Solve by completing the square

$5x^2 - 3x - 9 = 0$

is not = 1 makes it tough

old-school

$5x^2 - 3x = 9$

$5\left(x^2 - \frac{3}{5}x + \left(\frac{3}{10}\right)^2\right) = 9 + 5\left(\frac{9}{100}\right)$

Binomial squared: $\frac{\frac{3}{5}}{2} = \frac{3}{10} \rightarrow \left(\frac{3}{10}\right)^2 = \frac{9}{100}$

WRITE MUCH THINK LITTLE

$5\left(x - \frac{3}{10}\right)^2 = 9 + 5\left(\frac{9}{100}\right)$

$\left(x - \frac{3}{10}\right)^2 = \frac{9}{5} + \frac{5\left(\frac{9}{100}\right)}{5} = \frac{9}{5} \cdot \frac{20}{20} + \frac{9}{100}$

$\left(x - \frac{3}{10}\right)^2 = \frac{180 + 9}{100} = \frac{189}{100}$

Shortcut straight to here

$\left(x - \frac{3}{10}\right)^2 = \frac{189}{100}$

$\sqrt{x^2} = |x|$

$\sqrt{\left(x - \frac{3}{10}\right)^2} = \sqrt{\frac{189}{100}}$

$\sqrt{3^2} = 3$

$\sqrt{(-3)^2} = \sqrt{9} = 3$

$\left|x - \frac{3}{10}\right| = \frac{17}{10}$

$x - \frac{3}{10} = \frac{17}{10}$ OR $x - \frac{3}{10} = -\frac{17}{10}$

$x - \frac{3}{10} = \pm\frac{17}{10}$

$x = \frac{-3 \pm 17}{10}$

$\frac{-3+17}{10} = \frac{14}{10} = \frac{7}{5}$

$\frac{-3-17}{10} = \frac{-20}{10} = -2$

$5x^2 - 3x = 9$ $\quad \frac{b}{2a}$ is MAGIC!

$ax^2+bx+c = a\left(x+\frac{b}{2a}\right)^2 + c + ?$

$5x^2 - 3x + ? = 5\left(x-\frac{3}{10}\right)^2$

$a=5,\ b=-3$

$\frac{b}{2a} = \frac{-3}{10}$

$= 5\left(x^2 - \frac{6}{10}x + \left(\frac{3}{10}\right)^2\right)$ $\quad \frac{9}{100}$

$= 5x^2 - 3x + 5\left(\frac{9}{100}\right)$

$= 5x^2 - 3x + \frac{9}{20}$

$(x-b)^2 = x^2 - 2bx + b^2$

$(x+b)^2 = x^2 + 2bx + b^2$

So,

$5x^2 - 3x = 9$

$5\left(x-\frac{3}{10}\right)^2 = 9 + \frac{9}{20}$

etc.

use $\frac{b}{2a}$

$m = 4$ $(3, -3)$

$y = m(x - x_1) + y_1$

$y = 4(x-3) - 3$

$y = 4x - 12 - 3$

$y = 4x - 15$

$-4x + y = -15$ is legit Book ~~whiners~~ wants.

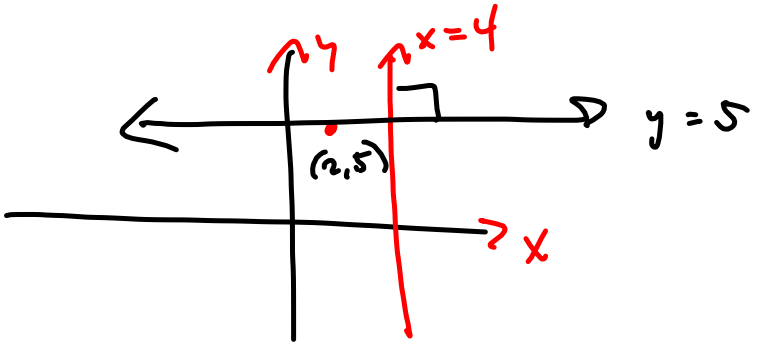
$4x - y = 15$ is what the

Integer Coefficients

Line perpendicular to $x=4$ (vertical!) thru $(2,5)$

m = undefined = $\frac{\text{some \#}}{0}$

$m_\perp = \frac{-0}{\text{some \#}} = 0$



Line thru (x_1, y_1) $(-2, 3)$ & (x_2, y_2) $(8, 5)$

perp to $y = 2x + 2$

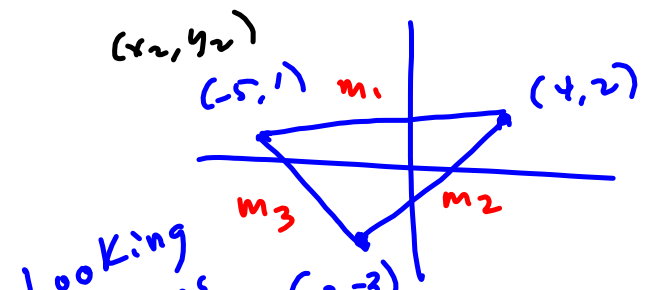
Find its slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5-3}{8-(-2)} = \frac{2}{10} = \frac{1}{5} = m$$

$\Rightarrow m_{\perp} = -\frac{5}{1} = -5$, so $a = -5$

$(-5,1)$, $(-2,-3)$, $(4,2)$

Are these vertices of a right triangle?



Looking for slopes that are negative reciprocals

$m = \frac{y_2-y_1}{x_2-x_1}$

$m_1 = \frac{2-1}{4+5} = \frac{1}{9}$

$m_2 = \frac{2+3}{4+2} = \frac{5}{6}$

$m_3 = \frac{1+3}{-5+2} = \frac{4}{-3}$

If I did it right, then NO.

POINT-SLOPE

BOOK $y-y_1=m(x-x_1)$ is lame

ME $y=m(x-x_1)+y_1$ is GREAT!

Line perpendicular to $y = \frac{2}{3}x - 7$ that passes thru $(11, 9)$.

$$y = -\frac{3}{2}(x-11)+9$$

DONE

$y = m(x-x_1)+y_1$

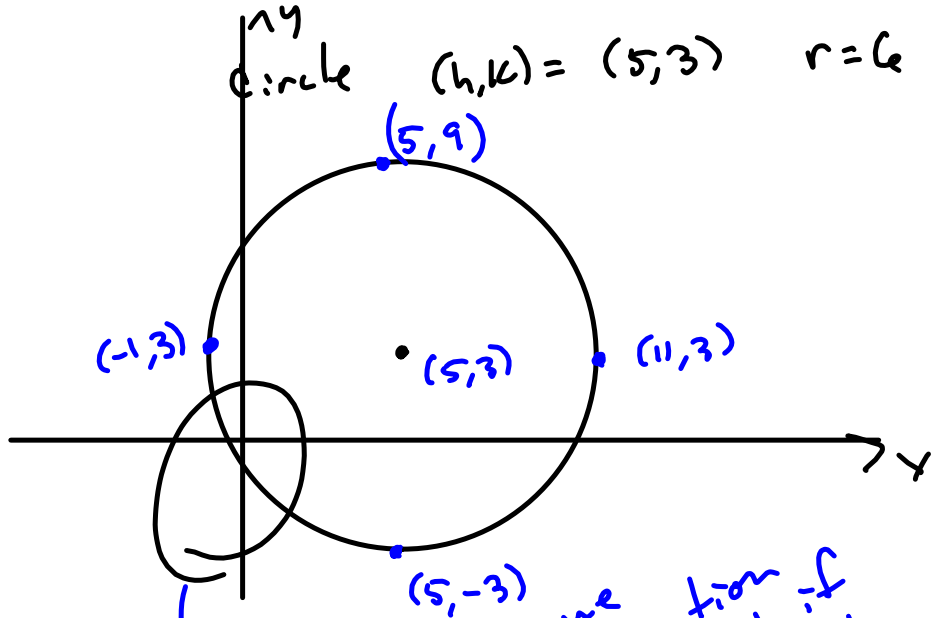
$m = \frac{2}{3} \Rightarrow m_\perp = -\frac{3}{2}$

Line parallel to .... thru $(11, 9)$

$m = \frac{2}{3} = m_{\parallel}$:

$y = m(x-x_1)+y_1$

$y = \frac{2}{3}(x-11)+9$

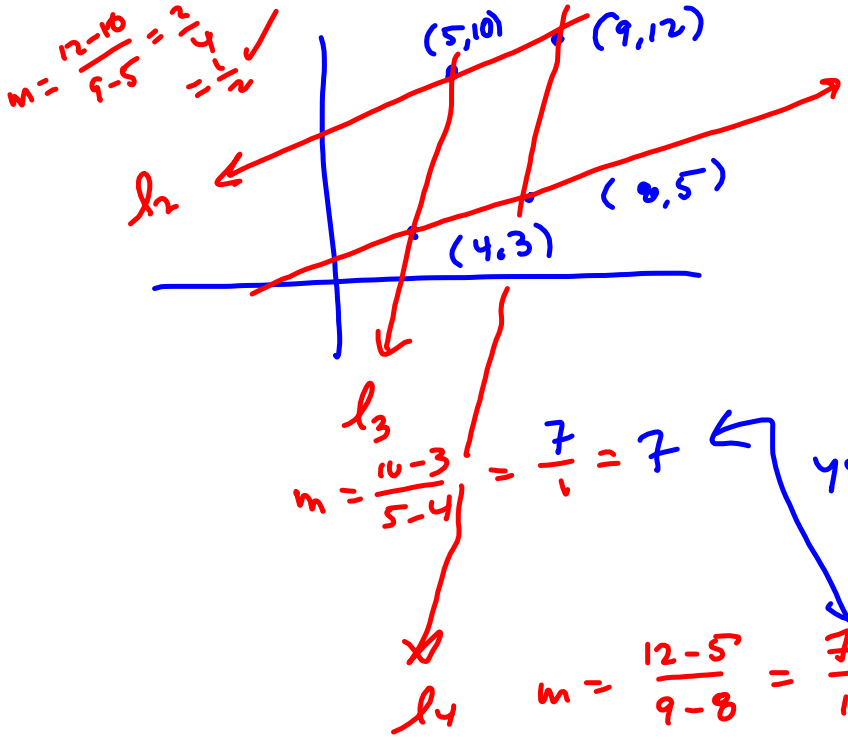


A little vague on precise location of the origin, but if we NEED that detail, we'll ask for it. (Probably won't ask!)

1.4.89

Decide whether the statement is true or false.

The points (4,3), (5,10), (8,5) and (9,12) form the vertices of a parallelogram.



$m = \frac{12-10}{9-5} = \frac{2}{4} = \frac{1}{2}$

$m = \frac{5-3}{8-4} = \frac{2}{4} = \frac{1}{2}$ ✓

This is 4 slopes. See if diagonals are perpendicular is another way

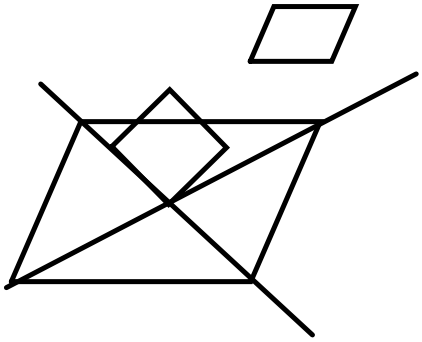
$m = \frac{10-3}{5-4} = \frac{7}{1} = 7$ ← yup!

$m = \frac{12-5}{9-8} = \frac{7}{1}$

(5,10) to (8,5): $\frac{10-5}{5-8} = \frac{5}{-3}$

(4,3) to (9,12): $\frac{3-12}{4-9} = \frac{-9}{-5} = \frac{9}{5}$

Nope. Not sure about 2nd way



Parallelogram whose diagonals are not perpendicular.