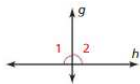


(3.4) Proofs with Perpendicular Lines 7.notebook

December 07, 2016

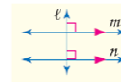
Objectives: You will be able to find the distance from a point to a line and prove theorems about perpendicular lines.

Linear Pair Perpendicular Theorem: If two lines intersect to form a linear pair of congruent angles, then the lines are perpendicular.



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Perpendicular Transversal Theorem: In a plane, if a transversal is perpendicular to one of two parallel lines, then it is perpendicular to the other line.



Lines Perpendicular to a Transversal Theorem: In a plane, if two lines are perpendicular to the same line, then they are parallel to each other.

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Example 1: Determine what lines, if any, are parallel.



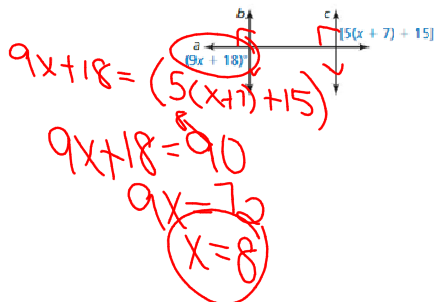
b || c
lines
⊥ transversal
thm



z || y by
alt ext conv
x || w lines
b/c ⊥ to trans
thm

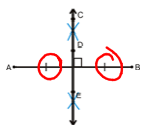
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Example 2: MATHEMATICAL CONNECTIONS Find the value of x when $a \perp b$ and $b \parallel c$.



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Perpendicular Bisector: A segment or line that intersects another segment at 90 degrees, and passes through the segment's midpoint.



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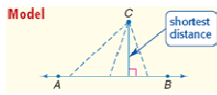
Example 3: Given $\overline{BA} \perp \overline{BC}$. Prove $\angle 1$ and $\angle 2$ are complementary.



Statements	Reasons
1. $\overline{AB} \perp \overline{BC}$	1. Given
2. $m\angle ABC = 90^\circ$	2. def of \perp
3. $m\angle 1 + m\angle 2 = m\angle ABC$	3. AAP
4. $m\angle 1 + m\angle 2 = 90^\circ$	4. Substitution
5. $\angle 1$ and $\angle 2$ are complementary	5. def of comp.

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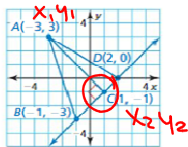
The distance from a line to a point not on the line is the length of the perpendicular segment from the point to the line.



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Example 4: Find the distance from point A to \overleftrightarrow{BC}



$$\begin{aligned} d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ AC &= \sqrt{(1 - (-3))^2 + (-1 - 3)^2} \\ &= \sqrt{4^2 + (-4)^2} \\ &= \sqrt{16 + 16} \\ &= \sqrt{32} = 4.12 \end{aligned}$$

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