College Algebra /
Module 3 - Absolute Value Equations and Inequalities

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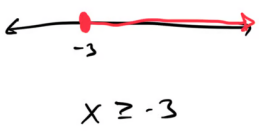
Topic 1: Graphing a linear inequality on the number line

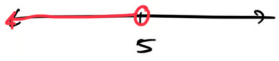
1. Graph the inequality $x \geq -3$ on the number line.



$x \geq -3$

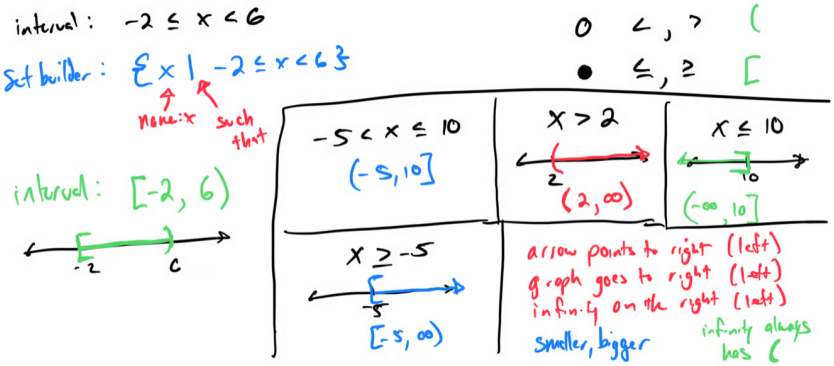
< less than
≤ less than equal to
> greater than
≥ greater than or equal to
○ <, > open circle
● ≤, ≥ closed circle

1. Graph the inequality $x < 5$ on the number line.



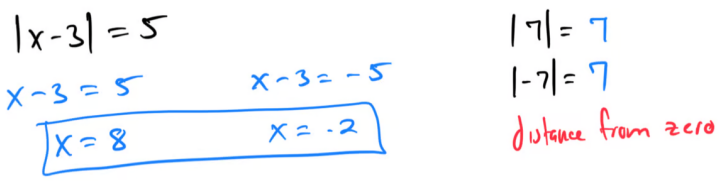
$x < 5$

Topic 2: Set-builder and interval notation



Topic 3: Solving an absolute value equation: Problem type 2

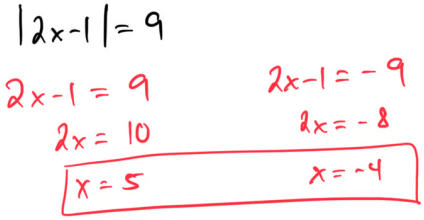
1. Solve the equation |x - 3| = 5.



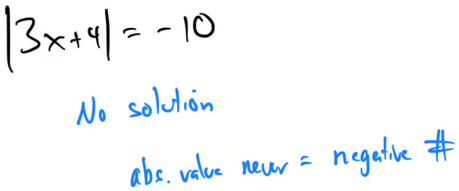
1. Solve the equation |x + 2| = 7.

Topic 4: Solving an absolute value equation: Problem type 3

1. Solve the equation |2x - 1| = 9.

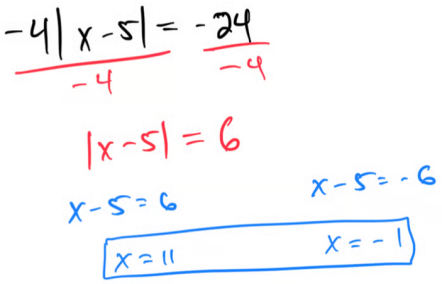


1. Solve the equation |3x + 4| = -10.



Topic 5: Solving an absolute value equation: Problem type 4

1. Solve the equation -4|x - 5| = -24



1. Solve the equation 3|3x - 2| = 15

Topic 6: Translating a sentence into a one-step inequality

1. Translate "A number is at least 12" into a one-step inequality.

$n \geq 12$

$\geq$ at least
$\leq$ at most

1. Translate "A number is at most 7" into a one-step inequality.

$n \leq 7$

1.

Topic 7: Writing an inequality for a real-world situation

1. A car rental company charges $30 per day plus $0.20 per mile. Write an inequality to represent the situation where the total cost must be less than $50.

$30 + 0.20m < 50$

1.
2. A store offers a discount if you buy more than 5 items. Write an inequality to represent the number of items needed to qualify for the discount.

Topic 8: Writing an inequality given a graph on the number line

$x > 6$

Topic 10: Solving a two-step linear inequality: Problem type 2

1. Solve the inequality 3x + 4 > 10 and graph the solution on a number line.

$3x + 4 > 10$
$-4 \quad -4$
$\frac{3x}{3} > \frac{6}{3}$
$x > 2$
$(2, \infty)$

1. Solve the inequality 2x - 5 ≤ -9 and graph the solution on a number line.

$2x - 5 \leq -9$
$\frac{2x}{2} \leq \frac{-4}{2}$
$x \leq -2$

$(-\infty, -2]$

Topic 11: Solving a linear inequality with multiple occurrences of the variable: Problem type 1

1. Solve the inequality -2x + 8 < 5x - 6.

$-2x+8 < 5x-6$

$-5x \quad -5x$

$-7x+8 < -6$

$-8 \quad -8$

$\frac{-7x}{-7} < \frac{-14}{-7}$

$x > 2$

$(2, \infty)$

If you Divide/multiply by a negative, FLIP THE SIGN!

1. Solve the inequality 4x - 7 ≥ x + 8.

Topic 12: Solving a compound linear inequality: Graph solution, basic

1. Solve the compound inequality -2 ≤ x+2 < 5 and graph the solution on a number line.

$-2 \leq x+2 < 5$

$-2 \quad -2 \quad -2$

$-4 \leq x < 3$

$[-4, 3)$

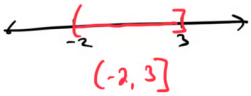
1. Solve the compound inequality -3 < 2x + 1 ≤ 7 and express the solution in interval notation.

$-3 < 2x+1 \leq 7$

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

$\frac{-4}{2} < \frac{2x}{2} \leq \frac{6}{2}$

$-2 < x \leq 3$



$(-2, 3]$

Topic 13: Solving a compound linear inequality: Interval notation

$2y+1 \geq 13$ or $3y+4 < 1$

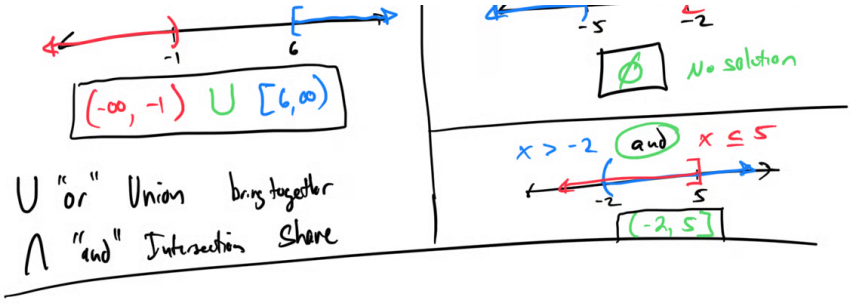
$2y \geq 12 \qquad 3y < -3$

$y \geq 6 \qquad y < -1$

$-4x > 20$ and $2x+1 \geq -3$

$\frac{-4x}{-4} > \frac{20}{-4} \qquad 2x \geq -4$

$x < -5 \qquad x \geq -2$



1. Solve the compound inequality $1 \leq 3x - 2 < 10$ and express the solution in interval notation.

Topic 14: Solving a decimal word problem using a two-step linear inequality

1. A phone plan charges $0.10 per minute plus a $15 monthly fee. Write and solve an inequality to find how many minutes you can use if your bill must be less than $25.

$$0.10x + 15 < 25$$
$$-15 \quad -15$$
$$\frac{0.10x}{0.10} < \frac{10}{0.10}$$
$$x < 100$$

1. A coffee shop sells drinks for $2.50 each plus a $5 service fee. Write and solve an inequality to determine how many drinks you can buy if your total cost must be at most $20.

$$2.50x + 5 \leq 20$$
$$\frac{2.50x}{2.50} \leq \frac{15}{2.50}$$
$$x \leq 6$$