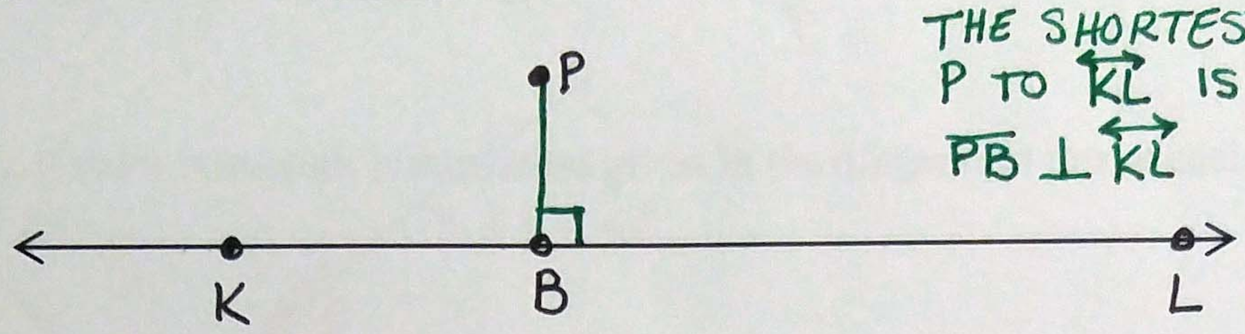
Name Key Date _____ Period _____

All about Perpendicular Lines

Distance from a point to a line: this distance is the length of the ⊥ segment from the point to the line.

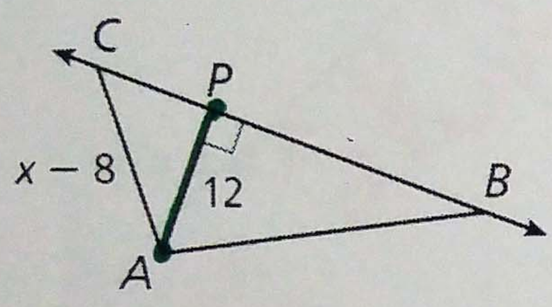
→ This ⊥ segment is also the SHORTEST distance between the point and the line.



THE SHORTEST DISTANCE FROM P TO $\overleftrightarrow{KL}$ IS $\overline{PB}$.

$\overline{PB} \perp \overleftrightarrow{KL}$

Example:



1. Name the shortest distance from point A to $\overline{BC}$: $\overline{AP}$

2. Write and solve an inequality to solve for the values of x that are valid.

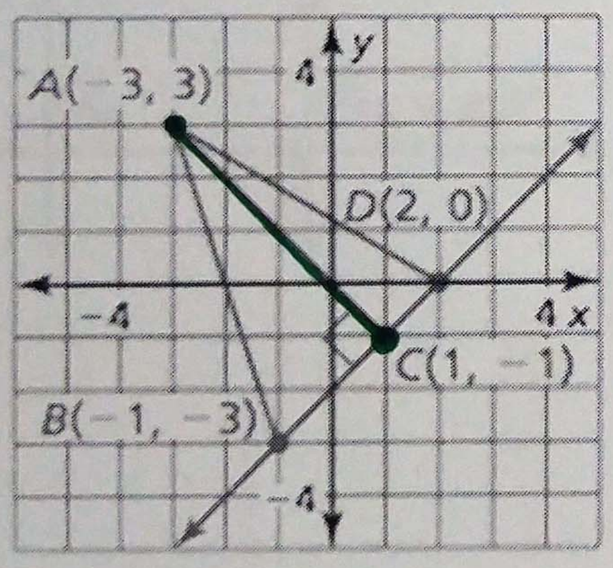
$AC > AP$

$x - 8 > 12$

$+8 \quad +8$

$x > 20$

3. Find the distance from point A to $\overleftrightarrow{BD}$.



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

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

$AC = \sqrt{(4)^2 + (-4)^2}$

$AC = \sqrt{16+16}$

$AC = \sqrt{32}$

$\boxed{AC = 4\sqrt{2}}$

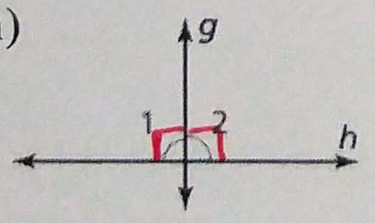
A (−3, 3)
x_1 y_1

C (1, −1)
x_2 y_2

32
2 16
4 4

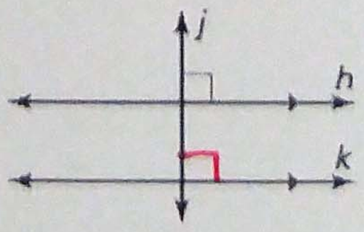
Perpendicular Line Theorems (*** to abbreviate "transversal," we will use TRANSV. .***)

Linear Pair Perpendicular Theorem: If two lines intersect to form a linear pair of ≅ angles, then the lines are perpendicular. (Lin. Pair ⊥ Thm)



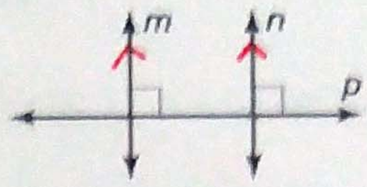
$g \perp h$

Perpendicular Transversal Theorem: In a PLANE, if a transversal is ⊥ to one of the two parallel lines, then it is ⊥ to the other line. (⊥ Transv. Thm)



$j \perp k$

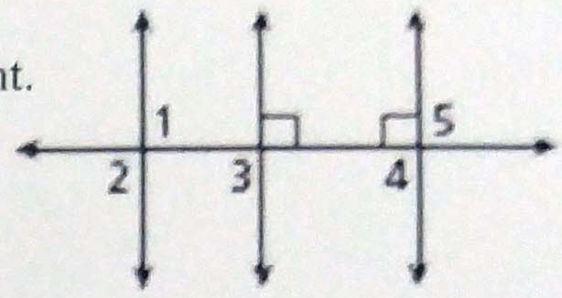
Lines Perpendicular to a Transversal Theorem: In a PLANE, IF two lines are ⊥ to the SAME line, then the two lines are // to each other. (Line ⊥ to Transv. Thm)



m // n

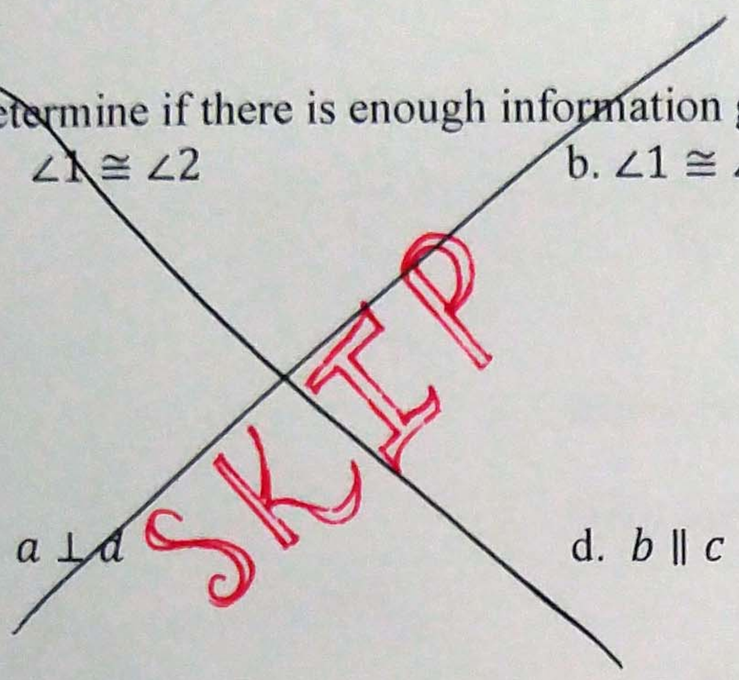
Examples:

1. Determine if there is enough information given in the diagram to prove each statement.



a. $\angle 1 \cong \angle 2$

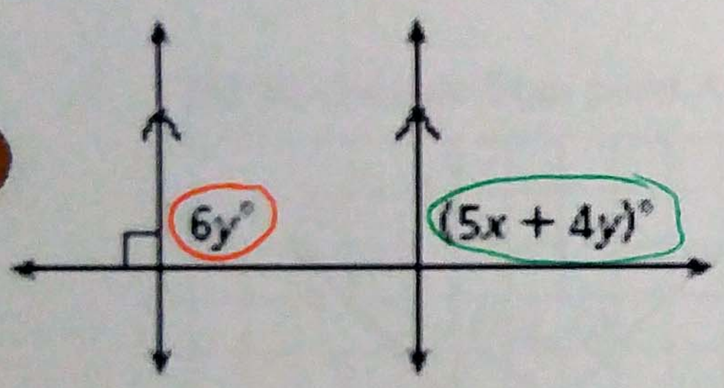
b. $\angle 1 \cong \angle 3$



c. $a \perp d$

d. $b \parallel c$

2. Solve to find x and y in the diagram.



$\frac{6y}{6} = \frac{90°}{6}$

$\boxed{y = 15}$

$5x + 4y = 90$

$5x + 4(15) = 90$

$5x + 60 = 90$

$5x = 30$

$\boxed{x = 6}$