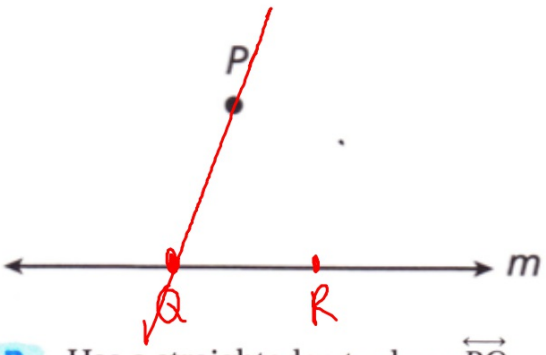
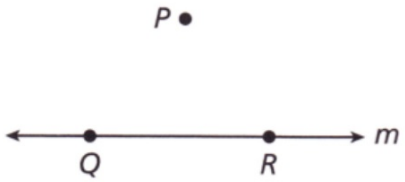
Section 3.3
Proving Lines are Parallel

Constructing a line parallel to another line at a point

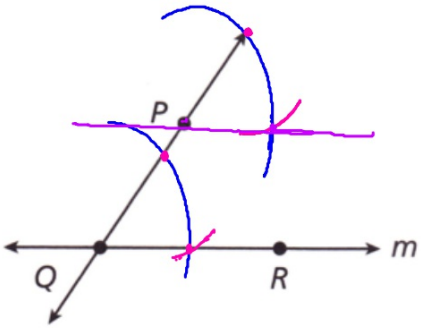
Construct a line parallel to line m that passes through point P. Work directly on the figure below.



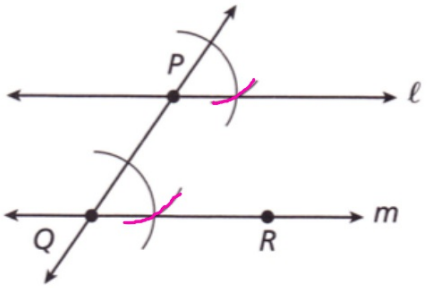
A Choose points Q and R on line



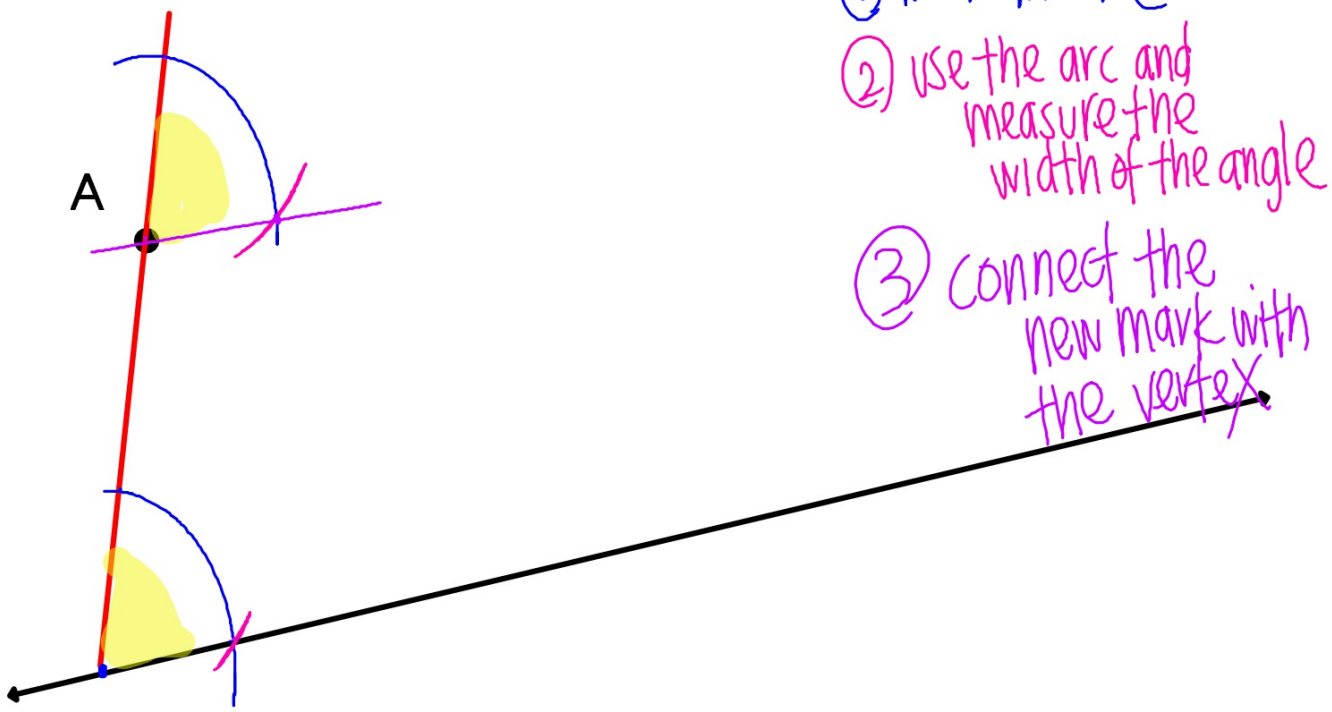
B Use a straightedge to draw $\overleftrightarrow{PQ}$.



C Copy $\angle PQR$ at point P, as shown. Label line ℓ. Line ℓ is the required line.



Construct a line parallel to the line that contains point A



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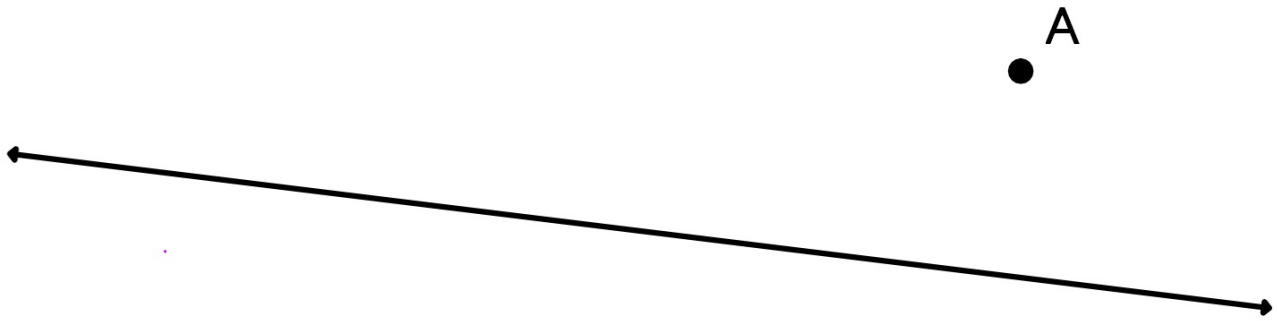
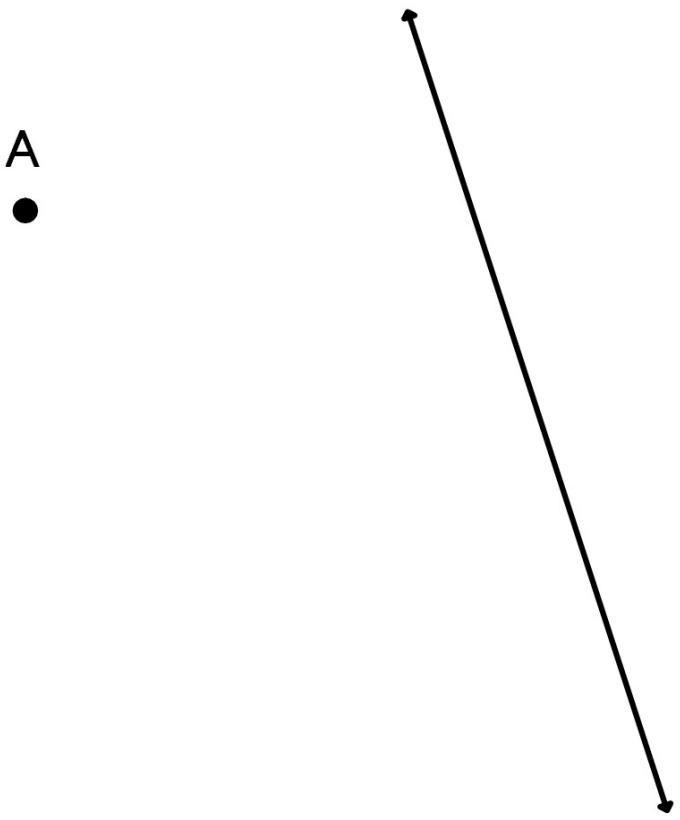
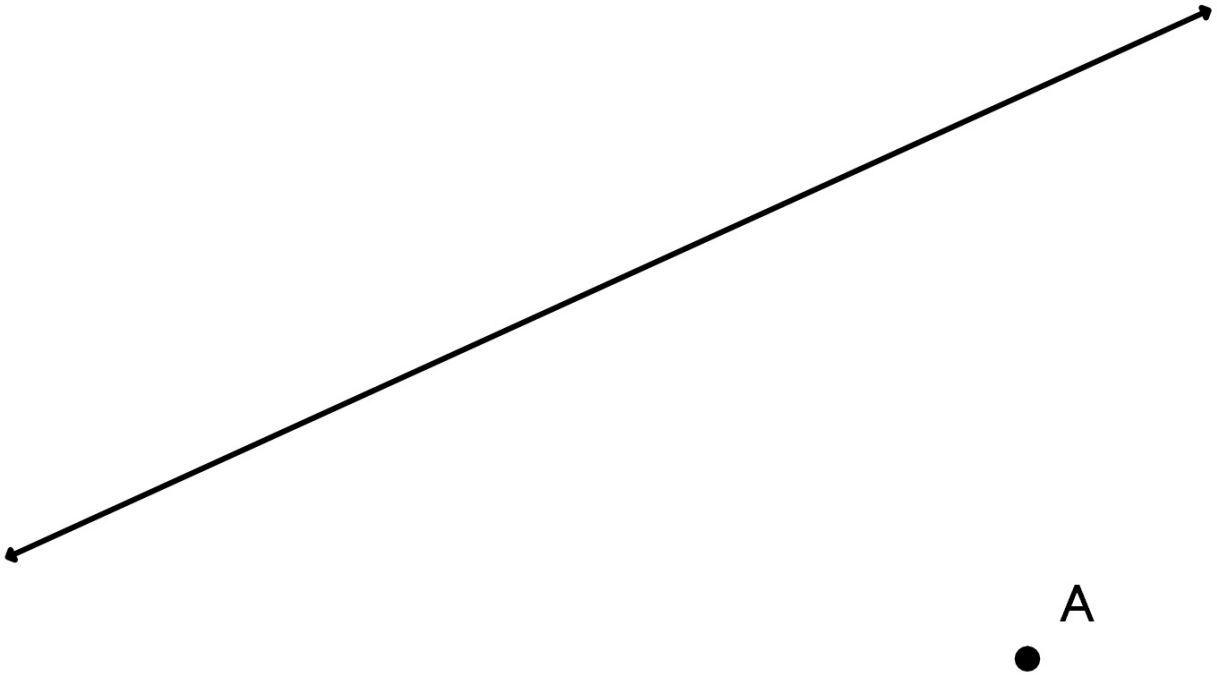


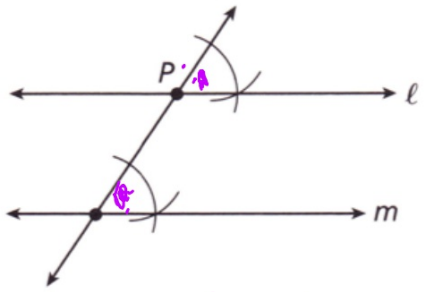
Construct a line parallel to the line that contains point A



Construct a line parallel to the line that contains point A



4. The figure shows a given line m, a given point P, and the construction of a line ℓ that is parallel to line m. Explain why line ℓ is parallel to line m.



copied the ∠ so corr ∠ ≅

Theorem

IF 2 // cut by transversal → corr ∠ ≅

REFLECT

1a. Why does it make sense to copy $\angle PQR$ to get a line parallel to line m?

1b. Is it possible to construct a line parallel to a given line m that passes through a point P that is *on* line m? Why or why not?

1c. Write an if-then statement that justifies the method used in the construction of parallel lines.

Below are the main postulates/theorems from yesterday.

Write the converse of each

corr $\cong$ → // lines

If two parallel lines are cut by a transversal, then the pairs of corresponding angles are congruent.

IF 2 pair corr $\measuredangle \cong$

Then // lines (cut by a transversal)

They are

If two parallel lines are cut by a transversal, then the pairs of alternate interior angles are congruent.

IF Alt. INT $\measuredangle \cong$

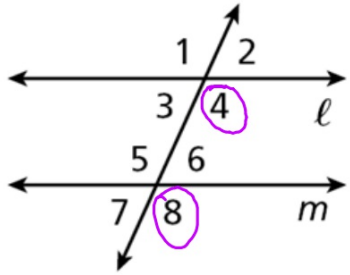
If two parallel lines are cut by a transversal, then the two pairs of same-side interior angles are supplementary.

IF same side interior are supple

then //...

Use the Converse of the Corresponding Angles Postulate and the given information to show that $\ell \parallel m$.

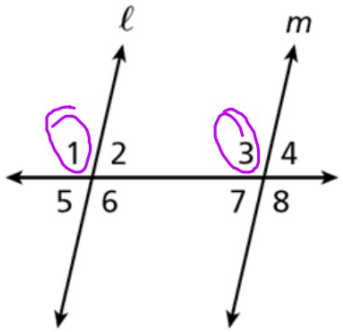
$\angle 4 \cong \angle 8$



$\angle 4 \cong \angle 8$	*$\angle 4$ and $\angle 8$ are corresponding angles.*
$\ell \parallel m$	*Conv. of Corr. $\angle$s Post.*

corr $\angle$s $\cong$ → // lines

Use the Converse of the Corresponding Angles Postulate and the given information to show that $\ell \parallel m$.



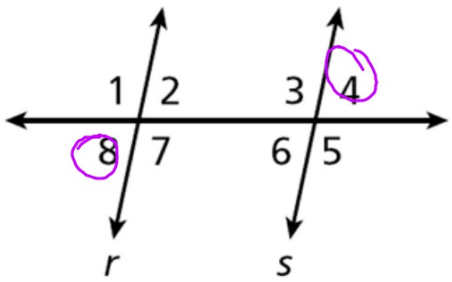
$m\angle 1 = m\angle 3$

$\angle 1 \cong \angle 3$ def of congruence $\cong \leq$

$\ell \parallel m$ corr $\measuredangle \cong \rightarrow$ // lines (converse of corr $\measuredangle$ post)

Use the given information and the theorems you have learned to show that *r* || *s*.

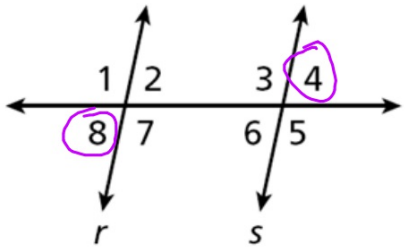
∠4 ≅ ∠8



∠4 ≅ ∠8	*∠4 and ∠8 are alternate exterior angles.*
r || *s*	*Conv. Of Alt. Int. ∠s Thm.*

IF AEA ≅ → // lines

Refer to the diagram. Use the given information and the theorems you have learned to show that *r* || *s*.

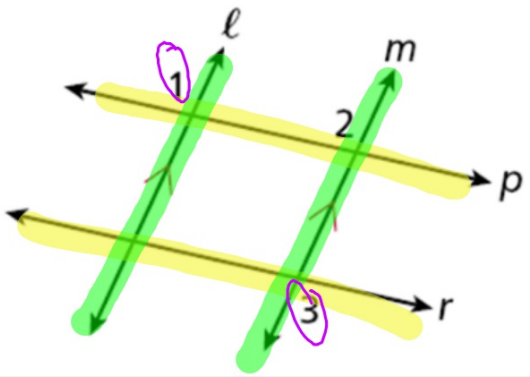


m∠4 = m∠8

∠4 ≅ ∠8 def. Congruent angles

∠4 ≅ ∠8	AEA def.
r || *s*	AEA ≅ → // lines

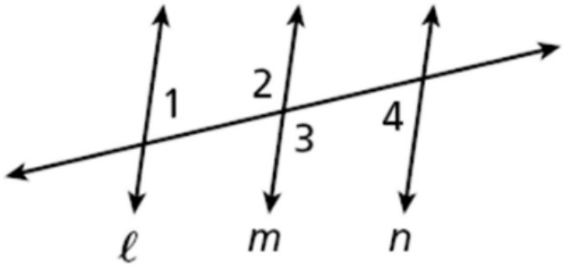
Given: $p \parallel r$, $\angle 1 \cong \angle 3$
Prove: $\ell \parallel m$



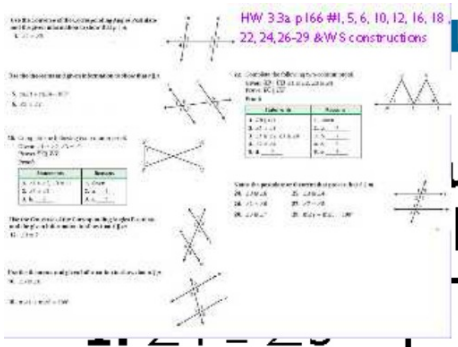
Statements	Reasons
1. $p \parallel r$	**1.**
2. $\angle 3 \cong \angle 2$	**2.**
3.	**3.** Given
4.	**4.**
5. $\ell \parallel m$	

Given: $\angle 1 \cong \angle 4$, $\angle 3$ and $\angle 4$ are supplementary.

Prove: $\ell \parallel m$

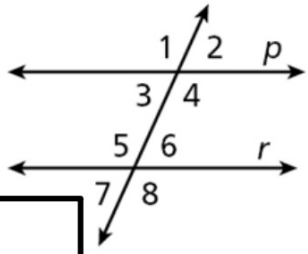


Statements	Reasons
1. $\angle 1 \cong \angle 4$	**1.**
2. $m\angle 1 = m\angle 4$	**2.** Def. $\cong \angle$s
3. $\angle 3$ and $\angle 4$ are supp.	**3.** Given
4. $m\angle 3 + m\angle 4 = 180°$	**4.**
5. $m\angle 3 + m\angle 1 = 180°$	**5.**
6. $m\angle 2 = m\angle 3$	**6.**
7. $m\angle 2 + m\angle 1 = 180°$	**7.**
8. $\ell \parallel m$	



Lesson Quiz: Part I

ulate or theorem
| *r*.



2. ∠2 ≅ ∠7

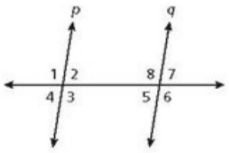
3. ∠3 ≅ ∠7

4. ∠3 and ∠5 are supplementary.

HW 3.3a p166 #1, 5, 6, 10, 12, 16, 18 , 22, 24, 26-29 & WS constructions

Use the Converse of the Corresponding Angles Postulate and the given information to show that $p \parallel q$.

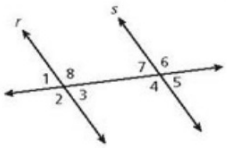
1. $\angle 4 \cong \angle 5$



Use the theorems and given information to show that $r \parallel s$.

5. $m\angle 3 + m\angle 4 = 180°$

6. $\angle 3 \cong \angle 7$

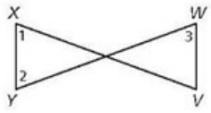


10. Complete the following two-column proof.

Given: $\angle 1 \cong \angle 2, \angle 3 \cong \angle 1$
Prove: $\overline{XY} \parallel \overline{WV}$

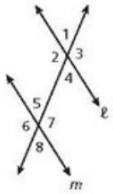
Proof:

Statements	Reasons
1. $\angle 1 \cong \angle 2, \angle 3 \cong \angle 1$	1. Given
2. $\angle 2 \cong \angle 3$	2. a. ___?___
3. b. ___?___	3. c. ___?___



Use the Converse of the Corresponding Angles Postulate and the given information to show that $\ell \parallel m$.

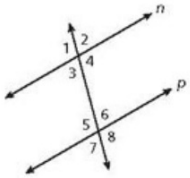
12. $\angle 3 \cong 7$



Use the theorems and given information to show that $n \parallel p$.

16. $\angle 3 \cong \angle 6$

18. $m\angle 4 + m\angle 6 = 180°$

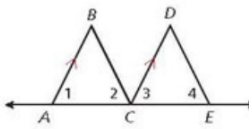


22. Complete the following two-column proof.

Given: $\overline{AB} \parallel \overline{CD}, \angle 1 \cong \angle 2, \angle 3 \cong \angle 4$
Prove: $\overline{BC} \parallel \overline{DE}$

Proof:

Statements	Reasons
1. $\overline{AB} \parallel \overline{CD}$	1. Given
2. $\angle 1 \cong \angle 3$	2. a. ___?___
3. $\angle 1 \cong \angle 2, \angle 3 \cong \angle 4$	3. b. ___?___
4. $\angle 2 \cong \angle 4$	4. c. ___?___
5. d. ___?___	5. e. ___?___

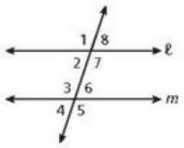


Name the postulate or theorem that proves that $\ell \parallel m$.

24. $\angle 8 \cong \angle 6$ **25.** $\angle 8 \cong \angle 4$

26. $\angle 2 \cong \angle 6$ **27.** $\angle 7 \cong \angle 5$

28. $\angle 3 \cong \angle 7$ **29.** $m\angle 2 + m\angle 3 = 180°$



Name_____

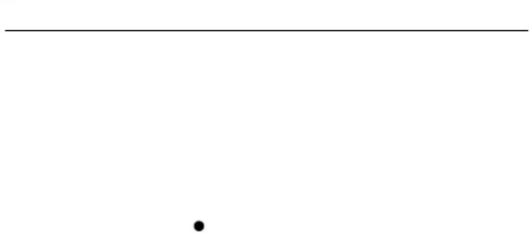
Constructing Parallel Lines

Date_____ Period____ Assn #:_____

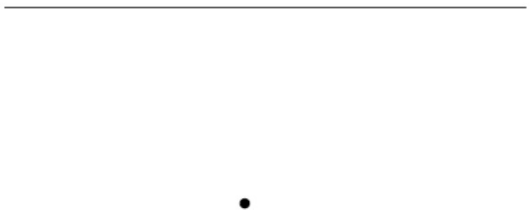
Construct a line segment through the given point parallel to the given line segment.

1)

2)



3)



4)