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## Play Ball! Absolute Value Equations and Inequalities



### Vocabulary

Define each term in your own words.

1. opposites

2. absolute value

Give an example of each term.

3. linear absolute value equation

4. linear absolute value inequality

Match each equivalent compound inequality to its corresponding absolute value inequality.

5.  $|ax + b| < c$

a.  $-c < ax + b < c$

6.  $|ax + b| \leq c$

b.  $ax + b < -c$  or  $ax + b > c$

7.  $|ax + b| > c$

c.  $-c \leq ax + b \leq c$

8.  $|ax + b| \geq c$

d.  $ax + b \leq -c$  or  $ax + b \geq c$

### Problem Set

Evaluate each absolute value.

1.  $|3| = 3$

2.  $|-3| =$

3.  $\left|\frac{1}{4}\right| =$

4.  $\left|-\frac{1}{4}\right| =$

5.  $|3.7| =$

6.  $|-3.7| =$

Determine the number of solutions for each equation. Then calculate the solution.

7.  $x = -9$

There is only one solution.

$x = -9$

8.  $|x| = -6$

9.  $|x| = 4$

10.  $|-x| = -8$

11.  $|x| = 0$

12.  $|-x| = 15$

Solve each linear absolute value equation.

13.  $|x + 9| = 2$

$(x + 9) = 2$

$x + 9 - 9 = 2 - 9$

$x = -7$

$-(x + 9) = 2$

$x + 9 = -2$

$x + 9 - 9 = -2 - 9$

$x = -11$

14.  $|x + 4| = 10$

15.  $|x - 12| = 5$

16.  $|2x - 6| = 18$

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17.  $|3x + 1| = -9$

**2**

18.  $|5x + 1| = 14$

Solve each linear absolute value equation.

19.  $|x| - 8 = 25$

$|x| - 8 = 25$

$|x| - 8 + 8 = 25 + 8$

$|x| = 33$

$x = 33$

$-(x) = 33$

$x = -33$

20.  $|x + 3| - 7 = 40$

21.  $2|x - 6| = 48$

22.  $3|x + 8| = 36$

**2**

23.  $5|x| + 4 = 79$

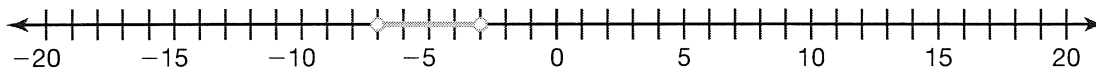
24.  $2|x| - 5 = 11$

Solve each linear absolute value inequality. Graph the solution on the number line.

25.  $|x + 5| < 2$

$$\begin{aligned} (x + 5) &< 2 \\ x + 5 - 5 &< 2 - 5 \\ x &< -3 \end{aligned}$$

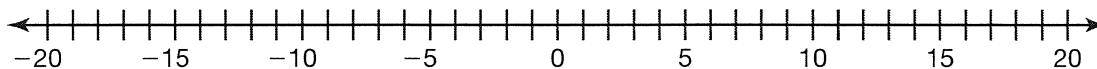
$$\begin{aligned} -(x + 5) &< 2 \\ x + 5 &> -2 \\ x + 5 - 5 &> -2 - 5 \\ x &> -7 \end{aligned}$$



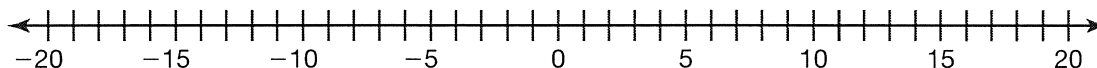
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26.  $|x - 3| \leq 6$

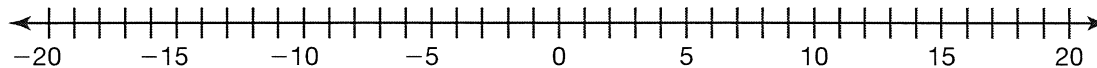
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27.  $2|x - 1| < 14$

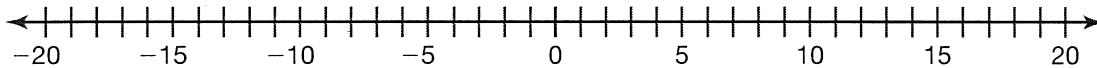


28.  $3|x + 4| \geq 9$

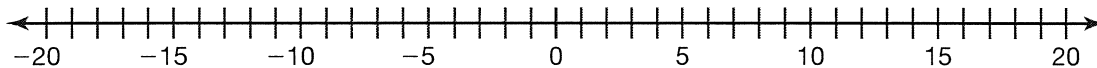


29.  $2|x - 1| - 8 \leq 10$

**2**



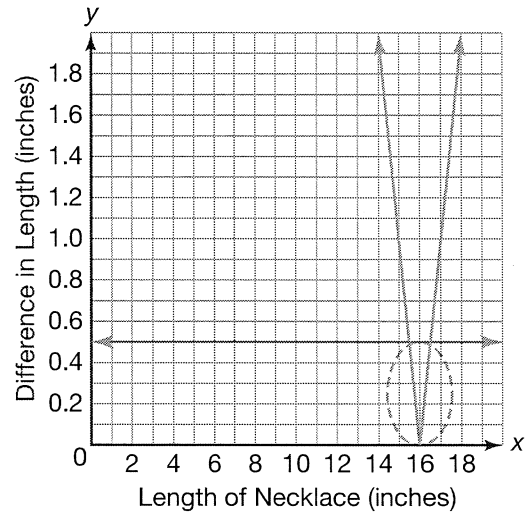
30.  $3|x + 2| + 5 \geq 23$



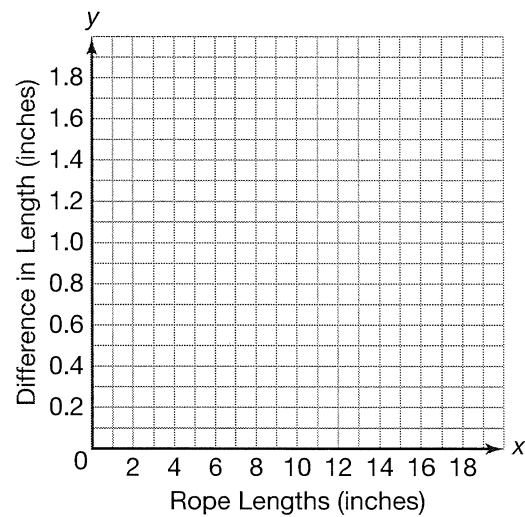
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Graph the function that represents each problem situation. Draw an oval on the graph to represent the answer.

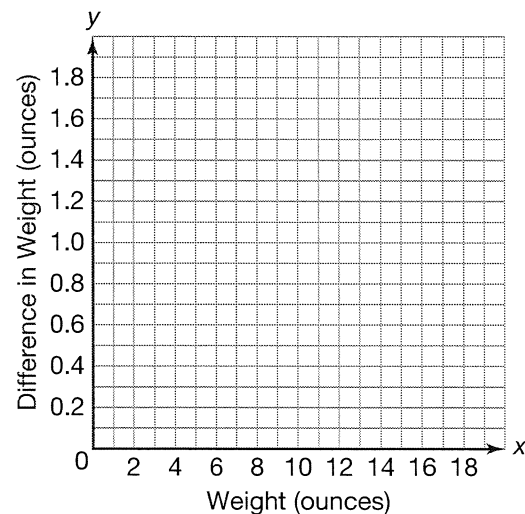
- 31.** A jewelry company is making 16-inch bead necklaces. The specifications allow for a difference of 0.5 inch. The function  $f(x) = |x - 16|$  represents the difference between the necklaces manufactured and the specifications. Graph the function. What necklace lengths meet the specifications?  
The necklaces can be between 15.5 and 16.5 inches long to meet the specifications.



- 32.** Julian is cutting lengths of rope for a class project. Each rope length should be 10 inches long. The specifications allow for a difference of 1 inch. The function  $f(x) = |x - 10|$  represents the difference between the rope lengths cut and the specifications. Graph the function. What rope lengths meet the specifications?

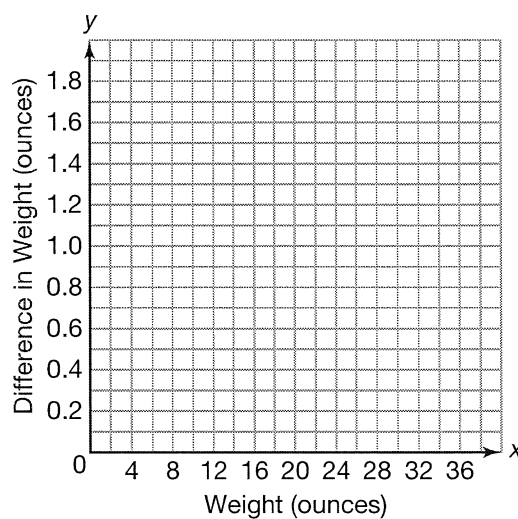


- 33.** A snack company is filling bags with pita chips sold by weight. Each bag should contain 8 ounces of chips. The specifications allow for a difference of 0.25 ounce. The function  $f(x) = |x - 8|$  represents the difference between the weight of a bag of chips and the specifications. Graph the function. What weights meet the specifications?

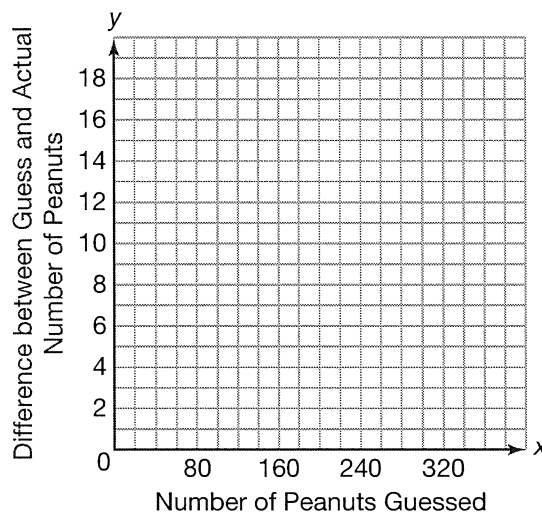


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- 34.** A cereal company is filling boxes with cereal sold by weight. Each box should contain 32 ounces of cereal. The specifications allow for a difference of 0.5 ounce. The function  $f(x) = |x - 32|$  represents the difference between the weight of a box of cereal and the specifications. Graph the function. What weights do not meet the specifications?



- 35.** Guests at the school harvest festival are asked to guess how many peanuts are in a jar. The jar contains 260 peanuts. All guests within 10 peanuts of the correct answer win a prize. The function  $f(x) = |x - 260|$  represents the difference between a guess and the actual number of peanuts in the jar. Graph the function. What possible guesses will not win a prize?



- 36.** The rules of an art contest state that sculptures submitted should be 3 feet high but allow for a difference of 6 inches. The function  $f(x) = |x - 3|$  represents the difference between a sculpture that is submitted and the specifications. Graph the function. What heights do not meet the specifications?

