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Date _____
Pre Calculus

Solving Quadratic Inequalities

Solve each of the following for x and graph on a number line.

1. $x^2 + 2x < 8$ *convergent*

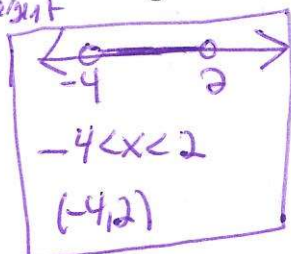
$$x^2 + 2x = 8$$

$$-8 \quad -8$$

$$x^2 + 2x - 8 = 0$$

$$(x+4)(x-2) = 0$$

$$x = -4 \quad x = 2$$



2. $x^2 \geq 7x - 12$ *divergent*

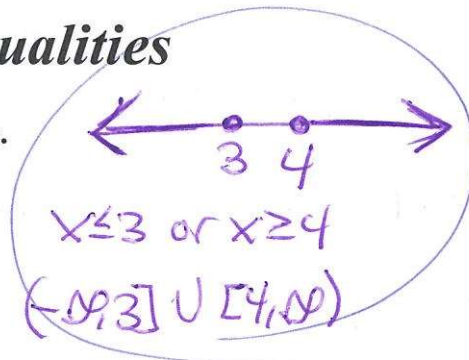
$$x^2 = 7x - 12$$

$$-7x + 12 = -7x + 12$$

$$x^2 - 7x + 12 = 0$$

$$(x-4)(x-3) = 0$$

$$x = 4 \quad x = 3$$



3. $x^2 + 3x < 18$ *convergent*

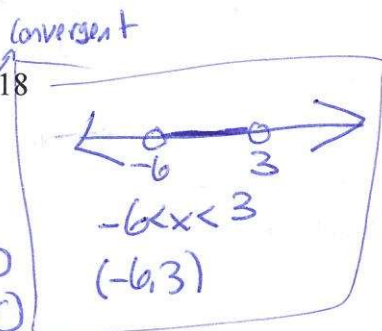
$$x^2 + 3x = 18$$

$$-18 \quad -18$$

$$x^2 + 3x - 18 = 0$$

$$(x+6)(x-3) = 0$$

$$x = -6 \quad x = 3$$



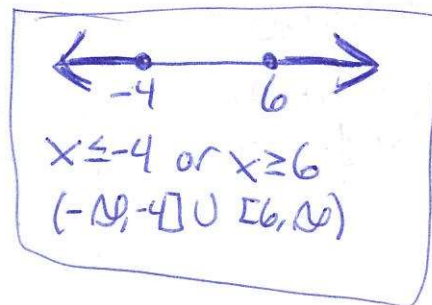
4. $x^2 - 2x \geq 24$ *divergent*

$$x^2 - 2x = 24$$

$$x^2 - 2x - 24 = 0$$

$$(x-6)(x+4) = 0$$

$$x = 6 \quad x = -4$$



5. $x^2 \leq 4x + 12$ *convergent*

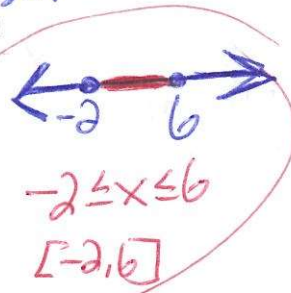
$$x^2 = 4x + 12$$

$$-4x - 12 = -4x - 12$$

$$x^2 - 4x - 12 = 0$$

$$(x-6)(x+2) = 0$$

$$x = 6 \quad x = -2$$



6. $x^2 > 8x - 15$ *divergent*

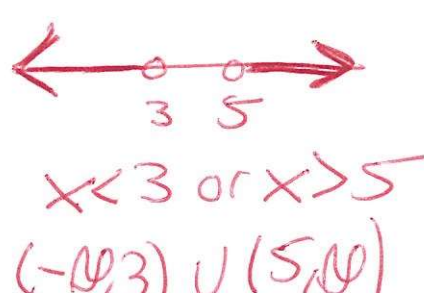
$$x^2 = 8x - 15$$

$$-8x + 15 = -8x + 15$$

$$x^2 - 8x + 15 = 0$$

$$(x-5)(x-3) = 0$$

$$x = 5 \quad x = 3$$



7. $3x^2 + 2x \leq 8$

Convergent

$$3x^2 + 2x - 8 = 0$$

$$(3x-4)(x+2) = 0$$

$$3x-4=0 \quad x+2=0$$

$$3x=4 \quad x=-2$$

$$x=\frac{4}{3}$$

$-2 \leq x \leq \frac{4}{3}$
 $[-2, \frac{4}{3}]$

8. $4x^2 - 2x > 6x - 4$

$$4x^2 - 2x - 6x + 4 = 0$$

$$4x^2 - 8x + 4 = 0$$

$$x^2 - 2x + 1 = 0$$

$$(x-1)(x-1) = 0$$

$$x=1 \quad x=1$$

$(x-1)(x-1) > 0$
 2: (+)(+)
 0: (-)(-)

$x < 1$ or $x > 1$
 $(-\infty, 1) \cup (1, \infty)$

9. $-2x^2 + 3x \leq -5$

divergent

$$-2x^2 + 3x + 5 \leq 0$$

$$2x^2 - 3x - 5 > 0$$

$$(2x+1)(x-5) = 0$$

$$2x+1=0 \quad x-5=0$$

$$x=-\frac{1}{2} \quad x=5$$

$x < -\frac{1}{2}$ or $x > 5$
 $(-\infty, -\frac{1}{2}) \cup (5, \infty)$

10. $8x^2 \geq 16x + 10$

divergent

$$8x^2 - 16x - 10 \geq 0$$

$$4x^2 - 8x - 5 \geq 0$$

$$(4x^2 - 10x)(2x - 1)$$

$$2x(2x-5) + 1(2x-1)$$

$$(2x+1)(2x-5) = 0$$

$$2x+1=0 \quad 2x-5=0$$

$$x=-\frac{1}{2} \quad x=\frac{5}{2}$$

$x \leq -\frac{1}{2}$ or $x \geq \frac{5}{2}$
 $(-\infty, -\frac{1}{2}] \cup [\frac{5}{2}, \infty)$

11. What is the solution of the inequality $x^2 + 6x < 16$?

- 1) $-2 < x < 8$
- 2) $x < -2$ or $x > 8$
- 3) $-8 < x < 2$
- 4) $x < -8$ or $x > 2$

Convergent

$$x^2 + 6x - 16 = 0$$

$$(x+8)(x-2) = 0$$

$$x = -8 \quad x = 2$$

$-8 < x < 2$

12. What is the solution of the inequality $x^2 \geq 16$?

- 1) $x \geq 4$
- 2) $x < -2$ or $x > 8$
- 3) $-4 < x < 4$
- 4) $x \leq -4$ or $x \geq 4$

divergent

$$x^2 - 16 = 0$$

$$(x+4)(x-4) = 0$$

$$x = -4 \quad x = 4$$

$x \leq -4$ or $x \geq 4$

13. What is the solution of the inequality $x^2 - x - 6 < 0$?

- 1) $-3 < x < -2$
- 2) $-2 < x < 3$
- 3) $1 < x < 6$
- 4) $-3 < x < 2$

$$x^2 - x - 6 = 0$$

$$(x-3)(x+2) = 0$$

$$x = 3 \quad x = -2$$

$-2 < x < 3$
 $(-2, 3)$