Period 4, Sept 12, 2024

Solve.

$3x^2 = 60x$

$-60x \quad -60x$

$3x^2 - 60x = 0$

$3x(x-20) = 0$

$3x = 0$ or $x - 20 = 0$

$x = 0$ $\quad x = 20$

$3(0)^2 = 60(0)$

$0 = 0$

$3(20)^2 = 60(20)$

$3 \cdot 400 = 1200$

$1200 = 1200$

30th word

Solve the quadratic equation by completing the square.

$x^2 + 2x = 15 \Rightarrow x^2 + 2x + 1 = 1 + 15$

$a = 1$

$b = 2$

$\left(\frac{b}{2}\right) = \frac{2}{2} = 1$

$\left(\frac{b}{2}\right)^2 = (1)^2 = 1$

$\sqrt{(x+1)^2} = \sqrt{16}$

$|x+1| = 4$

$x + 1 = 4$ or $x + 1 = -4$

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

$x = 3$ or $x = -5$

Solve the formula for f.

$\frac{1}{f} = \frac{1}{s} + \frac{1}{qs}$

$qfs \cdot \frac{1}{f} = \frac{1}{s} \cdot qfs + \frac{1}{qs} \cdot qfs$

$\frac{qf}{qs} + \frac{s}{qs} = \frac{1}{f}$

$\frac{(qf+s)}{qs} \Leftrightarrow \frac{1}{f}$

$1 \cdot qfs = F(qf+s)$

$\frac{qfs}{qf+s} = F$

Solve the absolute value equation or indicate that the equation has no solution.

$\frac{3|2x-5|}{3} = \frac{9}{3}$

$|2x-5| = 3$

$2x - 5 = 3$ or $2x - 5 = -3$

$+5 \quad +5 \qquad +5 \quad +5$

$\frac{2x}{2} = \frac{8}{2} \qquad \frac{2x}{2} = \frac{2}{2}$

$x = 4$ or $x = 1$

$3|2(4)-5| = 9$

$3|8-5|$

$3 \cdot 3 = 9$

$3|2(1)-5| = 9$

$3|2-5|$

$3 \cdot |-3|$

$3 \cdot 3 = 9$

The following rational equation has denominators that contain variables. For this equation, **a.** Write the value or values of the variable that make a denominator zero. These are the restrictions on the variable. **b.** Keeping the restrictions in mind, solve the equation.

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

$x \neq -2$

$\frac{4x}{x+2} = \frac{2(x+2)}{1(x+2)} - \frac{8}{x+2}$

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

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

$\frac{(x+2)}{} \frac{4x}{x+2} = \frac{2x-4}{x+2} \frac{(x+2)}{}$

$4x = 2x - 4$

$-2x \quad -2x$

$\frac{2x}{2} = \frac{-4}{2}$

$x = -2$

Does not work.

Todays lesson

"a" Has To be Positive $|x|<a \Rightarrow -a<x<a$

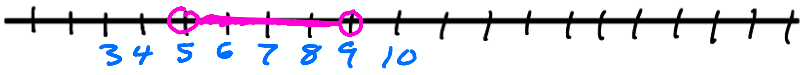
a has To be Positive $|x|>a \Rightarrow x>a$ or $x<-a$

Fill in the blank so that the resulting statement is true.

The inequality $|x-7|<2$ can be rewritten without absolute value bars as _____.

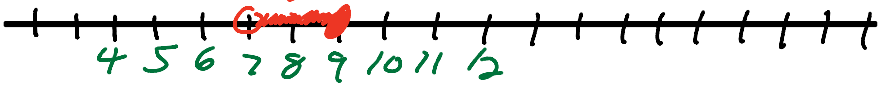
$-2<x-7<2 \Rightarrow 5<x<9$ (+7 +7 +7)

Set Notation $(5,9)$



Express the interval in set-builder notation and graph the interval on a number line.

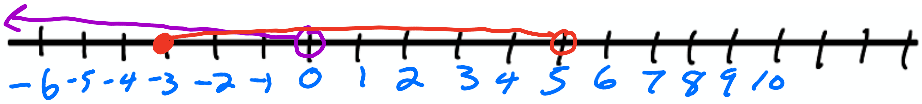
$(7,9]$ $7<x\leq 9$



Use graphs to find the set. intersection "both colors"

$(-\infty,0) \cap [-3,5)$

$[-3, 0)$

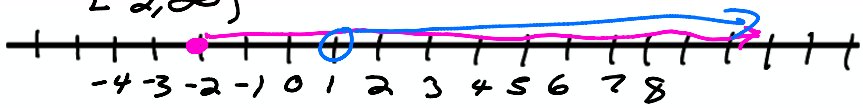


Can't equal ∞ need $\infty)$

Use graphs to find the set. union "all colors"

$[-2, \infty) \cup (1, \infty)$

$[-2,\infty)$



$(-2, 6] \cup [3, 7) = (-2, 7)$

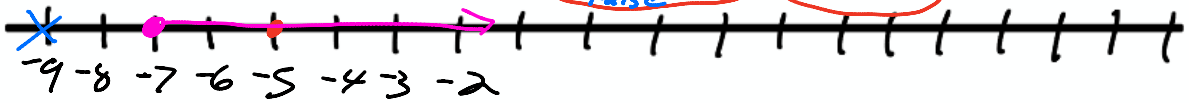
Other than a no solution set, use interval notation to express the solution set and then graph the solution set on a number line.

$-3x \le 21 \Rightarrow x \ge -7$ (same) $-7 \le x$

Test points on both sides of -7

$-9 \ge -7$ False

$-5 \ge -7$ True



Solve the compound inequality.

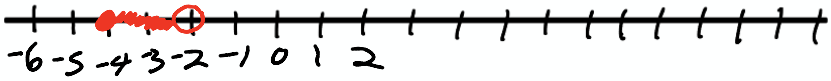
$5 \le \frac{1}{2}x + 7 < 6$

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

$-2 \le \frac{1}{2}x < -1$ $\cdot 2 \quad \cdot 2$

$-4 \le x < -2$

$[-4, -2)$



Solve the absolute value inequality.

$|4(x-1)+10| \le 14$ (Triple)

$-14 \le 4(x-1)+10 \le 14$

$-14 \le 4x - 4 + 10 \le 14$

$-14 \le 4x + 6 \le 14$

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

$-20 \le 4x \le 8$

$\frac{-20}{4} \le \frac{4x}{4} \le \frac{8}{4}$

$-5 \le x \le 2$

$[-5, 2]$

Solve the inequality for x.

$\left|\frac{2x+6}{8}\right| \ge 4$ ("or =")

$\frac{2x+6}{8} \ge 4.8$ or $\frac{2x+6}{8} \le -4.8$

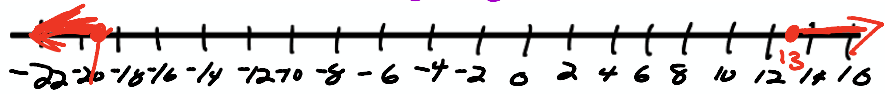
$2x+6 \ge 32$ or $2x+6 \le -32$

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

$\frac{2x}{2} \ge \frac{26}{2}$ or $\frac{2x}{2} \le \frac{-38}{2}$

$x \ge 13$ or $x \le -19$

$[13, \infty) \cup (-\infty, -19]$



Solve the absolute value inequality.

$-2|1-x| < -4$

$|1-x| > 2 \Rightarrow$ $1-x > 2$ or $1-x < -2$

$-x > 1$ or $-x < -3$

$x < -1$ or $x > 3$

$(-\infty, -1) \cup (3, \infty)$

Solve the absolute value inequality.

$2 > |1-x| \Rightarrow -2 < 1-x < 2$

$-3 < -x < 1$

$3 > x > -1$

$(-1, 3)$

Use interval notation to represent all values of x satisfying the given conditions.

$y = 9 - \left|\frac{x}{4} + 4\right|$ and y is at most 8 $\quad y \le 8$

$8 \ge 9 - \left|\frac{x}{4}+4\right|$

$-1 \ge -\left|\frac{x}{4}+4\right|$

$1 \le \left|\frac{x}{4}+4\right|$

$1 \le \frac{x}{4}+4$ or $-1 \ge \frac{x}{4}+4$

$-3 \le \frac{x}{4}$ or $-5 \ge \frac{x}{4} \Rightarrow -12 \le x$ or $-20 \ge x$

$(-\infty, -20] \cup [-12, \infty)$

The formula $I = \frac{1}{4}x + 24$ models the percentage of households with an interfaith marriage, I, x years after 1988. The formula $N = \frac{1}{4}x + 9$ models the percentage of households in which a person of faith is married to someone with no religion, N, x years after 1988.
Answer parts **a-d** below.

$I = \frac{1}{4}x + 24$ $\quad N = \frac{1}{4}x + 9$

a. In which years will more than 31% of households have an interfaith marriage?

After the year ☐

$31 = \frac{1}{4}x + 24$

$7 = \frac{1}{4}x$

$28 = x$

$1988 + 28 = 2016$

b. In which years will more than 13% of households have a person of faith married to someone with no religion?

After the year ☐

$13 = \frac{1}{4}x + 9$

$4 = \frac{1}{4}x$

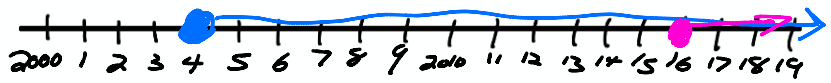
$16 = x$

$1988 + 16 = 2004$

c. Based on your answers to parts (a) and (b), in which years will more than 31% of households have an interfaith marriage **and** more than 13% have a faith/no religion marriage?

After the year ☐

Both colors intersection

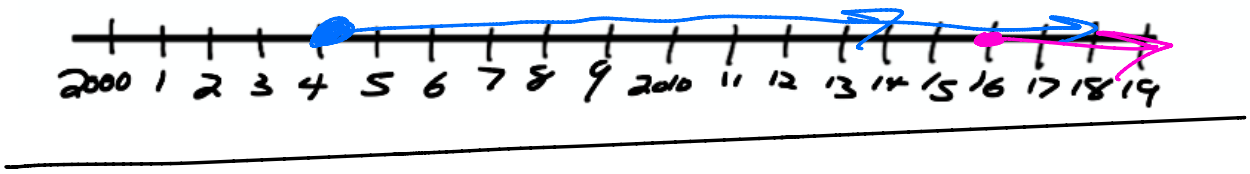


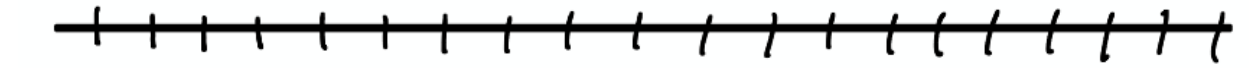
$x \ge 2016$

d. Based on your answers to parts (a) and (b), in which years will more than 31% of households have an interfaith marriage **or** more than 13% have a faith/no religion marriage?

After the year ☐

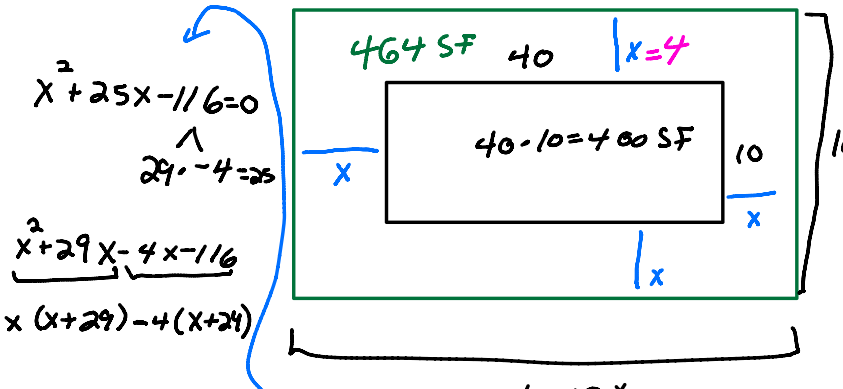
T
all reals
union
$x \geq 2004$





As part of a landscaping project, you put in a flower bed measuring 10 feet by 40 feet. To finish off the project, you are putting in a uniform border of pine bark around the outside of the rectangular garden. You have enough pine bark to cover 464 square feet. How wide should the border be?

The border should be 4 feet wide.



$x^2 + 25x - 116 = 0$

$29 \cdot -4 = -25$

$x^2 + 29x - 4x - 116$

$x(x+29) - 4(x+29)$

$(x+29)(x-4) = 0$

$x = -29$ or $x = 4$

Border can't be negative

$\text{Area} = (10+2x)(40+2x)$

$A = 400 + 20x + 80x + 4x^2$

$464 + 400 = 400 + 100x + 4x^2$

$-400 \quad -400$

$\frac{464}{4} = \frac{100x}{4} + \frac{4x^2}{4}$

$\frac{464}{4} = \frac{100x}{4} + \frac{4x^2}{4}$

$116 = 25x + x^2$

$-116 \quad -116$

23,000

Susan Marciano invested part of her $25,000 bonus in a fund that paid an 11% profit and invested the rest in stock that suffered a 4% loss. Find the amount of each investment if her overall net profit was $2,450.

2000

The amount invested at 11% is $ 20714 .

The amount invested in stock is $ 4286 .

Fund Stock

amount invested = x

y = amount invested

$x + y = 25000$

$y = 25000 - x$

$x(1.11) + y(.96) = 25{,}000 + 2450$

$1.11x + .96(25000 - x) = 27{,}450$

$1.11x + 24{,}000 - .96x = 27{,}450$

$-24{,}000 \quad -24{,}000$

$.15x = 3{,}450 \Rightarrow x = 23{,}000$

$\frac{.15x}{.15} = \frac{3{,}450}{.15}$

You ride your bike to campus a distance of 3 miles and return home on the same route. Going to campus, you ride mostly downhill and average 3 miles per hour faster than on your return trip home. If the round trip takes 50 minutes—that is, $\frac{5}{6}$ hours—what is your average velocity on the return trip? Use the formula

$\text{Time traveled} = \frac{\text{Distance traveled}}{\text{Average velocity}}$. $\Rightarrow D = R \cdot T$

The average rate on the return trip is ☐ miles per hour.

$R \neq 0$ or -3

To Campus To Home

Rate $= R + 3$ / 3 miles Rate $= R$ / 3 miles

Time

$\frac{5}{6} = \frac{3R}{(R+3)R} + \frac{3(R+3)}{R(R+3)} \Rightarrow \frac{5}{6} = \frac{3R}{R(R+3)} + \frac{3R+9}{R(R+3)} \Rightarrow \frac{5}{6} \cancel{=} \frac{6R+9}{R(R+3)}$

$6(6R+9) = 5 \cdot R(R+3)$

$36R + 54 = 5R^2 + 15R$

$-36R \quad -54 \qquad -36R \quad -54$

$0 = 5R^2 - 21R - 54$

Use Quad Formula

Keep going