5.5 Solving Absolute Value Equations

An absolute value equation is in the form $|ax + b| = c$.

To solve an absolute value equation when $c \geq 0$:

$ax + b = c$ or $ax + b = -c$

c: right of 0 $\quad$ $-c$: left of 0

Always isolate the absolute value before separating into two equations!!

Solve & graph the absolute value equations.

1. $|x| = 7$

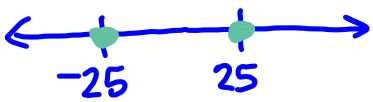
the distance from 0 is 7

$x = -7$ or $x = 7$

2. $|x| = 25$

the distance from 0 is 25

$x = -25$ or $x = 25$



3. $|x| = -4$

the distance from 0 is -4

no solution

Solve & graph the absolute value equations.

4. $|x - 2| = 5$ the dist. from 0 is 5

$x - 2 = -5$ or $x - 2 = 5$

$+2 \quad +2 \qquad +2 \quad +2$

$x = -3$ or $x = 7$

5. $|x + 3| = 18$ the dist. from 0 is 18

$x + 3 = -18$ or $x + 3 = 18$

$-3 \quad -3 \qquad -3 \quad -3$

$x = -21$ or $x = 15$

Solve the absolute value equations.

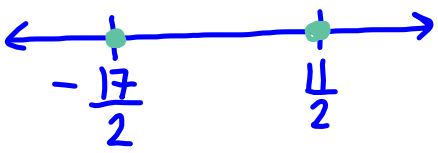
6. $|4x + 6| = 28$

$4x + 6 = -28$ or $4x + 6 = 28$

$-6 \quad -6 \qquad -6 \quad -6$

$\frac{4x}{4} = \frac{-34}{4}$ $\qquad$ $\frac{4x}{4} = \frac{22}{4}$

$x = -\frac{17}{2}$ $\qquad$ $x = \frac{11}{2}$



7. $|7 - 2x| = 19$

$7 - 2x = -19$ or $7 - 2x = 19$

$-7 \quad -7 \qquad -7 \quad -7$

$\frac{-2x}{-2} = \frac{-26}{-2}$ $\qquad$ $\frac{-2x}{-2} = \frac{12}{-2}$

$x = 13$ or $x = -6$

Solve the absolute value equations.

8. $|x+1|+2=5$

$-2 \quad -2$

$|x+1| = 3$

$x+1=-3$ or $x+1=3$

$-1 \quad -1 \qquad -1 \quad -1$

$x=-4$ or $x=2$

9. $|2x-8|-14=-4$

$+14 \quad +14$

$|2x-8| = 10$

$2x-8=-10$ or $2x-8=10$

$+8 \quad +8 \qquad +8 \quad +8$

$\frac{2x}{2} = \frac{-2}{2} \qquad \frac{2x}{2} = \frac{18}{2}$

$x=-1$ or $x=9$

Solve the absolute value equations.

10. $2|x-3|=16$

$\frac{2}{2} \quad \frac{16}{2}$

$|x-3| = 8$

$x-3=-8$ or $x-3=8$

$+3 \quad +3 \qquad +3 \quad +3$

$x=-5$ or $x=11$

11. $5 \cdot \frac{|x+4|}{5} = 3 \cdot 5$

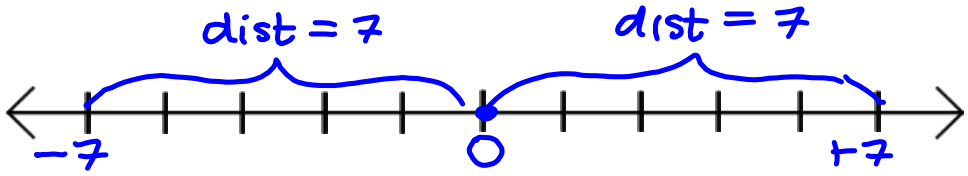
$|x+4| = 15$

$x+4=-15$ or $x+4=15$

$-4 \quad -4 \qquad -4 \quad -4$

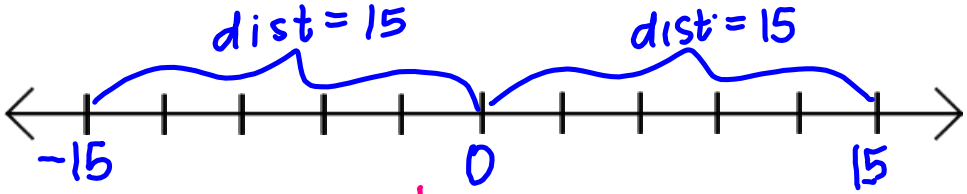
$x=-19$ or $x=11$

12. Write an absolute value equation that has -7 and 7 as its solutions.



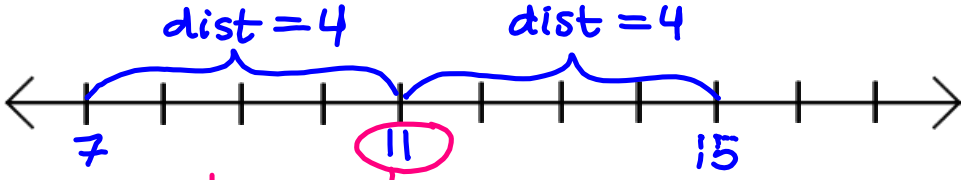
$|x| = 7$

13. Write an absolute value equation that has 15 and -15 as its solutions.



$|x| = 15$

14. Write an absolute value equation that has 7 and 15 as its solutions.

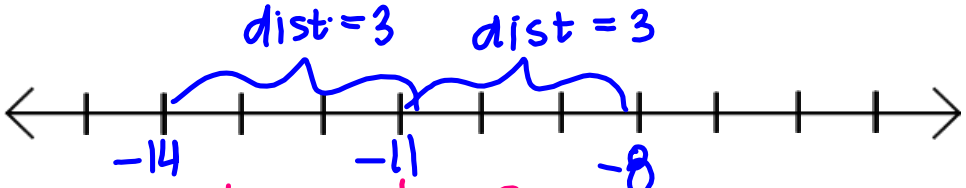


$|x-11| = 4$

in middle

dist.

15. Write an absolute value equation that has -8 and -14 as its solutions.



$|x+11| = 3$