MTH1W Grade 9 Mathematics

5.6 Relations of the Form $xy = k$

Goal(s) - *To match equations and inequalities of the form xy = k with their corresponding graphs*

- *Sketch the graph of a relation with an equation in the form xy = k*

Jun 19-8:29 AM

List *5* ordered pairs that make this equation true:

$x + y = 10$

(5,5) because $5+5=10$

(1,9) because $1+9=10$

(4,6) because $4+6=10$

(7,3) because $7+3=10$

(2,8) because $2+8=10$

List *5* ordered pairs that make this equation true where one value is a negative number.

$x + y = 10$

$(-1, 11)$ because $(-1) + 11 = 10$

$(-4, 14)$ because $(-4) + 14 = 10$

$(-20, 30)$ because $(-20) + 30 = 10$

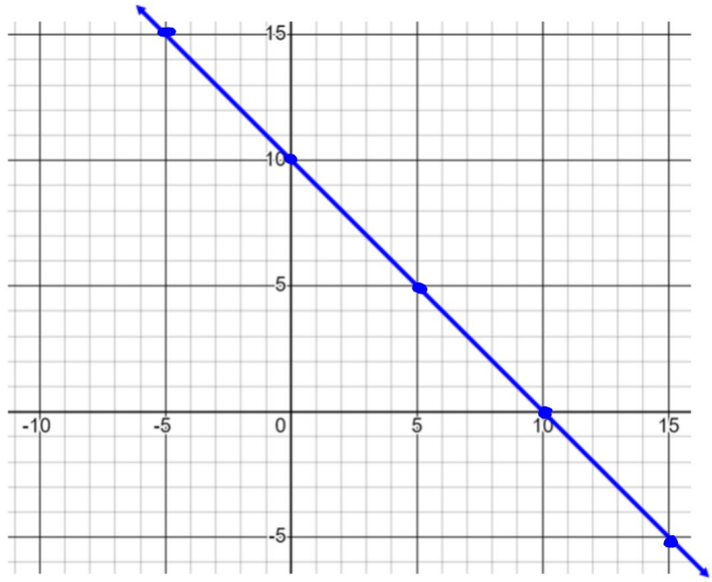
$(-6, 16)$ because $(-6) + 16 = 10$

$(-8, 18)$ because $(-8) + 18 = 10$

Plot the points you found that satisfy the equation $x + y = 10$.

If you were to connect these points, what type of relationship has been graphed?

Are these all the possible values that satisfy the equation or are there more?



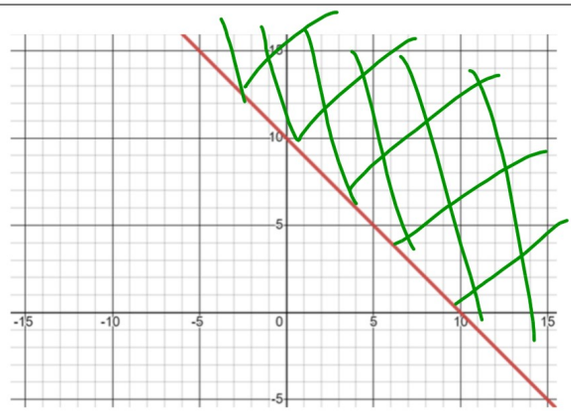
We have a linear relation (slope $= -1$, y-intercept $= 10$)

There are an INFINITE number of values that would work.

How does the relationship $x + y = 10$ change if we consider:

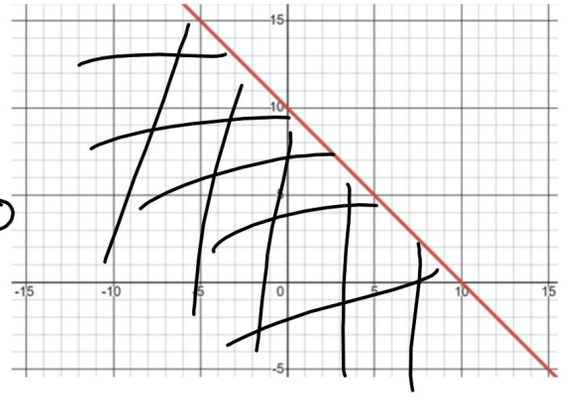
All the points above the line?

$x+y>10$



All the points below the line?

$x+y<10$



List a minimum of 5 ordered pairs that make this equation true.

$xy = 10$

(5, 2) because $5 \times 2 = 10$

(−5, −2) because $(-5) \times (-2) = 10$

(1, 10) because $1 \times 10 = 10$

(−1, −10) because $(-1) \times (-10) = 10$

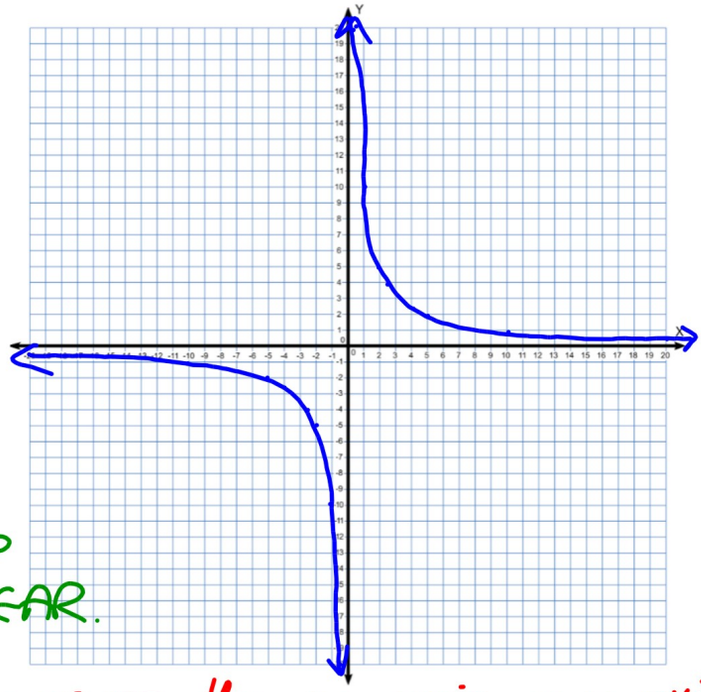
(2.5, 4) because $2.5 \times 4 = 10$

(−2.5, −4) because $(-2.5) \times (-4) = 10$

Plot the points you found that satisfy the equation $xy = 10$.

If you were to connect these points, what type of relationship has been graphed?

What two lines does the graph not appear to intersect?

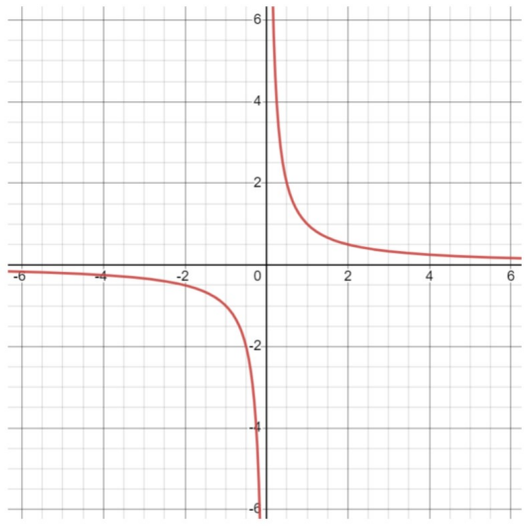


The relationship is NON-LINEAR.

They will never cross the x-axis or y-axis

The graph of $xy = k$, where $k > 0$, does not have an x or y intercept.

As the values of x and y get infinitely large and small, the graph approaches the lines $y = 0$ and $x = 0$ (these lines are called **asymptotes**!)

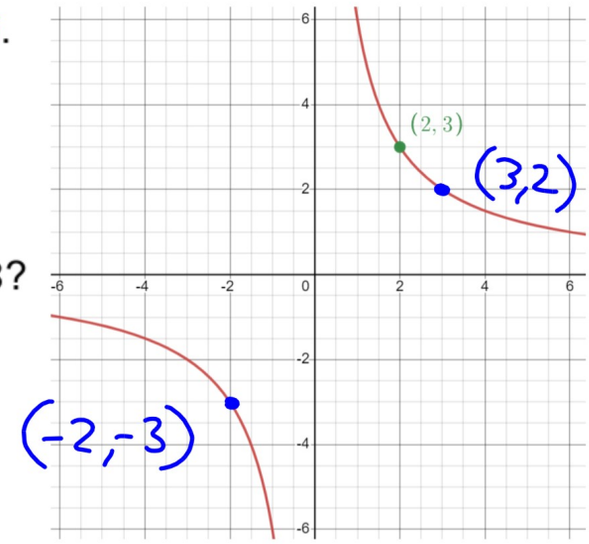


Consider the graph of $xy = 6$.

Why does the graph pass through the point $(2, 3)$?

Why does the graph only appear in quadrants **1** and **3**?

State two other points that satisfy this relation, one in quadrant 1 the other in quadrant 3.



The products of x and y will be negative in quadrants 1 and 3. We need to have a positive product.

Sketch the graph of $xy = 8$.

0.5×16

1×8

2×4

4×2

8×1

16×0.5

-0.5×-16

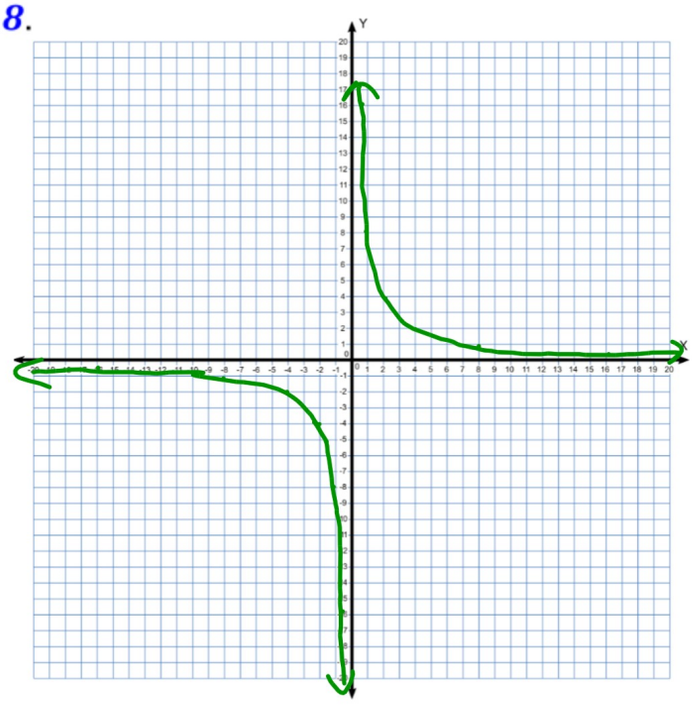
-1×-8

-2×-4

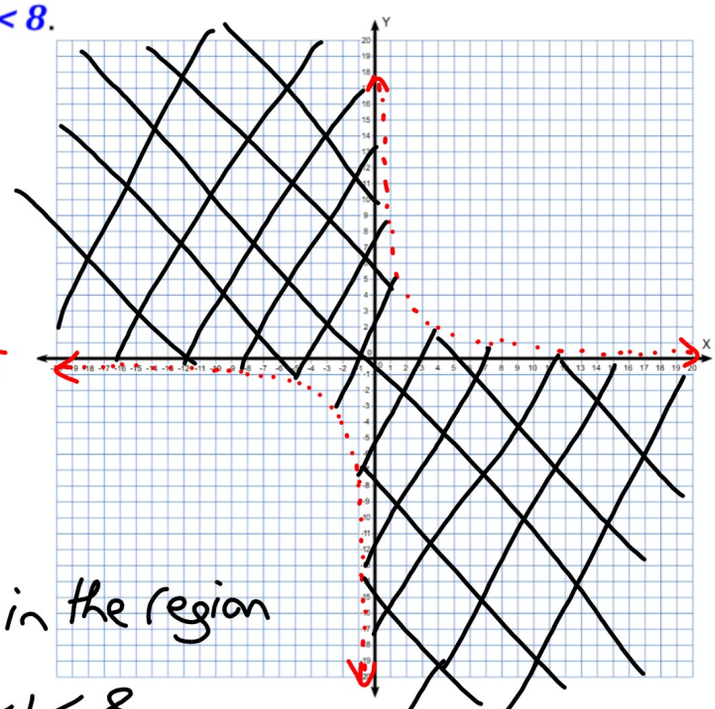
-4×-2

-8×-1

-16×-0.5



Sketch the graph of $xy < 8$.



The shaded region represents $xy < 8$

Eg (2, 1) is in the region because $2 \times 1 < 8$