

# Plan for this week + next

Mon - Distance b/n point and line

Tues - Distance b/n parallel lines (last new topic)

Wed - Practice

Thurs - no school

Fri - practice / review / some kind of assessment

Mon - fun activity \*

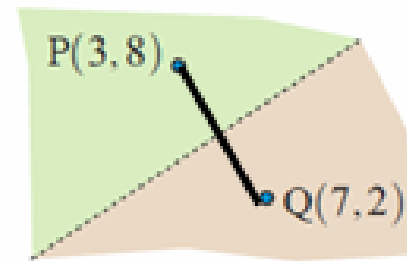
Tues - review

Wed - review

Thurs - Test

Fri - Start next unit

- 2 Two Post Offices are located at P(3, 8) and Q(7, 2) on a Council map. What is the equation of the line which should form the boundary between the two regions being serviced by the Post Offices?



Pg 126

$$M_{PQ} = \frac{8-2}{3-7}$$
$$M_{PQ} = \left( \frac{3+7}{2}, \frac{8+2}{2} \right)$$
$$= (5, 5)$$

$x$     $y$

$$\text{Step} = \frac{2}{3}$$

perpendicular  
bisector of PQ

$$y = mx + c$$

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

$$5 = \frac{2}{3}(5) + c$$

$$5 = \frac{10}{3} + c$$

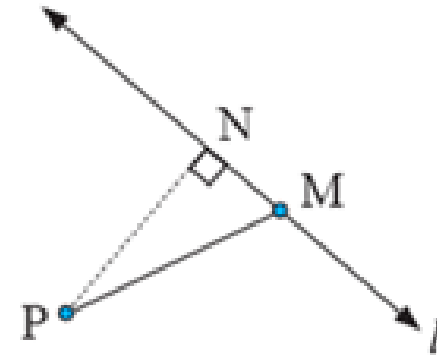
$$5 - \frac{10}{3} = c$$

$$\frac{5}{3} = c$$

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

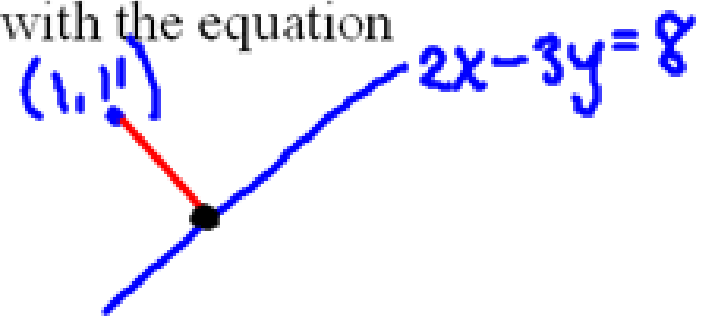
## Chapter 5F- Distance from a point to a line

- When we are looking for the distance from a point to a line, we are ALWAYS looking for the shortest distance.
- We know that this distance is found by creating a line that is perpendicular to the given line.



shortest distance b/w a point and  
a line will always be perpendicular  
to the line

**Example:** Find the distance from  $P(1, 11)$  to the line with the equation  $2x - 3y = 8$ .



Step 1- Find the gradient of the given line.

$$2x - 3y = 8$$

$$\frac{-3y}{-3} = \frac{-2x + 8}{-3}$$

$$y = \frac{2}{3}x - \frac{8}{3}$$

$$\perp \text{ slope} = -\frac{3}{2}$$

Step 2- Use the perpendicular slope and the point  $P$  to find the equation of the new line.

$$y = mx + c$$

$$y = -\frac{3}{2}x + c$$

$$11 = -\frac{3}{2}(1) + c$$

$$11 = -\frac{3}{2} + c$$

$$11 + \frac{3}{2} = c$$

$$\frac{22}{2} + \frac{3}{2} = c$$

$$\frac{25}{2} = c$$

$$y = -\frac{3}{2}x + \frac{25}{2}$$

$$2 \left( y = -\frac{3}{2}x + \frac{25}{2} \right)$$

$$2y = -3x + 25$$

$$3x + 2y = 25$$

General Form

$$Ax \pm By = C$$

Step 3- Find the point of intersection (this involves solving a system of equations...).

$$3(2x - 3y = 8) \rightarrow 6x - 9y = 24$$

$$2(3x + 2y = 25) \rightarrow 6x + 4y = 50$$

$$\begin{array}{r} \cancel{6x} \quad -13y = -26 \\ \underline{\phantom{\cancel{6x}} -13} \quad \underline{\phantom{-26}} -13 \end{array}$$

$$y = 2$$

P.O.I

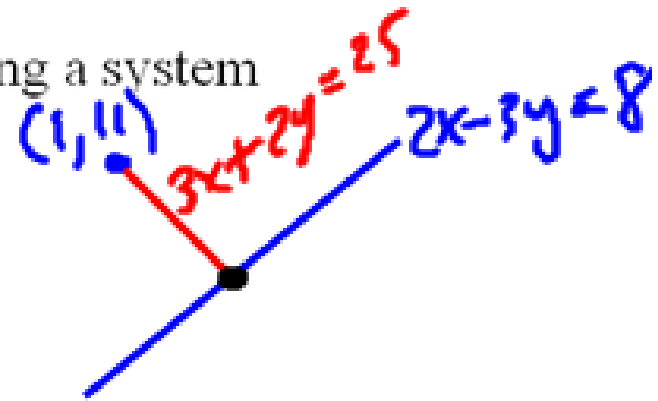
(7, 2)

$$2x - 3y = 8$$

$$2x - 3(2) = 8$$

$$2x - 6 = 8$$

$$2x = 14 \rightarrow x = 7$$



Step 4 Use the point of intersection and the given point P to find the distance from the point to the line.

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

$$d = \sqrt{(7 - 1)^2 + (2 - 11)^2}$$

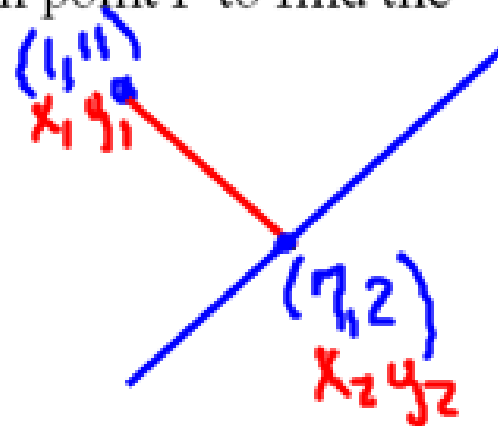
$$d = \sqrt{6^2 + (-9)^2}$$

$$d = \sqrt{36 + 81}$$

$$d = \sqrt{117}$$

$$d = \sqrt{9 \cdot 13}$$

$$d = 3\sqrt{13} \text{ (exact answer)}$$



$$117 \div 4 \text{ no}$$

$$117 \div 9 = 13$$

$$\text{decimal} = 10.82$$

HW: Pg 128 #1 (a-f)