

# Absolute value equations and inequalities Guided Notes

## Notes:

### Absolute value equations:

To solve an absolute value equation, isolate the absolute value on one side of the equal sign, and establish two cases:

Case 1:	Case 2:
$ a  = b$	$ a  = b$
$a = b$	$a = -b$
Set the expression inside the absolute value symbol equal to the other given expression.	Set the expression inside the absolute value symbol equal to the negation of the other given expression

### Absolute value inequalities:

Start by isolating the absolute value on one side of the inequality symbol, then follow the rules below:

If the symbol is  $>$  (or  $\geq$ ) :

If  $a > 0$ , then the solutions to  $|x| > a$  are  $x > a$  or  $x < -a$ .

(or) if  $a < 0$ , all real numbers will satisfy  $|x| > a$

**Think about it:** absolute value is always positive (or zero), so, of course, it is greater than any negative number.

If the symbol is  $<$  (or  $\leq$ ) :

If  $a > 0$ , then the solutions to  $|x| < a$  and  $x > -a$

Also written as :  $-a < x < a$

(and) if  $a < 0$ , there is no solution to  $|x| < a$

**Think about it:** absolute value is always positive (or zero), so, of course, it cannot be less than a negative number.

**Absolute value equations and inequalities** Guided Notes**Questions:**

1. Solve the following equation for x

$$|x + 5| = 9$$

Case 1

$$x + 5 = 9$$

$$x = 4$$

Case 2

$$x + 5 = -9$$

$$x = -14$$

2. Solve the following equation for x

$$2 \times |x - 4| + 9 = 19$$

$$2 \times |x - 4| = 10$$

$$|x - 4| = 5$$

Case 1

$$x - 4 = 5$$

$$x = 9$$

Case 2

$$x - 4 = -5$$

$$x = -1$$

3. Solve the following inequality for x

$$\frac{|-x + 4|}{6} > 10$$

$$|-x + 4| > 6 \times 10$$

$$|-x + 4| > 60$$

Case 1

$$-x + 4 > 60$$

$$4 - 60 > x$$

$$-56 > x$$

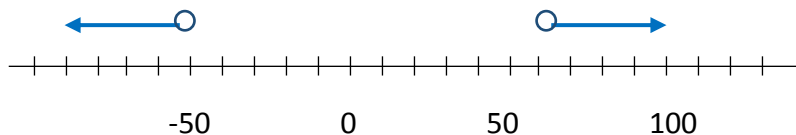
$$\text{So } x < -56 \text{ or } x > 64$$

Case 2

$$-x + 4 < -60$$

$$60 + 4 < x$$

$$64 < x$$



**Absolute value equations and inequalities** Guided Notes

4. Solve the following inequality for x

$$|x + 10| + 5 \leq 20$$

$$|x + 10| \leq 15$$

Case 1

$$x + 10 \leq 15$$

$$x \leq 5$$

$$\text{So } -25 \leq x \leq 5$$

Case 2

$$x + 10 \geq -15$$

$$x \geq -25$$

