25| \\ = 6.25 \end{aligned}$$

$$\begin{aligned} \text{f) } \left| -5\frac{1}{2} \right| \\ = 5\frac{1}{2} \end{aligned}$$

2. Order the numbers from least to greatest.

$$\begin{array}{ccccccc} 10.81, & 1.1, & |-2|, & \left| \frac{3}{5} \right|, & -0.4, & \left| -1\frac{1}{4} \right|, & -0.8 \\ \Downarrow & & \Downarrow & \Downarrow & & \Downarrow & \\ 0.8 & & 2 & \frac{3}{5} & & 1\frac{1}{4} & \end{array}$$

The numbers from least to greatest are:

$$-0.8, -0.4, \left| \frac{3}{5} \right|, 10.81, 1.1, \left| -1\frac{1}{4} \right|, \text{ and } |-2|.$$

3. Order the numbers from greatest to least.

$$\begin{array}{ccccccc} -2.4, & |1.3|, & \left| -\frac{7}{5} \right|, & -1.9, & |-0.6|, & \left| 1\frac{1}{10} \right|, & 2.2. \\ & \Downarrow & \Downarrow & & \Downarrow & \Downarrow & \\ & 1.3 & \frac{7}{5} & & 0.6 & 1\frac{1}{10} & \end{array}$$

The numbers from greatest to least are:

$$2.2, \left| -\frac{7}{5} \right|, |1.3|, \left| 1\frac{1}{10} \right|, |-0.6|, -1.9 \text{ and } -2.4.$$

Solutions

4. Evaluate each expression.

$$\begin{aligned} \text{a) } & |8-15| \\ &= |-7| \\ &= 7 \end{aligned}$$

$$\begin{aligned} \text{b) } & |3|-|-8| \\ &= 3-8 \\ &= -5 \end{aligned}$$

$$\begin{aligned} \text{c) } & |7-(-3)| \\ &= |7+3| \\ &= |10| \\ &= 10 \end{aligned}$$

$$\begin{aligned} \text{d) } & |2-5(3)| \\ &= |2-15| \\ &= |-13| \\ &= 13 \end{aligned}$$

6. Determine the value of each absolute value expression.

$$\begin{aligned} \text{a) } & 2|-6-(-11)| \\ &= 2|-6+11| \\ &= 2|5| \\ &= 2(5) \\ &= 10 \end{aligned}$$

$$\begin{aligned} \text{b) } & |-9.5|-|12.3| \\ &= 9.5-12.3 \\ &= -2.8 \end{aligned}$$

$$\begin{aligned} \text{c) } & 3\left|\frac{1}{2}\right| + 5\left|-\frac{3}{4}\right| \\ &= 3\left(\frac{1}{2}\right) + 5\left(\frac{3}{4}\right) \\ &= \frac{3}{2} + \frac{15}{4} \\ &= \frac{6}{4} + \frac{15}{4} \\ &= \frac{21}{4} \end{aligned}$$

$$\begin{aligned} \text{d) } & |3(-2)^2 + 5(-2) + 7| \\ &= |3(4) - 10 + 7| \\ &= |12 - 10 + 7| \\ &= |2 + 7| \\ &= |9| \\ &= 9 \end{aligned}$$

Solutions

$$\begin{aligned}
 e) & \quad |-4+13| + |6-(-9)| - |8-17| + |-2| \\
 & = |9| + |6+9| - |-9| + 2 \\
 & = 9 + |15| - 9 + 2 \\
 & = 9 + 15 - 9 + 2 \\
 & = 24 - 9 + 2 \\
 & = 15 + 2 \\
 & = 17
 \end{aligned}$$

8. Southern Alberta often experiences dry chinook winds in winter and spring that can change temperatures by a large amount in a short time. On a particular day in Warner, Alberta, the temperature was -11°C in the morning. A chinook wind raised the temperature to $+7^{\circ}\text{C}$ by afternoon. The temperature dropped to -9°C during the night. Use absolute value symbols to write an expression for the total change in temperature that day. What is the total change in temperature for the day?

$$\text{Let } T_1 = -11, T_2 = 7, T_3 = -9$$

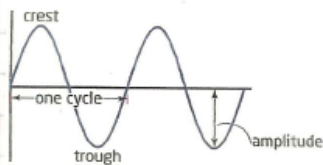
$$\begin{aligned}
 & \quad |T_2 - T_1| + |T_3 - T_2| \\
 & = |7 - (-11)| + |-9 - 7| \\
 & = |7 + 11| + |-16| \\
 & = |18| + 16 \\
 & = 18 + 16 \\
 & = 34
 \end{aligned}$$

The total change in temperature for the day is 34°C .

Solutions

12. In physics, the amplitude of a wave is measured as the absolute value of the difference between the crest height and the trough height of the wave, divided by 2.

$$\text{Amplitude} = \frac{|\text{crest height} - \text{trough height}|}{2}$$



Determine the amplitude of waves with the following characteristics.

a) crest at height 17 and trough at height 2.

$$\begin{aligned} \text{Amplitude} &= \frac{|\text{crest height} - \text{trough height}|}{2} \\ &= \frac{|17 - 2|}{2} \\ &= \frac{|15|}{2} \\ &= \frac{15}{2} \end{aligned}$$

Solutions

$$\begin{aligned} \text{b) Amplitude} &= \frac{|\text{crest height} - \text{trough height}|}{2} \\ &= \frac{|90 - (-90)|}{2} \\ &= \frac{|90 + 90|}{2} \\ &= \frac{|180|}{2} \\ &= \frac{180}{2} \\ &= 90 \end{aligned}$$

$$\begin{aligned} \text{c) Amplitude} &= \frac{|\text{crest height} - \text{trough height}|}{2} \\ &= \frac{|1.25 - (-0.5)|}{2} \\ &= \frac{|1.25 + 0.5|}{2} \\ &= \frac{|1.75|}{2} \\ &= \frac{1.75}{2} \\ &= 0.875 \end{aligned}$$