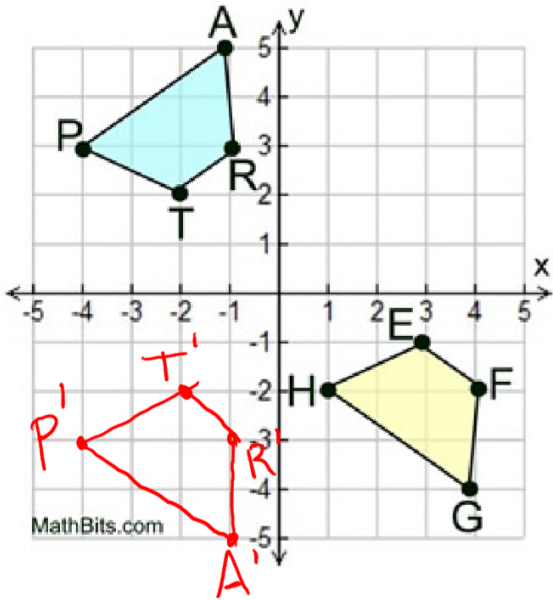


Warm - Up

Parallel Line Properties

Prove the following figures are congruent in terms of rigid motions.



PART can be mapped to HGFE by a reflection over the x-axis then a translation of 5 right and up 1. A reflection then a translation is a sequence of rigid motions. Rigid motions create congruent figures. Thus, PART is congruent to HGFE.

Vocabulary / Properties

Parallel Line Properties

1

2

5

6

Corresponding \angle s:
 $\angle 1 \cong \angle 5$
 Alternate exterior \angle s:
 $\angle 1 \cong \angle 8$
 Same side exterior \angle s:

$$m\angle 1 + m\angle 6 = 180^\circ$$

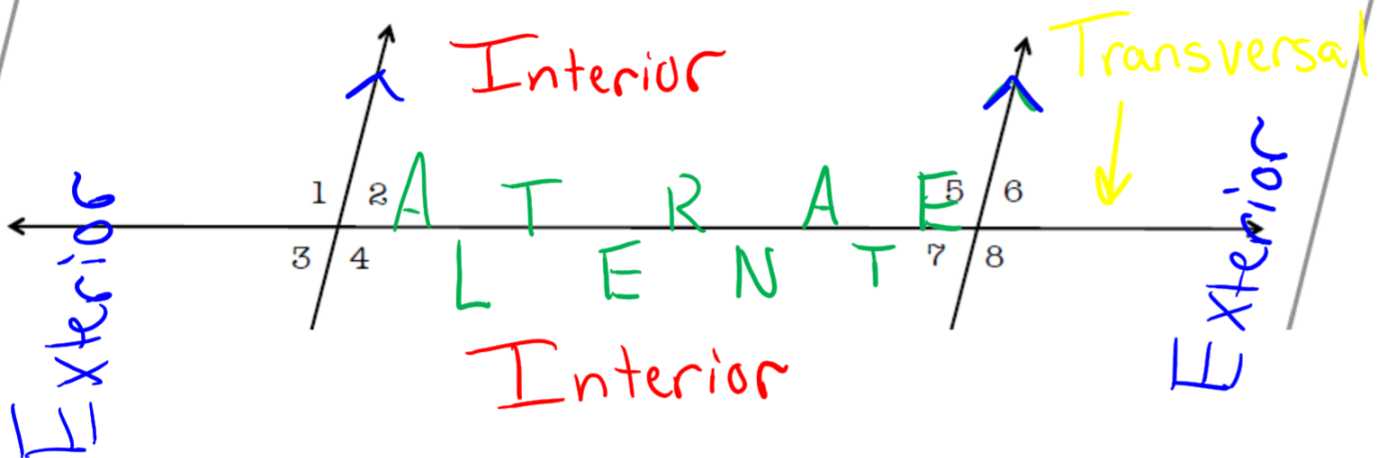
Corresponding \angle s:
 $\angle 2 \cong \angle 6$
 Alternate interior \angle s:
 $\angle 2 \cong \angle 7$
 Same side interior \angle s:

$$m\angle 2 + m\angle 5 = 180^\circ$$

Corresponding \angle s:
 Alternate interior \angle s:
 Same side interior \angle s:

Corresponding \angle s:
 Alternate exterior \angle s:
 Same side exterior \angle s:

Created by iisanumber.blogspot.com



Proof -Evidence or argument establishing or helping to establish a fact or the truth of a statement.

What are the three pieces to every proof?

1. Given

2. Logic

3. Conclusion

Let's add another one. Transitive property

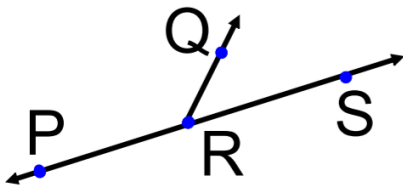
If $a = b$ and $b = c$
then $a = c$

Let's look at another piece of Logic.



Linear Pair Conjecture - Linear Pairs of angles add up to 180°

Lets look at one way to write a proof for linear pairs.



Given: $\angle PRQ$ and $\angle QRS$ are linear pairs.

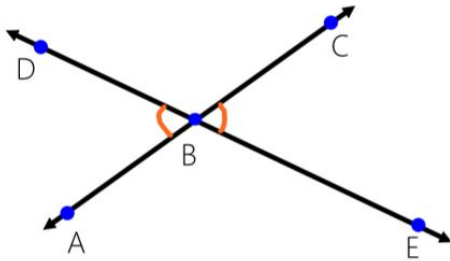
Prove: Linear pairs are supplementary.

We know $\angle PRQ$ and $\angle QRS$ are linear Pairs, because it is given.

$m\angle PRQ + m\angle QRS = 180$, by the Linear pairs conjecture

Thus $\angle PRQ$ and $\angle QRS$ are supp. by Definition of Supplementary

Given that DE and CA are lines, Prove that vertical angles are congruent.



Prove $\angle CBE = \angle ABD$

statement	Reason
DE and CA are lines	Given
$\angle ABD$ and $\angle DBC$ are linear pairs	Def. of Linear pairs
$\angle DBC$ and $\angle CBE$ are linear pairs	Def. of Linear pairs
$m\angle ABD + m\angle DBC = 180^\circ$ $m\angle DBC + m\angle CBE = 180^\circ$	Linear Pairs Conjecture
$m\angle ABD = 180 - m\angle DBC$ $m\angle CBE = 180 - m\angle DBC$	Inverse Operation of Addition
$m\angle ABD = m\angle CBE$	Transitive Property
$\angle ABD \cong \angle CBE$	Definition of Congruence

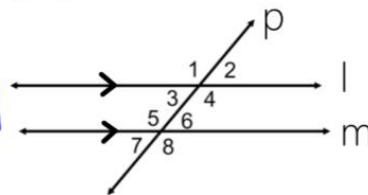
Review

Parallel Line Properties

Use the given figure to answer the following questions.

1. Identify the parallel lines and their transversal

l and m are parallel p is the transversal



2. Name two pairs of congruent angles and what property makes them congruent.

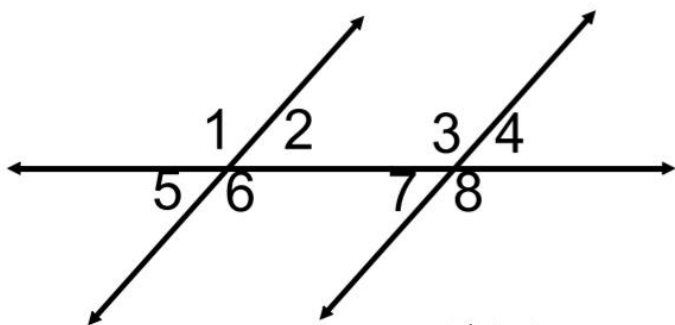
$\angle 1 \cong \angle 4 \rightarrow$ vertical angles
 $\angle 1 \cong \angle 5$ corresponding angles
 $\angle 3 \cong \angle 6$ Alt. Int. angles
 $\angle 1 \cong \angle 8 \rightarrow$ Alt. Ext. angles

3. Name two pairs of supplementary angles and what property makes them supplementary.

$\angle 1 + \angle 2 \rightarrow$ Linear Pairs
 $\angle 1 + \angle 7$ Same side exterior \angle 's
 $\angle 3 + \angle 5$ same side interior angles.

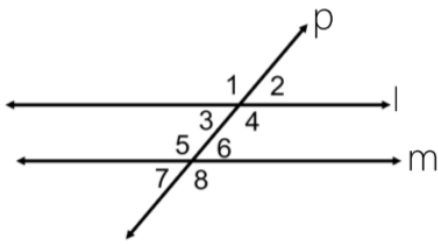
Parallel Line Properties

Corresponding Angles Postulate



This is a postulate, meaning that it is not proven, but is accepted to be true.

Let's prove the theorems we learned. [Parallel Line Properties](#)



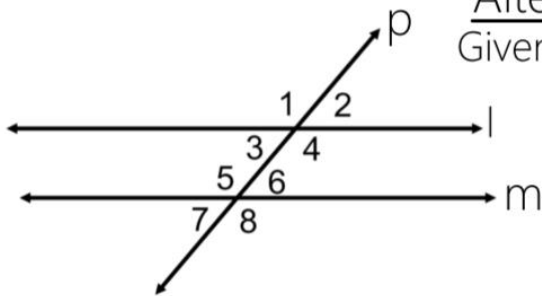
Alternate Interior Angles

Given that $l \parallel m$ prove that $\angle 3 \cong \angle 6$.

What logic do we know?
 Corresponding Angles Postulate
 Vertical Angles
 Linear Pairs
 Transitive Property

Statement	Reason
$l \parallel m$	Given
$\angle 3 \cong \angle 7$	Corr. \angle 's Post.
$\angle 7 \cong \angle 6$	Vertical \angle 's Thm.
$\angle 3 \cong \angle 6$	Transitive Property

Let's prove the theorems we learned. [Parallel Line Properties](#)



Alternate Exterior Angles Theorem

Given that $l \parallel m$ show that $\angle 2 \cong \angle 7$

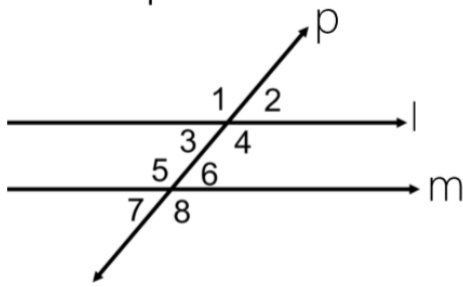
What logic do we know?
 Corresponding Angles Postulate
 Vertical Angles
 Linear Pairs
 Transitive Property

Statement	Reason
$l \parallel m$	Given
$\angle 2 \cong \angle 6$	Corr. \angle 's Post.
$\angle 6 \cong \angle 7$	Vert. \angle 's Theorem
$\angle 2 \cong \angle 7$	Transitive Prop.

Let's prove the theorems we learned. [Parallel Line Properties](#)

Same Side Interior Angles Theorem

Given that l is parallel to m show that $\angle 4$ is supplementary to $\angle 6$.



What logic do we know?

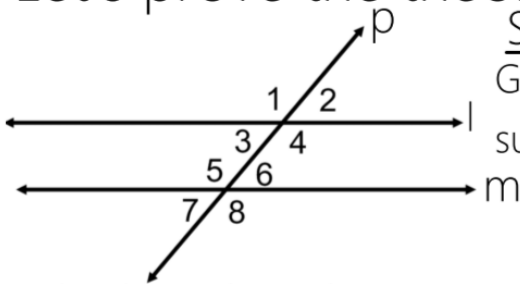
- Corresponding Angles Postulate
- Vertical Angles
- Linear Pairs
- Transitive Property
- Congruence
- Supplementary

Statement	Reason
$l \parallel m$	Given
$\angle 4 \cong \angle 8$	Corr. \angle 's Post.
$m\angle 4 = m\angle 8$	Def. of Congruence
$\angle 6$ and $\angle 8$ are linear pairs	Def. of Linear Pairs
$m\angle 6 + m\angle 8 = 180^\circ$	Linear Pairs Conjecture
$m\angle 6 + m\angle 4 = 180^\circ$	Substitution
$\angle 6$ and $\angle 4$ are Supp.	Def. of Supplementary

Let's prove the theorems we learned. [Parallel Line Properties](#)

Same Side Exterior Angles Theorem

Given that l is parallel to m show that $\angle 1$ is supplementary to $\angle 7$.



What logic do we know?

- Corresponding Angles Postulate
- Vertical Angles
- Linear Pairs
- Transitive Property
- Congruence
- Supplementary

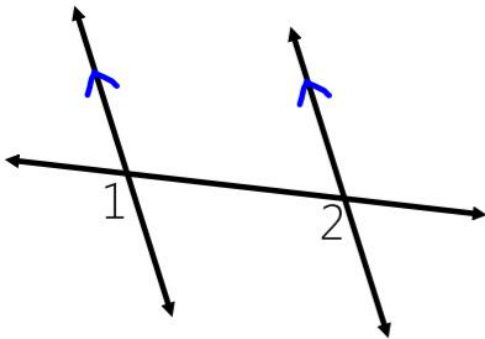
Statement	Reason
$l \parallel m$	Given
$\angle 1 \cong \angle 5$	Corr. \angle 's Post.
$m\angle 1 = m\angle 5$	Def. of Congruence
$\angle 5$ and $\angle 7$ are linear pairs	Def. of Linear Pairs
$m\angle 5 + m\angle 7 = 180^\circ$	Linear Pairs Conjecture
$m\angle 1 + m\angle 7 = 180^\circ$	Substitution
$\angle 1$ and $\angle 7$ are supplementary	Def. of Supp.

Parallel Line Properties

Ok, now that we have the properties proved, lets apply them.

What is the relationship between the two marked angles?

How do you know?

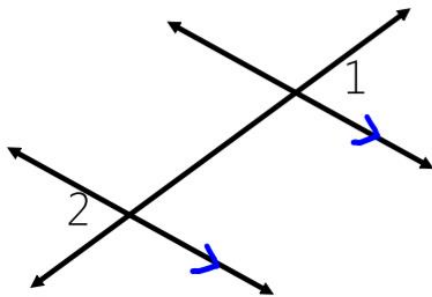


Corresponding angles
are congruent

Parallel Line Properties

What is the relationship between the two marked angles?

How do you know?

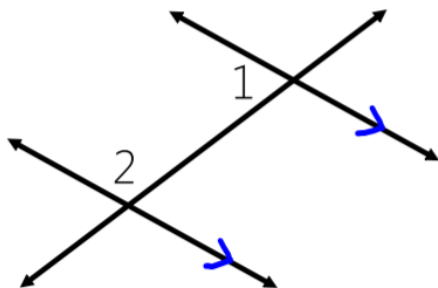


Alt. Ext. angles are congruent.

Parallel Line Properties

What is the relationship between the two marked angles?

How do you know?

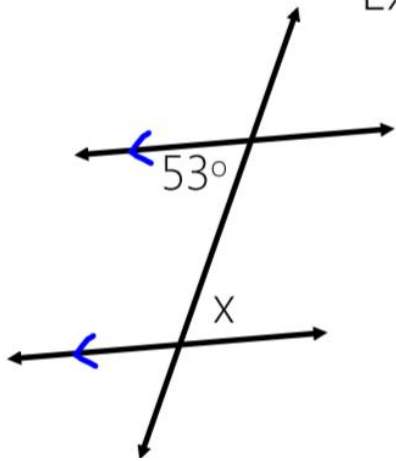


Same Side interior angles
are supplementary

Parallel Line Properties

What is the measure of the given angle?

Explain how you find the value.



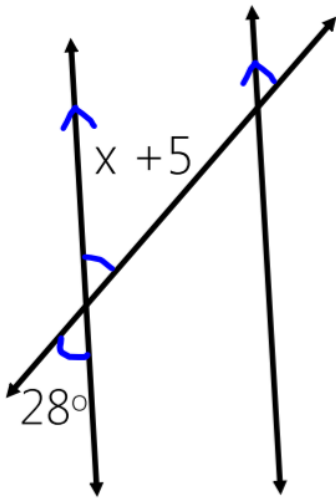
Alt. interior angles

$$x = 53$$

What is the value of x?

Parallel Line Properties

Explain or show how you find the value.



Vertical Angles are congruent

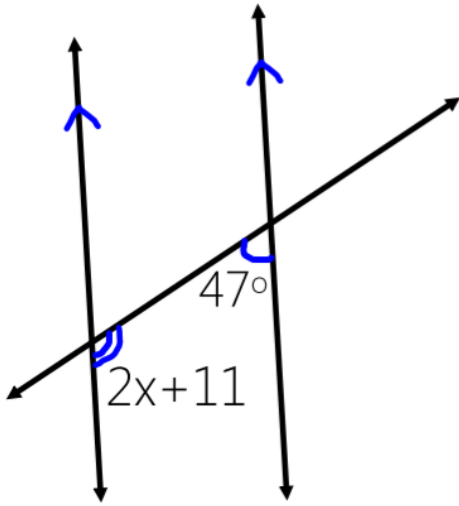
$$x + 5 = 28$$

$$x = 23$$

What is the value of x ?

Parallel Line Properties

Explain or show how you find the value.



Same side interior angles
are supp.

$$2x+11+47=180$$

$$2x+58=180$$

$$\frac{2x}{2} = \frac{122}{2}$$

$$x=61$$

Review

Parallel Line Properties

Which angle relationships have congruent angles?

Corr. Angles, vertical angles, Alt. Ext angles, Alt. Int \angle 's

Which angle relationships have supplementary angles?

Same Side Interior

Same Side Exterior