Aug. 21

Bellwork!

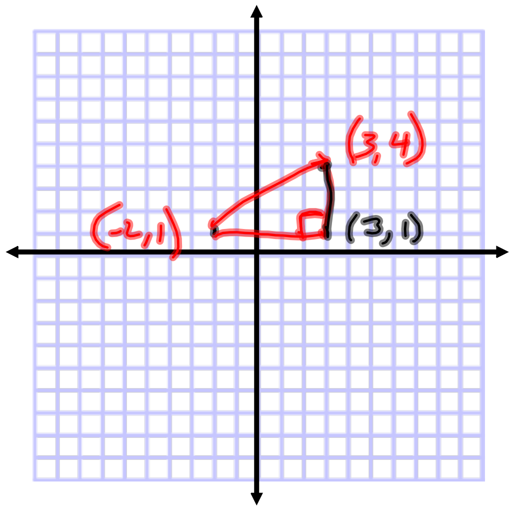
Find the distance between A and B.

$A(-2, 1) \qquad B(3, 4)$

<u>Notes</u> - Aug 21

distance formula $d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

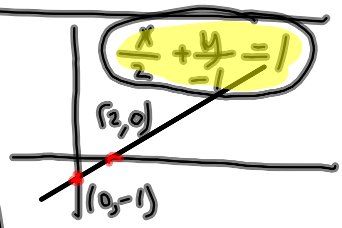
A$(-2,1)$ B$(3,4)$



$d=\sqrt{(4-1)^2+(3-(-2))^2}$

$=\sqrt{9+25}$

$=\sqrt{34}$

form name	form	when to use	ex.
slope-intercept form	$y=mx+b$	usually	line with slope $m=\frac{1}{3}$ and y-int $(0,-2)$ $y=\frac{1}{3}x-2$
point-slope form	$y-y_1=m(x-x_1)$	when given a point and the slope	$(5,7)$ $m=\frac{7}{3}$ $y-7=\frac{7}{3}(x-5)$
slope form	$\frac{y-y_1}{x-x_1}=m$	use with derivatives	$\frac{y-7}{x-5}=\frac{7}{3}$
standard form	$ax+by=c$	matrix algebra	$3x+2y=5$ $-3x+6y=-1$
intercept form	$\frac{x}{a}+\frac{y}{b}=1$	use when x-int $(a,0)$ and y-int $(0,b)$ are known	$\frac{x}{2}+\frac{y}{-1}=1$ 

Really?

$$m=\frac{y_2-y_1}{x_2-x_1}=\frac{1}{2} \qquad b=-1$$

$$y=\frac{1}{2}x-1$$

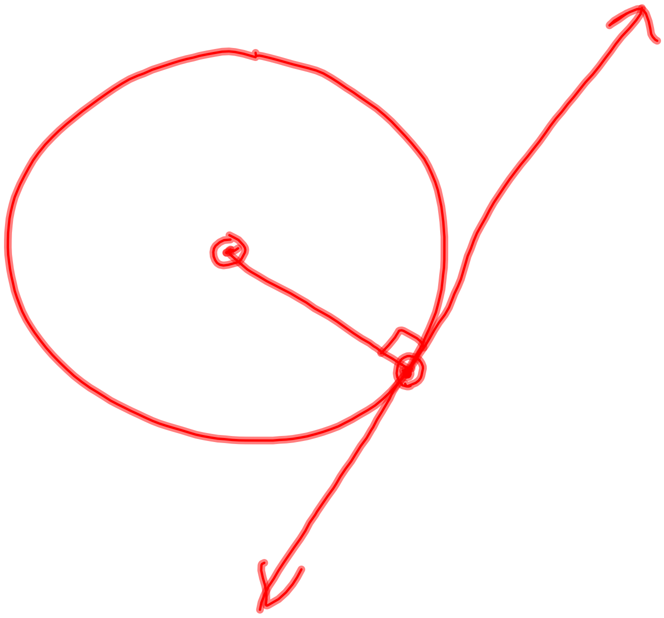
$$-x+2y=-2$$

$$2y=x-2$$

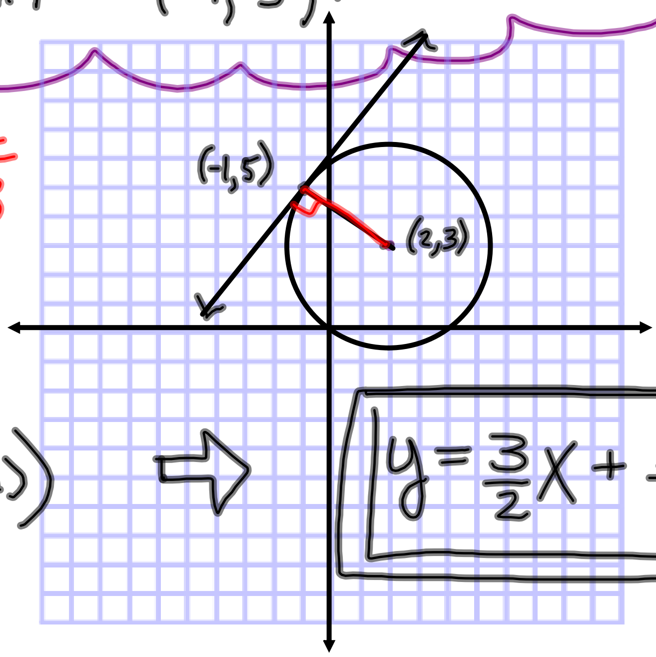
$$y=\frac{1}{2}x-1 \checkmark$$

When lines are perpendicular...

slopes are negative reciprocals.



Find the equation of the line tangent to the circle with center $(2,3)$ at the point $(-1,5)$.



$m = \frac{5-3}{-1-2} = \frac{2}{-3}$

$m = \frac{3}{2}$

$y - 5 = \frac{3}{2}(x-(-1)) \Rightarrow \boxed{y = \frac{3}{2}x + \frac{13}{2}}$

$y = \frac{3x}{2} + \frac{3}{2} + 5$

Midpoint formula

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

Just know it.

vertical lines

$$x = a$$

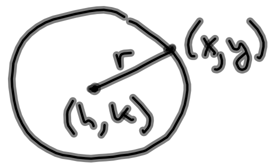
horizontal lines

$$y = b$$

Circles

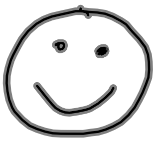
standard form for a circle with center (h, k) and radius r . . .

$$\boxed{(x-h)^2 + (y-k)^2 = r^2}$$



Find the equation of the circle with center $(-1,-2)$ and radius $r=1$.

$$\boxed{(x+1)^2+(y+2)^2=1}$$



Find the center and radius of the circle with equation

$$x^2+y^2-2x+4y-4=0$$

Move the constant:

$$x^2+y^2-2x+4y=4$$

group x's:

$$\underbrace{x^2-2x+1}_{\text{leave spot}}\ \underbrace{+y^2+4y+4}_{\text{leave spot}}=4+1+4$$

$$(x-1)^2+(y+2)^2=9$$

center $(1,-2)$ radius $=\sqrt{9}=3$

unit circle

$$x^2 + y^2 = 1$$

$f \circ g$

$f(g(x))$

$f(x) = 3x^2 + 5x$

$g(x) = 2$

$$f \circ g = f(g(x)) = 3(2)^2 + 5(2) = 22$$

Inverse of a function

Given a function, such as

$$y = \frac{2x-4}{x+1} \quad ,$$

we can find its inverse by exchanging x with y and solving for "the new y".

$$x = \frac{2y \; -4}{y+1}$$

$$yx + x = 2y - 4$$

$$yx - 2y = -x - 4$$

$$y(x-2) = -x - 4$$

$$y = \frac{-x-4}{x-2} \quad \Big\} \text{ rational function}$$

asymptotes

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

vertical asymptotes...
set denom = 0
and solve:

$x-2=0$

$\boxed{x=2}$

horizontal asymptotes...

$$y = \lim_{x\to\infty}\left(\frac{-x-4}{x-2}\right)$$

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

$$\boxed{y=-1}$$

form for quadratic

$y = ax^2 + bx + c$; $a \neq 0$

If "a" is negative, it opens down, like a frown

axis of symmetry $\boxed{x = -\frac{b}{2a}}$

vertex $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$