Real Numbers

- Representing real numbers
- Order and interval notation

Cartesian Coordinate System

- Distance Formulas
- Midpoint Formulas
- Equations of Circles

Sections P1 & P2:

HW: Math XL P1 & P2...due Tues. 8/28 at midnight

Interval Notation

Inequality	Interval Notation	Graph on Number Line	Description
$x > a$	(a, ∞)		x is greater than a
$x < a$	$(-\infty, a)$		x is less than a
$x \geq a$	$[a, \infty)$		x is greater than or equal to a
$x \leq a$	$(-\infty, a]$		x is less than or equal to a
$a < x < b$	(a, b)		x is strictly between a and b
$a \leq x < b$	$[a, b)$		x is between a and b, to include a
$a < x \leq b$	$(a, b]$		x is between a and b, to include b
$a \leq x \leq b$	$[a, b]$		x is between a and b, to include a and b

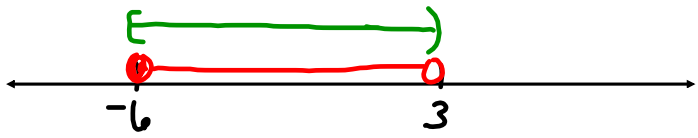
Interval Notation	Graph on Number Line	Bounded Type
(a, ∞)		Unbounded Open
$(-\infty, a)$		Unbounded Open
$[a, \infty)$		Unbounded Closed
$(-\infty, a]$		Unbounded Closed
(a, b)		Bounded Open
$[a, b)$		Bounded Half-open
$(a, b]$		Bounded Half-open
$[a, b]$		Bounded Closed

Converting Between Intervals and Inequalities

Convert interval notation to inequality notation or vice versa. Find the endpoints and state whether the interval is bounded, its type and then graph it.

$[-6, 3)$

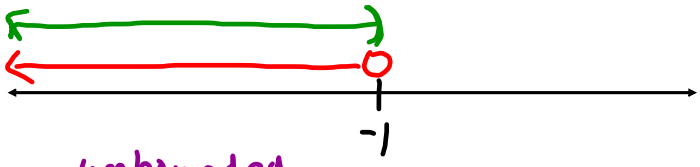
$-6 \leq x < 3$



Bounded Half-open

$(-\infty, -1)$

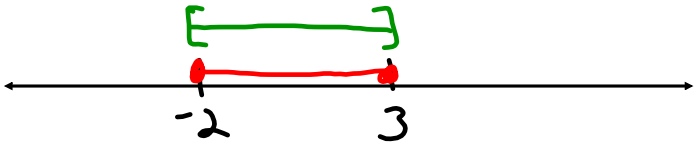
$x < -1$



unbounded

$-2 \leq x \leq 3$

$[-2, 3]$



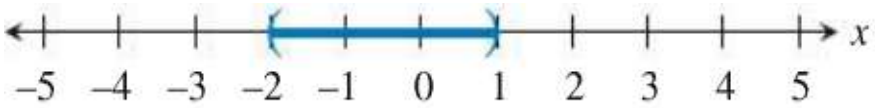
Bounded closed

Writing Using Interval Notation

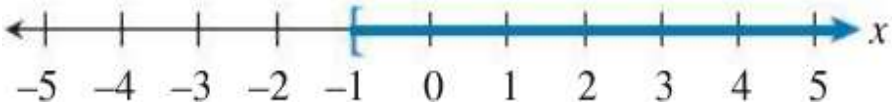
Use interval notation to describe the interval of real numbers

$x > -3$ $(-3, \infty)$

$-7 < x \leq 2$ $(-7, 2]$



$(-2, 1)$



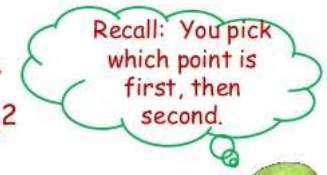
$[1, \infty)$

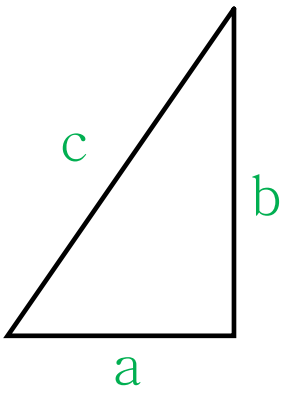
DISTANCE FORMULA

THE DISTANCE FORMULA

Given the two points (x_1, y_1) and (x_2, y_2), the distance between these points is given by the formula:

$$\sqrt{(X_1 - X_2)^2 + (Y_1 - Y_2)^2}$$





Finding the Distance Between Two Points

Find the distance d between the points (−2, 5) and (6, 1)

$\sqrt{8^2+4^2}$

$\sqrt{64+16}$

$\sqrt{80}$

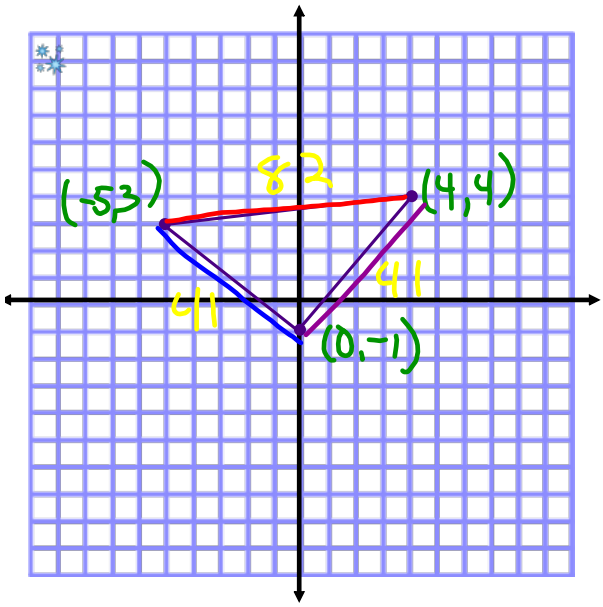
$\sqrt{16}\cdot\sqrt{5}$

$4\sqrt{5}$

Finding Perimeter and Area of Figures

Find the area of the figure determined by the points...

(−5, 3), (0, −1), (4, 4)



$\sqrt{9^2+1^2} = \sqrt{82}$

$\sqrt{4^2+5^2} = \sqrt{41}$

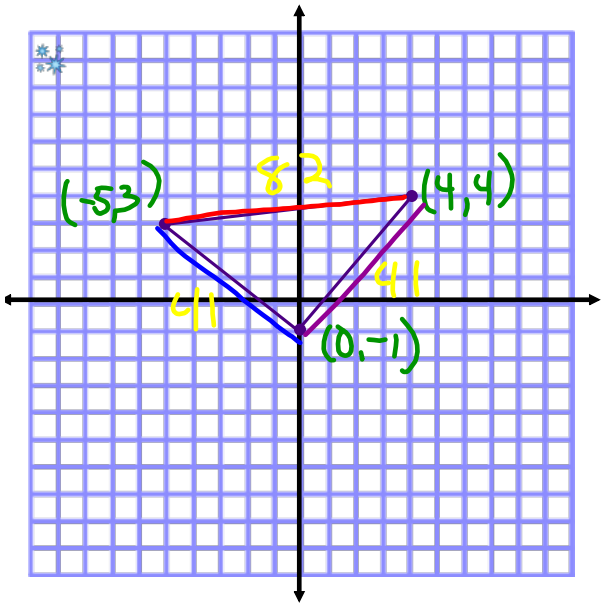
$\sqrt{5^2+4^2} = \sqrt{41}$

$\sqrt{82}+2\sqrt{41}$

Finding Perimeter and Area of Figures

Find the area of the figure determined by the points...

(−5, 3), (0, −1), (4, 4)



$\sqrt{9^2+1^2} = \sqrt{82}$

$\sqrt{4^2+5^2} = \sqrt{41}$

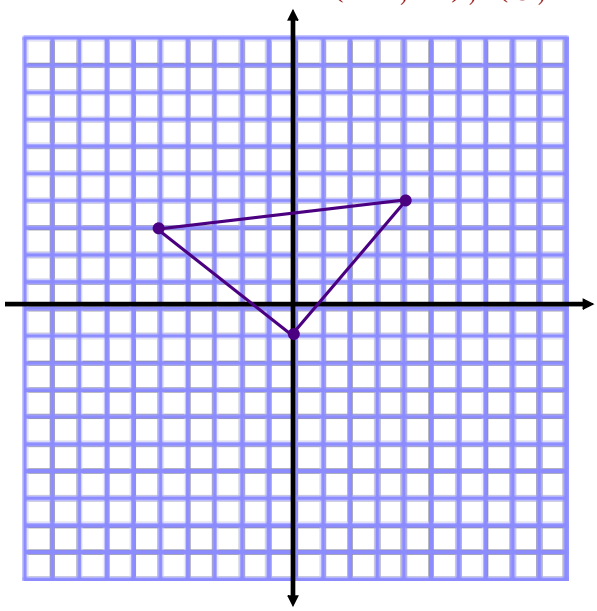
$\sqrt{5^2+4^2} = \sqrt{41}$

$\sqrt{82}+2\sqrt{41}$

Finding Perimeter and Area of Figures

Now find the perimeter of that figure

(−5, 3), (0, −1), (4, 4)



Midpoint Formula

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

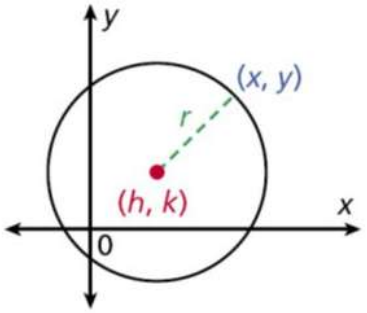
Finding the Midpoint of a Line Segment

Find the midpoint of the line segment with endpoints (−5, 2) and (3, 7)

$\left(\frac{-5+3}{2}, \frac{2+7}{2}\right)$ Average of x's and y's

$\left(-1, \frac{9}{2}\right)$

The equation of a circle is based on the Distance Formula and the fact that all points on a circle are equidistance from the center.



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

center (h,k)

radius $=r$

$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$	Distance Formula
$r=\sqrt{(x-h)^2+(y-k)^2}$	Substitute the given values.
$r^2=(x-h)^2+(y-k)^2$	Square both sides.

Finding the Standard Form Equations of Circles

Find the standard form equation of the circle with...

Center (−4, 1), radius 8

$(x+4)^2+(y-1)^2=64$

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

(h,k) center

r radius

Determining the center and radius of a circle

What is the center and radius of the circle described by the equation...

$$(x - 7)^2 + (y + 2)^2 = 121$$

Center (7, -2)

radius 11