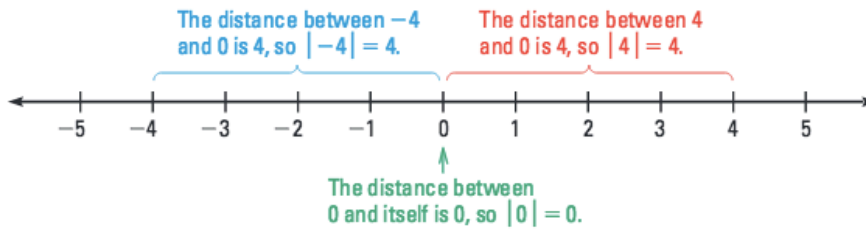


Absolute Value Worksheet

The **absolute value** of a number x , written $|x|$, is the distance the number is from 0 on a number line. Notice that the absolute value of a number is always nonnegative.



The absolute value of x can be defined algebraically as follows.

$$|x| = \begin{cases} x, & \text{if } x \text{ is positive} \\ 0, & \text{if } x = 0 \\ -x, & \text{if } x \text{ is negative} \end{cases}$$

To solve an absolute value equation of the form $|x| = c$ where $c > 0$, use the fact that x can have two possible values: a positive value c or a negative value $-c$. For instance, if $|x| = 5$, then $x = 5$ or $x = -5$.

ABSOLUTE VALUE SIGNS ARE TO BE TREATED AS GROUPING SYMBOLS. TRY TO SIMPLIFY INSIDE THE BARS FIRST, THEN TAKE THE ABSOLUTE VALUE (the positive number.)

I. Simplify each expression

1. $|3 - 8|$
2. $|5 \cdot 2 - 25|$
3. $|29 - 10 \div 5|$
4. $|17 - 19 + 2|$

II. Multiple Choice - Using substitution, solve each of the following absolute value equations. Remember to check all responses. Show your work and circle your response.

1. Solve $|x + 4| = 3$
 - a.) $x = -1$ and 7
 - b.) $x = -1$ and -7
 - c.) $x = -7$
 - d.) $x = -1$
2. Solve $|m| - 7 = -5$
 - a.) no solutions
 - b.) $m = 2$
 - c.) $m = 12$
 - d.) $m = 2$ and -2
3. Solve $|3x| = -12$
 - a.) $x = -4$
 - b.) no solutions
 - c.) $x = 4$
 - d.) $x = -15$
4. Solve $|-7m + 14| = 0$
 - a.) $m = 2$
 - b.) $m = -2$
 - c.) no solutions
 - d.) $m = -2$ and 2

III. Solve each equation. Remember that an absolute value equation may have two solutions. Include a check of your solution(s).

1. $|x| = 8$

2. $|y| = 1$

3. $|y - 5| = 8$

4. $|2x + 1| = 3$

IV. Write an absolute value equation that has the following solutions.

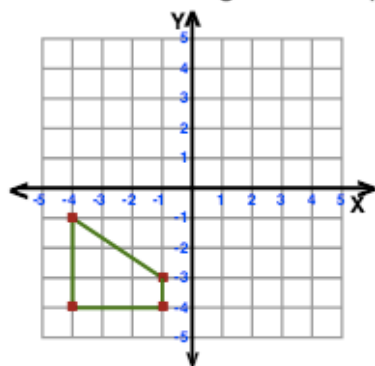
1. $m = 2$ and -2

2. $x = 3$ and -3

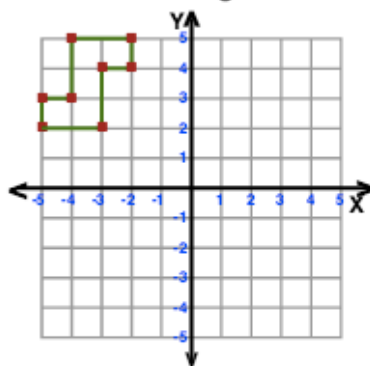
3. Challenge:
 $x = 7$ and -2

IV. Review of Transformations

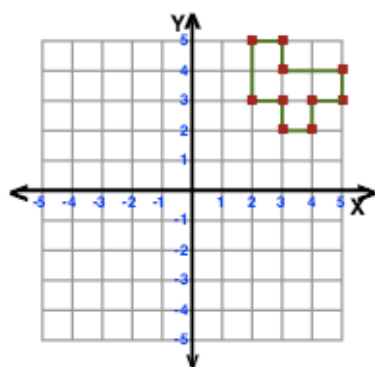
1) Translation: 2 right and 4 up



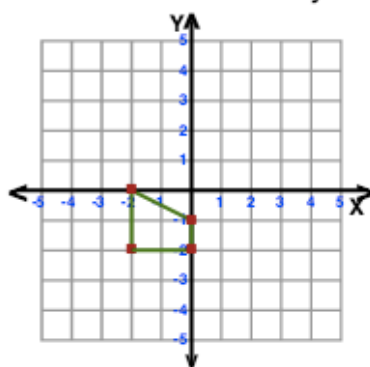
2) Translation: 2 right and 5 down



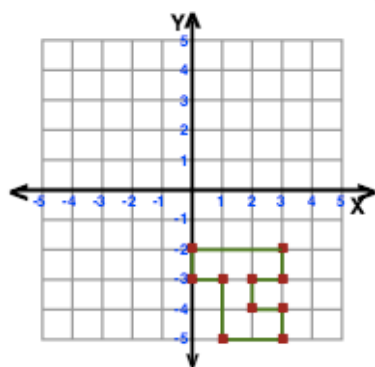
3) Reflection: Across the x-axis



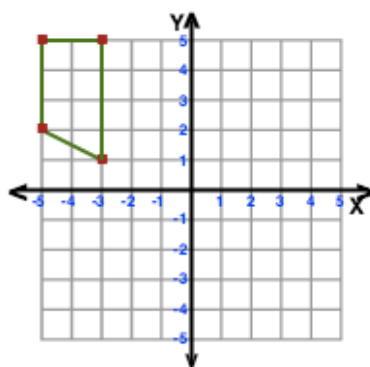
4) Reflection: Across the y-axis



5) Rotation: 180° about the origin



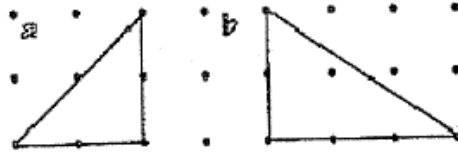
6) Rotation: 90° clockwise about the origin



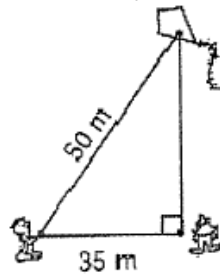
V. Review of Pythagorean Theorem

Word Problems. Draw a picture first, then use the Pythagorean Theorem to solve.

1. A wire is stretched from the top of an 8-ft pole to a bracket 5 ft. from the base of the pole. How long is the wire?
2. A helicopter rose vertically 300 m and then flew west 400 m. How far was the helicopter from its starting point?
3. The triangles below are drawn on 1-cm dot paper. Find the perimeter of each triangle.



4. A park is in the shape of a rectangle 8 miles long and 6 miles wide. How much shorter is your walk if you walk diagonally across the park than along two sides of it?
5. The bases on a softball diamond are 60 feet apart. How far is it from home plate to second base?
6. Anna has let out 50 meters of kite string when she observes that her kite is directly above Emily. If Anna is 35 meters from Emily, how high is the kite?



9. A lifeguard spots a drowning swimmer 40 ft. from the beach. She runs 90 ft. along the beach at a speed of 15 feet per second, then jumps in the water and swims straight to the swimmer at a speed of 5 feet per second. How long does it take her to reach the swimmer?

