

Midterm Review

Chapters 1-5

Which values for a and b are a solution to the inequality $|5 - 2a| - b \leq 4$?

1. $(6, -2)$
2. $(-4, 3)$
3. $(3, -1)$
4. $(-3, 5)$
5. All of the above
6. None of the above
7. More than one of the above

Answer: #3 : (3,-1)

$$|5 - 2a| - b \leq 4$$

$$(6, -2) : |5 - 2 \cdot 6| - -2 \leq 4$$

$$|5 - 12| + 2 = 7 + 2 = 9 \quad F$$

$$(-4, 3) : |5 - 2 \cdot -4| - 3 \leq 4$$

$$|5 + 8| - 3 = 13 - 3 = 10 \quad F$$

$$(3, -1) : |5 - 2 \cdot 3| - -1 \leq 4$$

$$|5 - 6| + 1 = 1 + 1 = 2 \quad T$$

$$(-3, 5) : |5 - 2 \cdot -3| - 5 \leq 4$$

$$|5 + 6| - 5 = 11 - 5 = 6 \quad F$$

What is the value of the function
 $y = -x^2 + 6x - 5$ when $x = 4$?

Answer: 3

$$y = -x^2 + 6x - 5 \text{ when } x = 4$$

$$Y = - (4^2) + 6(4) - 5$$

$$Y = -16 + 24 - 5$$

$$Y = 8 - 5$$

$$Y = 3$$

Which value for x is a solution for both
 $2(x - 8) < 5$ and $-4(2 - x) \geq 1$?

1. 3
2. -4
3. 0
4. 2
5. All of the above
6. None of the above
7. More than one of the above

Answer: #1: 3

$$2(x - 8) < 5 \text{ and } -4(2 - x) \geq 1$$

- | | | | | | |
|----|----|----------------------|---|-----------------------|---|
| 1. | 3 | $2(3-8)=2(-5)=-10$ | Y | $-4(2-3)=-4(-1)=4$ | Y |
| 2. | -4 | $2(-4-8)=2(-12)=-24$ | Y | $-4(2- -4)=-4(6)=-24$ | N |
| 3. | 0 | $2(0-8)=2(-8)=-16$ | Y | $-4(2-0)=-4(2)=-8$ | N |
| 4. | 2 | $2(2-8)=2(-6)=-12$ | Y | $-4(2-2)=-4(0)=0$ | N |

In which quadrant is the point $(5,0)$

Answer: None

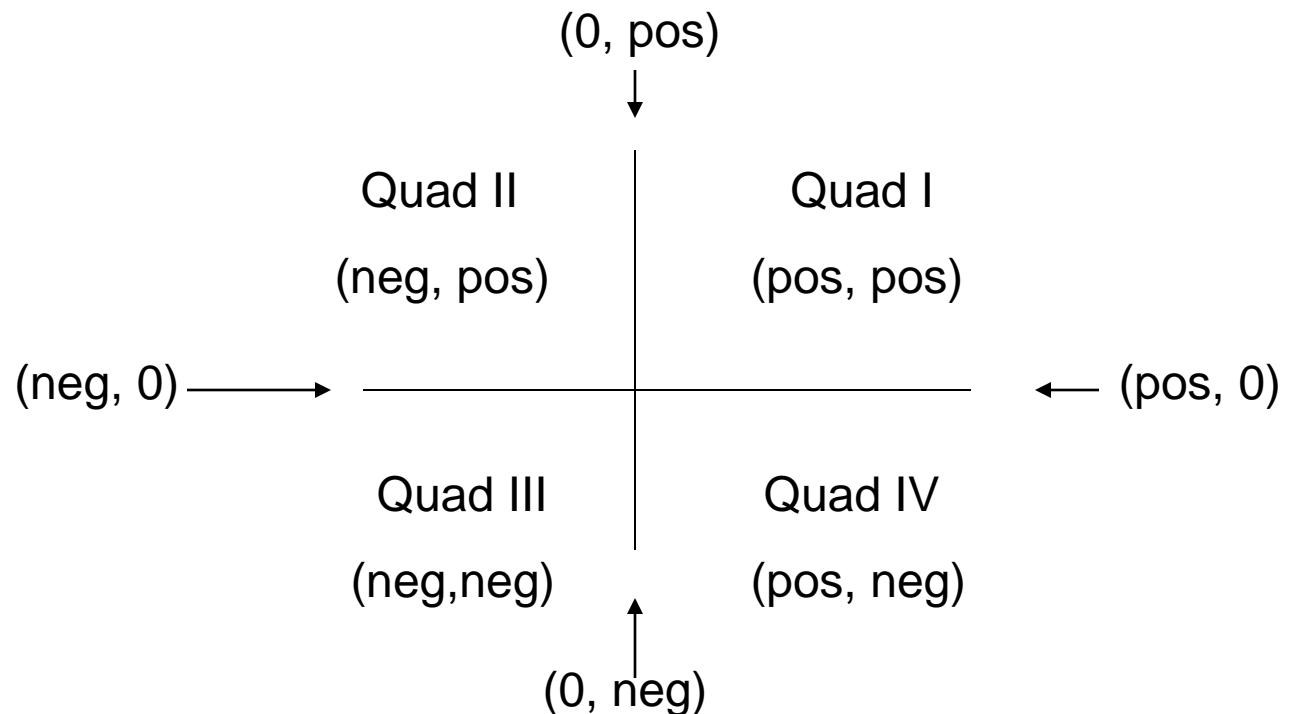
The point $(5,0)$ lies on the x-axis and is not any of the quadrants

In which quadrant are the points
defined by $(x < 0, y > 0)$

Answer: Quadrant II

$$(x < 0, y > 0)$$

All the ordered pairs in Quadrant II have negative values for x and positive values for y



What is the solution to

$$2(x+3)-4 = 3(x+7)-8$$

Answer: -11

$$2(x+3)-4 = 3(x+7)-8$$

$$2x + 6 - 4 = 3x + 21 - 8$$

$$2x + 2 = 3x + 13$$

$$2x - 3x = 13 - 2$$

$$-x = 11$$

$$X = -11$$

What is the answer to

$$5 - 2x > 3x + 7$$

Answer: $X < -2/5$

$$5 - 2x > 3x + 7$$

$$-2x - 3x > 7 - 5$$

$$-5x > 2$$

$$X < -2/5$$

Graph the solution to $|x+3|>6$

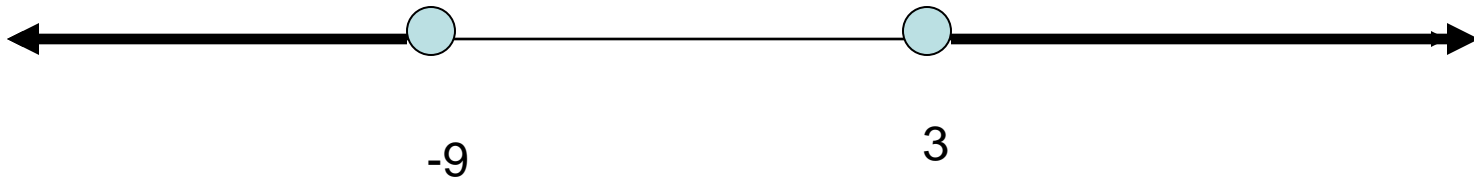
Answer: See graph

$$|x+3|>6$$

> OR < AND

$$x+3>6 \quad \text{OR} \quad x+3<-6$$

$$x > 3 \quad \text{or} \quad x < -9$$



Graph the solution to

$$2x + 3 < 12 \text{ AND } 3x - 7 > 4x + 5$$

Graph the solution to
 $3(x - 4) + 7 > 3(x - 5)$

OR

$$2x + 3 < 5x - 9$$

The points $(-8,5)$ and $(3,-7)$ are two solutions to a linear function.

What is the pattern for the rate of change of this linear function?

Answer: - 12 / 11

Pattern of change of the linear function passing through (-8,5) and (3,-7):

	X	Y	
+ 11	-8	5	- 12
	3	-7	

$$\frac{Y}{X} = \frac{-12}{11}$$

Name the property that converts:

$$2(3x + 5) = 5x - 7$$

to

$$2(3x) + 2(5) = 5x - 7$$

Answer: Distributive

$$2(3x + 5) = 5x - 7$$

to

$$2(3x) + 2(5) = 5x - 7$$

I distributed the multiplier of 2 to both terms inside the brackets

Name the property that converts:

$$2(3x) + 2(5) = 5x - 7$$

to

$$(2 \cdot 3)x + 2(5) = 5x - 7$$

Answer: Associative of Mult.

$$2(3x) + 2(5) = 5x - 7$$

to

$$(2*3)x + 2(5) = 5x - 7$$

I changed the “grouping” of the numbers being multiplied

Name the property that converts:

$$(2 \cdot 3)x + 2(5) = 5x - 7$$

to

$$6x + 10 = 5x - 7$$

Answer: Substitution

$$(2*3)x + 2(5) = 5x - 7$$

to

$$6x + 10 = 5x - 7$$

$$2*3 = 6 \quad \text{and} \quad 2*5 = 10$$

Also know as math fact and simplifying

Name the property that converts:

$$6x + 10 = 5x - 7$$

to

$$6x + 10 = 5x + -7$$

Answer: Def of Subtraction

$$6x + 10 = 5x - 7$$

to

$$6x + 10 = 5x + -7$$

I changed a subtraction sign to an addition of the opposite

$$5x - 7 = 5x + -7$$

Name the property that converts:

$$6x + 10 = 5x + -7$$

to

$$6x + 10 + -5x + -10 = 5x + -7 + -5x + -10$$

Answer: Addition of Equality

$$6x + 10 = 5x + -7$$

to

$$6x + 10 + -5x + -10 = 5x + -7 + -5x + -10$$

I added $(-5x + -10)$ to both sides of the equation

Name the property that converts:

$$6x + 10 + -5x + -10 = 5x + -7 + -5x + -10$$

to

$$6x + -5x + 10 + -10 = 5x + -5x + -7 + -10$$

Answer: Commutative of Addition

$$6x + 10 + -5x + -10 = 5x + -7 + -5x + -10$$

to

$$6x + -5x + 10 + -10 = 5x + -5x + -7 + -10$$

I rearranged the order of the numbers I was adding

Name the property that converts:

$$6x + -5x + 10 + -10 = 5x + -5x + -7 + -10$$

to

$$6x + -5x + 0 = 0 + -7 + -10$$

Answer: Inverse of Addition

$$6x + -5x + 10 + -10 = 5x + -5x + -7 + -10$$

to

$$6x + -5x + 0 = 0 + -7 + -10$$

$$10 + -10 = 0 \quad \text{and} \quad 5x + -5x = 0$$

Adding opposites equals zero

Name the property that converts:

$$6x + -5x + 0 = 0 + -7 + -10$$

to

$$6x + -5x = -7 + -10$$

Answer: Identity of Addition

$$6x + -5x + 0 = 0 + -7 + -10$$

to

$$6x + -5x = -7 + -10$$

Adding zero to an expression does not change its value

Name the property that converts:

$$6x + -5x = -7 + -10$$

to

$$(6+-5)x = -7 + -10$$

Answer: Distributive

$$6x + -5x = -7 + -10$$

to

$$(6+-5)x = -7 + -10$$

Reverse use of distributive property

I factored “x” out of the left side of the equation

$$(6+-5)x = 6x + -5x \text{ “reversed”}$$

Name the property that converts:

$$(6+-5)x = -7 + -10$$

to

$$1(x) = -17$$

Answer: Substitution

$$(6+-5)x = -7 + -10$$

to

$$1(x) = -17$$

Also know as math fact or simplification

$$6 + -5 = 1 \quad \text{and} \quad -7 + -10 = -17$$

Name the property that converts:

$$1(x) = -17$$

to

$$x = -17$$

Answer: Identity of Multiplication

$$1(x) = -17$$

to

$$x = -17$$

Multiplying an expression by “1” does not change its value

What property allows you to link all the properties used in the last few slides to justify that the solution at the end is really equal to the problem you started with?

Answer: Transitive of Equality

- Addition & Multiplication Props of Equality allow you to add or multiply both sides of an equation by the same thing: if $a = b$ then $a + c = b + c$ and $ac = bc$
- The reflexive property says one side of an equation is equal to itself: $a = a$
- The symmetric property says you can reverse the sides of an equation: if $a=b$ the $b=a$
- The transitive property lets you link relationships between varying forms of the sides of the same equation: if $a = b$ and $b = c$ then $a = c$

For the word problem:

A chemist needs 50L of a 25% solution so he mixes a 30% solution to a 10% solution. How much of each does he need?

Create a table to organize the data; complete the table including formula; write the equation needed to solve the problem

Answer:

A chemist needs 50L of a 25% solution so he mixes a 30% solution to a 10% solution. How much of each does he need?

Let: x = vol of one solution $50-x$ = vol of other solution

Who?	Volume	% Strength	Pure Element
1 st solution	x	30%	$.3x$
2 nd solution	$50 - x$	10%	$.1(50 - x)$
Final solution	50 L	25%	$.25(50)$

Equation: $.3x + .1(50-x) = .25(50)$ OR $.1x + .3(50 - x) = .25(50)$

For the word problem:

Two trains leave the same station traveling in opposite directions. One is traveling 56 mph and the other 72 mps. If the slower train left a half hour before the faster train, when will they be 860 miles apart?

Create a table to organize the data; complete the table including formula; write the equation needed to solve the problem

Answer:

Two trains leave the same station traveling in opposite directions. One is traveling 56 mph and the other 72 mph. If the slower train left a half hour before the faster train, when will they be 860 miles apart?

Vehicle	Rate	Time	Distance
Train 1	56 mph	$X + \frac{1}{2}$	$56(x + \frac{1}{2})$
Train 2	72 mph	X	72x
Total	NA	NA	860

Equation: $56(x + \frac{1}{2}) + 72x = 860$ OR $56x + 72(x - \frac{1}{2}) = 860$

Solve:

$$5(x - 7) + 3x = 8(x - 4)$$

Answer: No Solution

$$5(x - 7) + 3x = 8(x - 4)$$

$$5x - 35 + 3x = 8x - 32$$

$$8x - 35 = 8x - 32$$

$$\begin{array}{r} -8x \qquad \qquad -8x \end{array}$$

$$-35 = -32$$

False so No Solution

Solve:

$$5(x - 4) + 9 < 3x - 2(5 - x)$$

Answer: All Real Numbers

$$5(x - 4) + 9 < 3x - 2(5 - x)$$

$$5x - 20 + 9 < 3x - 10 + 2x$$

$$5x - 11 < 5x - 10$$

$$\begin{array}{r} -5x \\ -5x \end{array}$$

$$-11 < -10$$

True, so Infinite solutions or all Real number solution

For the following set of values
identify the domain and range:
{ (2,3) (4,5) (6,7) (8,9) (10,11) }

Answer:

Set = (2,3) (4,5) (6,7) (8,9) (10,11)

Domain =
{2,4,6,8,10}

Range =
{3,5,7,9,11}

Is the following set a relation, a function or both?

$\{ (1,0) (2,1) (3,2) (4,3) (3,2) (2,1) (1,0) \}$

Answer: Both

Can prove with a mapping diagram, of a vertical line test, observe unique pairing of each x to only one y

Do the following set of values constitute a linear function? If so, what is the pattern to the rate of change? If not, what “kind” of graph do they form?

X	Y
2	12
6	36
8	48
15	90

Answer: Yes - Linear

Pattern: $\frac{24}{4} = \frac{12}{2} = \frac{42}{7} = 6$

	X	Y	
+4	2	12	+24
+2	6	36	+12
+7	8	48	+42
	15	90	

Do the following set of values constitute a linear function? If so, what is the pattern to the rate of change? If not, what “kind” of graph do they form?

X	Y
-3	13
-1	-3
0	-5
1	-3
3	13

Answer: Not linear; no pattern for rate of change; quadratic equation

X	Y
-3	13
-1	-3
0	-5
1	-3
3	13

+2

-16

-2

+2

+10

Is the following series an arithmetic sequence? If so what is its equation?

-15, -11, -7, -3, 1, 5, 9, ...

Answer: Yes

-15, -11, -7, -3, 1, 5, 9, ...

Starting value: -15

Incremental value: +4

Place in sequence: x

Value in sequence: y

Equation: $y = -15 + 4(x - 1)$