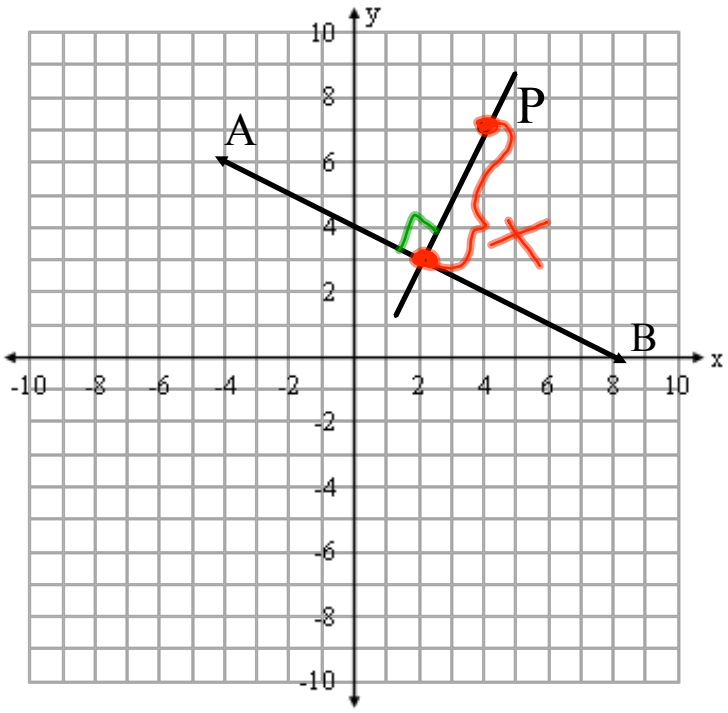
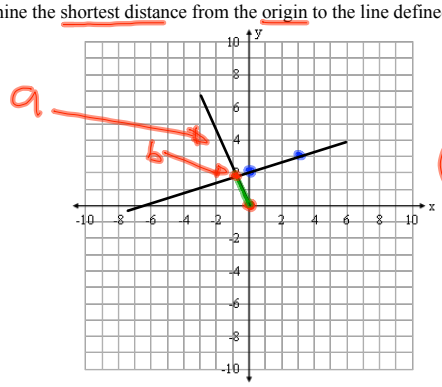
Day 3 - Points and Lines



Draw a line representing the shortest distance between point P and line AB.

Considering your diagram, what type of line results in the shortest distance between a line and a point?

1) Determine the shortest distance from the origin to the line defined by x - 3y = -6.



To find the shortest distance between a point and line, use the following:
a. Find the equation of the perpendicular line.
b. Find the point of intersection of the 2 lines.
c. Use the distance formula to determine the distance.

a) (0,0) $m = -3$

$y = mx + b$

$y = -3x + b$

$0 = -3(0) + b$

$b = 0$

$y = -3x$

$3x + y = 0$

b) $x - 3y = -6 \times 3$

$3x + y = 0$

$-(3x - 9y = -18)$

$10y = 18$

$y = 1.8$

$3x + y = 0$

$3x + 1.8 = 0$

$3x = -1.8$

$x = -0.6$

$(-0.6, 1.8)$

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

$(-0.6, 1.8)$ $(0, 0)$

x_1 y_1 x_2 y_2

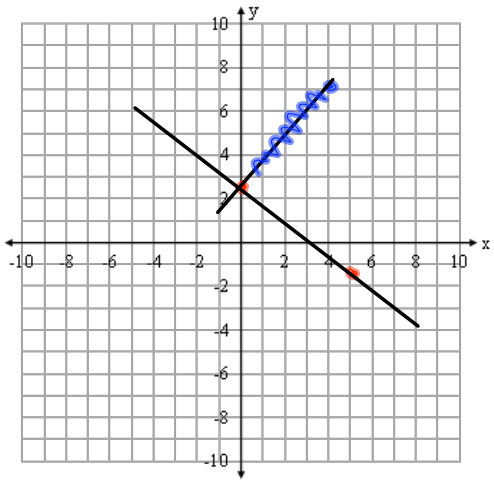
$d = \sqrt{(0 - (-0.6))^2 + (0 - 1.8)^2}$

$d = 1.897$

2) Determine the shortest distance form R(4, 7) to the line defined by $4x + 5y = 12$.

$5y = -4x + 12$

$y = \frac{-4}{5}x + \frac{12}{5}$ //



a) $(4,7)$ $m = \frac{5}{4}$

$y = mx + b$

$y = \frac{5}{4}x + b$

$7 = \frac{5}{4}(4) + b$

$b = 2$

$y = \frac{5}{4}x + 2$

$4y = 5x + 8$

$-5x + 4y = 8$

$Ax + By = C$

b) $-5x + 4y = 8$ $\times 4$

$4x + 5y = 12$ $\times 5$

$-20x + 16y = 32$

$+ \quad 20x + 25y = 60$

$41y = 92$

$y = 2.24$

$4x + 5y = 12$

$4x + 5(2.24) = 12$

$x = 0.2$

c) $(4,7)$ $(0.2, 2.24)$

$d = \sqrt{(0.2-4)^2 + (2.24-7)^2}$

$d = 6.090$

Assignment:
Pg. 540 #1-2odds, 5, 7