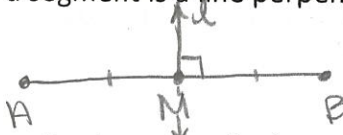


Objective Apply theorems about perpendicular lines.

Terms to Know

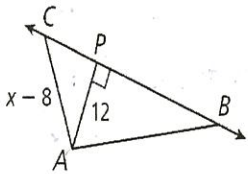
1. Perpendicular Bisector of a segment is a line perpendicular to a segment at the segment's midpoint.



2. The shortest segment from a point to a line is perpendicular to the line.

This fact is used to define the shortest distance from a point to a line as the length of the perpendicular segment from the point to the line.

Example 1



a. Name the shortest segment from point A to \overline{BC} . \overline{AP} or \overline{PA}

b. Write and solve an inequality for x.

$$x - 8 > 12 \quad \text{or} \quad 12 < x - 8$$

$$x > 20$$

FYI:

Theorems		
THEOREM	HYPOTHESIS	CONCLUSION
3-4-1 If two intersecting lines form a linear pair of congruent angles, then the lines are perpendicular. (2 intersecting lines form lin. pair of $\cong \angle \rightarrow$ lines \perp .)		$l \perp m$
3-4-2 <u>★</u> Transversal Theorem In a plane, if a transversal is perpendicular to one of two parallel lines, then it is perpendicular to the other line.		$q \perp p$
3-4-3 If two coplanar lines are perpendicular to the same line, then the two lines are parallel to each other. (2 lines \perp to same line \rightarrow 2 lines \parallel .)		$r \parallel s$

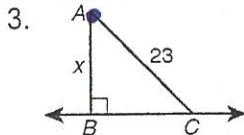
We know this already w/out these Thms !!

LESSON
3-4

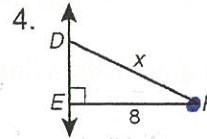
Practice A
Perpendicular Lines

- The perpendicular bisector of a segment is a line perpendicular to a segment at the segment's midpt.
- The shortest segment from a point to a line is perpendicular to the line.

For Exercises 3 and 4, name the shortest segment from the point to the line and write an inequality for x .



\overline{AB} ; $x < 23$

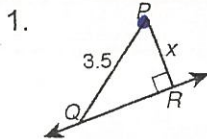


\overline{FE} ; $x > 8$

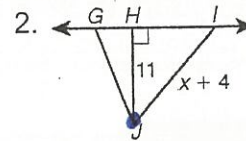
Fill in the blanks to complete these theorems about parallel and perpendicular lines.

- If two coplanar lines are perpendicular to the same line, then the two lines are parallel to each other. (By conv. of corr \angle s Post.)
- If two intersecting lines form a linear pair of congruent angles, then the lines are perpendicular.
- In a plane, if a transversal is perpendicular to one of two parallel lines, then it is (corr. \angle s) perpendicular to the other line.

For Exercises 1–4, name the shortest segment from the point to the line and write an inequality for x . (Hint: One answer is a double inequality.)

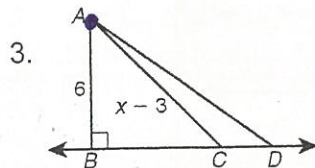


\overline{PR} ; $x < 3.5$



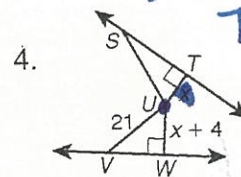
\overline{JH} ; $11 < x + 4$

$7 < x \Rightarrow x > 7$



\overline{AB} ; $6 < x - 3$

$9 < x$
 $x > 9$



\overline{UT} ; $x + 4 < 21$

$x < 17$

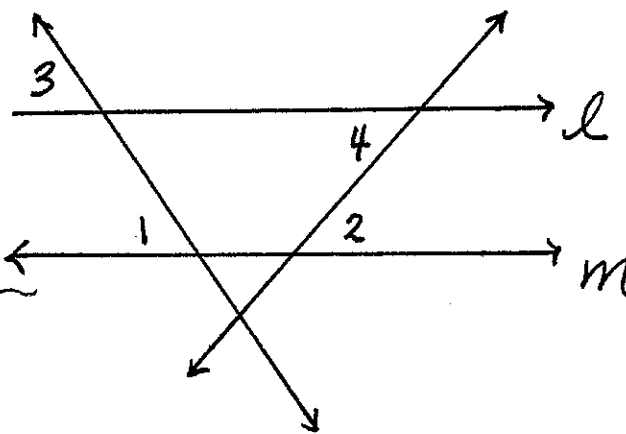
Honors Geometry
 Additional Practice
 Proofs with Parallel Lines

Name KEY

Date _____ Period _____

1. Given: $l \parallel m$; $m \angle 1 = m \angle 2$

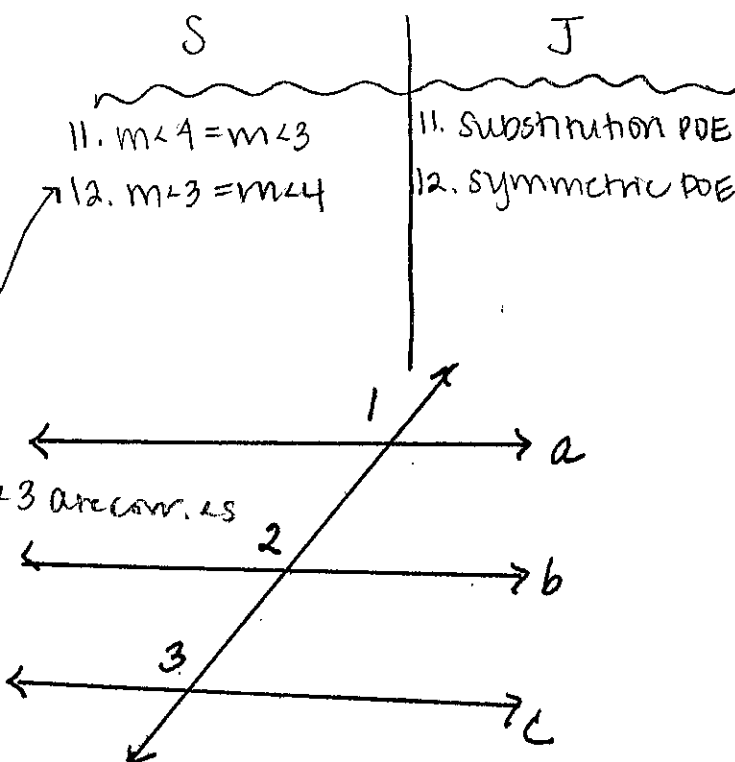
Prove: $m \angle 3 = m \angle 4$



S	J
1. $l \parallel m$	1. Given
2. $m \angle 1 = m \angle 2$	2. Given
3. $\angle 1 \cong \angle 2$	3. Def of \cong angles
4. $\angle 2$ and $\angle 4$ are alt. int. angles	4. Def of alt int angles
5. $\angle 2 \cong \angle 4$	5. Alt. int \angle s thm
6. $m \angle 2 = m \angle 4$	6. Def. of \cong angles
7. $\angle 1$ and $\angle 3$ are corr. \angle s	7. Def of corr. \angle s
8. $\angle 1 \cong \angle 3$	8. Corr. \angle s Post
9. $m \angle 1 = m \angle 3$	9. Def of \cong angles
10. $m \angle 2 = m \angle 3$	10. Substitution POE

Prove: $a \parallel c$ ~ need to be able to say $\angle 1$ & $\angle 3$ are corr. \angle s

S	J
1. $a \parallel b$	1. Given
2. $\angle 1$ and $\angle 2$ are corr. \angle s	2. Def of corr \angle s
3. $\angle 1 \cong \angle 2$	3. Corr. \angle s Post
4. $m \angle 1 = m \angle 2$	4. Def of \cong \angle s
5. $c \parallel b$	5. Given
6. $\angle 2$ and $\angle 3$ are corr \angle s	6. Def of corr \angle s
7. $\angle 2 \cong \angle 3$	7. Corr. \angle s Post
8. $m \angle 2 = m \angle 3$	8. Def of \cong \angle s
9. $m \angle 1 = m \angle 3$	9. Substitution POE
10. $\angle 1 \cong \angle 3$	10. Def of \cong \angle s
11. $\angle 1$ and $\angle 3$ are corr \angle s	11. Def of corr \angle s
12. $a \parallel c$	12. Conv. of corr \angle s Post *



11. $m \angle 4 = m \angle 3$
 12. $m \angle 3 = m \angle 4$

11. Substitution POE
 12. Symmetric POE

