

Pre Calculus
Prerequisite Review

Name: KEY
Block: _____

Calculator Allowed. Show all applicable work for full credit.

Use an inequality to describe:

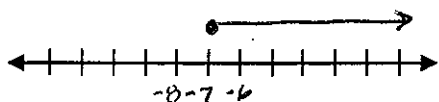
1. the interval $(-\infty, 3]$

$$x \leq 3$$

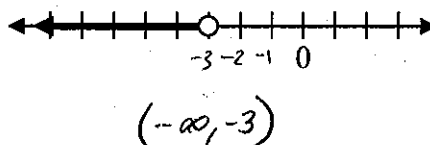
2. "Olympic gymnasts are at least 14 years old."

$a = \text{age of gymnasts}$
 $a \geq 14$

3. Graph the interval $[-7, \infty)$



4. Use interval notation to describe the graph below.



Simplify. Express answers with only positive exponents.

$$5. \frac{(xy^2)^3}{y^2x^3} = \frac{x^3y^6}{y^2x^3} = \boxed{y^4}$$

$$6. (4x^3y^{-5})^{-2} = 4^{-2}x^{-6}y^{10} = \frac{y^{10}}{16x^6} = \boxed{\frac{y^{10}}{16x^6}}$$

$$7. \left(\frac{x^3y^{-2}}{12x^6y^{-5}}\right) \left(\frac{4x^2y^6}{x^{-4}y}\right) = \frac{y^3}{12x^3} \cdot \frac{4x^6y^5}{1} = \frac{4x^6y^8}{12x^3} = \boxed{\frac{x^3y^8}{3}}$$

8. Write the equation of the line in point slope form through $(-1, -4)$ and $(3, 2)$.

$$m = \frac{-4-2}{-1-3} = \frac{-6}{-4} = \frac{3}{2}$$

$$\boxed{y+4 = \frac{3}{2}(x+1)}$$

$$\text{OR } \boxed{y-2 = \frac{3}{2}(x-3)}$$

9. Write the equation of the line in slope intercept form through $(3, 10)$ and parallel to $5x + 6y = 33$.

$$y-10 = -\frac{5}{6}(x-3)$$

$$y = -\frac{5}{6}x + \frac{5}{2} + 10$$

$$\boxed{y = -\frac{5}{6}x + \frac{25}{2}}$$

$-\frac{5}{6}$ slope } Same slope

$$\frac{6y}{6} = \frac{33-5x}{6}$$

$$y = \frac{33}{6} - \frac{5}{6}x$$

10. Write the equation of the line in general form through $(-3, 2)$ and perpendicular to $-4x + 2y = 8$.

$$y-2 = -\frac{1}{2}(x+3)$$

$$(y-2 = -\frac{1}{2}x - \frac{3}{2}) \cdot 2$$

$$2y-4 = -x-3$$

\perp slope = $-\frac{1}{2}$ ← opp. reciprocal slopes

$$\frac{2y}{2} = \frac{8+4x}{2}$$

$$y = 4 + 2x$$

this line has slope = 2

$$\boxed{x+2y-1 = 0}$$

$$\text{OR } \boxed{0 = -x-2y+1}$$

Solve each equation or inequality algebraically. Show all work!! Use interval notation where appropriate.

$$11. 2(3-4x) - 5(2x+3) = x-17$$

$$6 - 8x - 10x - 15 = x - 17$$

$$-18x - 9 = x - 17$$

$$8 = 19x$$

$$12. \left(\frac{x-2}{3} + \frac{x+5}{2} = \frac{1}{3} \right) \Rightarrow 2(x-2) + 3(x+5) = 2(1)$$

$$2x - 4 + 3x + 15 = 2$$

$$5x + 11 = 2$$

$$5x = -9$$

$$13. \left(\frac{x-4}{2} - 2x \leq 5(3-x) \right) \cdot 2$$

$$x - 4 - 4x \leq 10(3-x)$$

$$-3x - 4 \leq 30 - 10x$$

$$7x \leq 34 \rightarrow x \leq \frac{34}{7}$$

$$(-\infty, \frac{34}{7}]$$

$$14. -2 < 2x + 4 \leq 7$$

$$-6 < 2x \leq 3$$

$$-3 < x \leq \frac{3}{2}$$

$$(-3, \frac{3}{2}]$$

$$15. |4x+1| = 3$$

$$4x+1 = 3 \text{ or } 4x+1 = -3$$

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

$$x = \frac{1}{2} \text{ or } x = -1$$

$$16. |2-3x| < 11$$

$$-11 < 2-3x < 11$$

$$-13 < -3x < 9$$

$$\frac{13}{3} > x > -3 \text{ or } (-3, \frac{13}{3})$$

$$17. 2|3x+4| - 7 \geq -3$$

$$2|3x+4| \geq 4$$

$$|3x+4| \geq 2$$

$$3x+4 \leq -2 \quad 3x+4 \geq 2$$

$$3x \leq -6 \quad 3x \geq -2$$

$$x \leq -2 \text{ or } x \geq -\frac{2}{3} \text{ or } (-\infty, -2] \cup [-\frac{2}{3}, \infty)$$

$$18. \left(\frac{x-3}{x} + \frac{3}{x(x+1)} = \frac{3}{x+1} \right) \cdot x(x+1) \Rightarrow (x-3)(x+1) + 3 = 3(x)$$

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

$$x^2 - 5x = 0$$

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

$$x \neq 0 \text{ or } x = 5$$

Solve by factoring:

$$19. 6x^2 + 7x = 3 \Rightarrow 6x^2 + 7x - 3 = 0$$

$$(2x+3)(3x-1) = 0$$

$$2x+3=0 \text{ or } 3x-1=0$$

$$x = -\frac{3}{2} \text{ or } x = \frac{1}{3}$$

$$20. 12x^3 - 14x^2 - 6x = 0 \text{ extraneous}$$

$$2x(6x^2 - 7x - 3) = 0$$

$$2x(2x-3)(3x+1) = 0$$

$$2x=0 \text{ or } 2x-3=0 \text{ or } 3x+1=0$$

$$x=0 \text{ or } x=\frac{3}{2} \text{ or } x=-\frac{1}{3}$$

$$21. \text{Solve by extracting the square roots: } 3(3x-1)^2 = 21.$$

$$(3x-1)^2 = 7$$

$$3x-1 = \pm\sqrt{7}$$

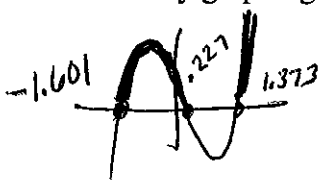
$$3x = 1 \pm\sqrt{7} \rightarrow x = \frac{1 \pm\sqrt{7}}{3}$$

$$22. \text{Solve by the quadratic formula: } 4x^2 = -10x - 5.$$

$$4x^2 + 10x + 5 = 0$$

$$x = \frac{-10 \pm \sqrt{100 - 4(4)(5)}}{2(4)} = \frac{-10 \pm \sqrt{100 - 80}}{8} = \frac{-10 \pm \sqrt{20}}{8} = \frac{-10 \pm 2\sqrt{5}}{8} = \frac{-5 \pm \sqrt{5}}{4}$$

23. Solve by graphing: $4x^3 - 9x + 2 > 0$. \leftarrow Above x-axis!



calculate zeros...

$$(-1.601, 0.227) \cup (1.373, \infty)$$

$$(x-h)^2 + (y-k)^2 = r^2$$

$C(h, k)$

24. Find the equation of a circle that has a center of $(-6, 7)$ and a radius of 8.

$$(x+6)^2 + (y-7)^2 = 64$$

25. Given the equation of the circle $(x-3)^2 + (y+1)^2 = 10$, what is the center and radius?

center $(3, -1)$

radius = $\sqrt{10}$

26. Use the following 2 points: $(8, 13)$ and $(-2, 7)$.

a) Find the midpoint.

$$\left(\frac{8+(-2)}{2}, \frac{13+7}{2} \right) = (3, 10)$$

b) Find the distance between the two points. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$$d = \sqrt{(8 - (-2))^2 + (13 - 7)^2}$$

$$d = \sqrt{100 + 36}$$

$$d = \sqrt{136}$$

$$\begin{array}{r} 136 \\ \sqrt{} \\ 4 34 \end{array}$$

$$d = 2\sqrt{34} \approx 11.662$$