Parallelism and Perpendicularity

Jonathan R. Bacolod

Sauyo High School

How to Prove if Two Lines are Parallel?

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1. Corresponding Angles Converse Postulate

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3. Alternate Exterior Angles Converse Theorem
4. Consecutive Interior Angles Converse Theorem

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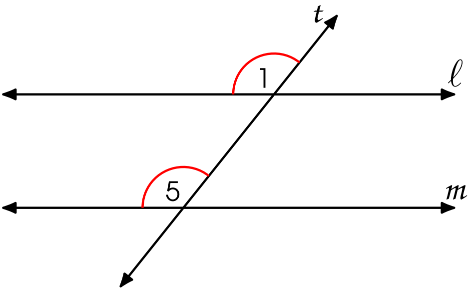
2. Alternate Interior Angles Converse Theorem
3. Alternate Exterior Angles Converse Theorem
4. Consecutive Interior Angles Converse Theorem
5. Consecutive Exterior Angles Converse Theorem

What is the Corresponding Angles Converse Postulate?

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



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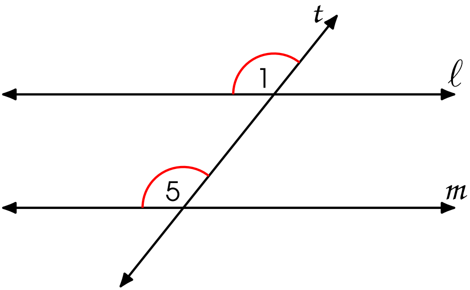
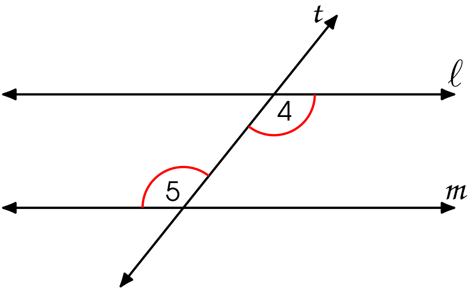


If $\angle 1 \cong \angle 5$, then $\ell \parallel m$

What is the Alternate Interior Angles Converse Theorem?

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



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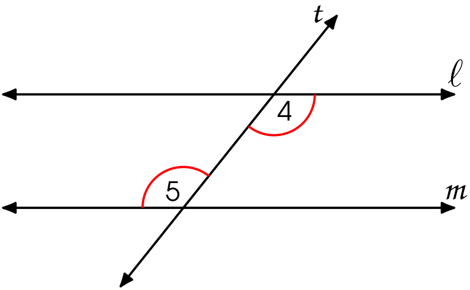
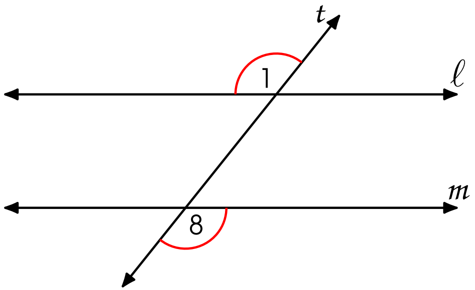


If $\angle 4 \cong \angle 5$, then $\ell \parallel m$

What is the Alternate Exterior Angles Converse Theorem?

If two lines are cut by a transversal so that alternate exterior angles are congruent, then the lines are parallel.



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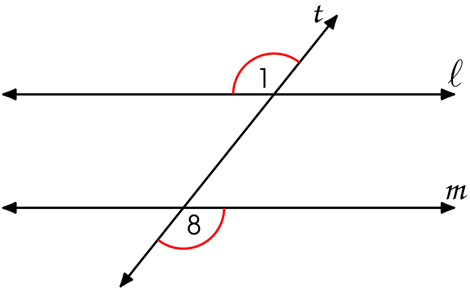
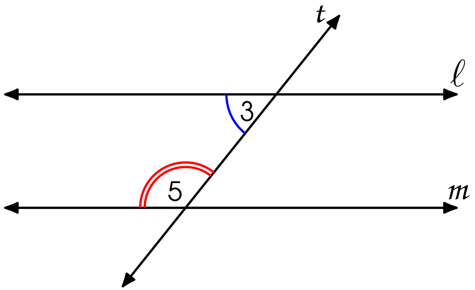


If $\angle 1 \cong \angle 8$, then $\ell \parallel m$

What is the Consecutive Interior Angles Converse Theorem?

If two lines are cut by a transversal so that consecutive interior angles are supplementary, then the lines are parallel.



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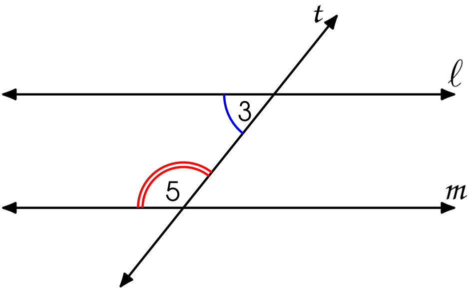

If $m\angle 3 + m\angle 5 = 180^\circ$, then $\ell \parallel m$

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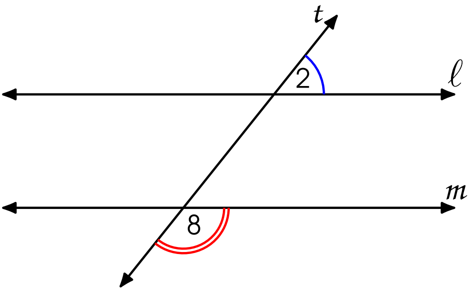
If two lines are cut by a transversal so that consecutive exterior angles are supplementary, then the lines are parallel.



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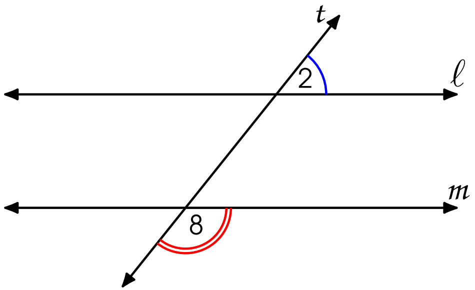
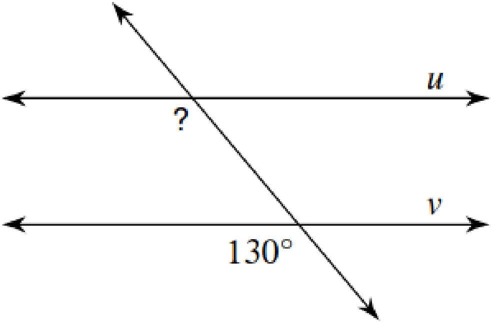
If two lines are cut by a transversal so that consecutive exterior angles are supplementary, then the lines are parallel.



If $m\angle 2 + m\angle 8 = 180^\circ$, then $\ell \parallel m$

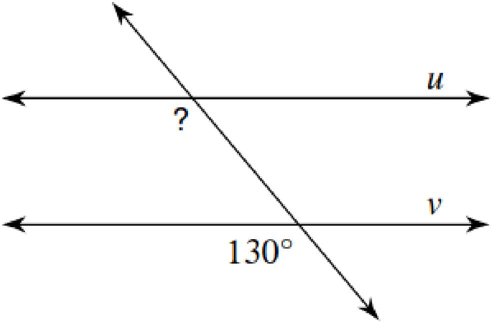
Example 1

Find the measure of the indicated angle that makes lines *u* and *v* parallel.



Example 1

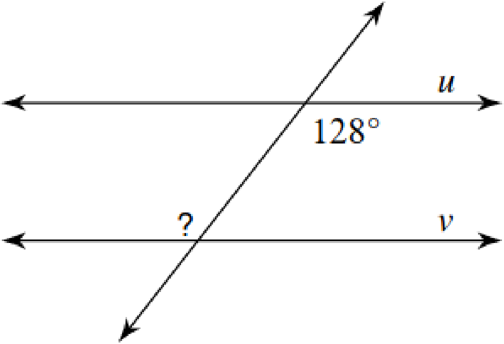
Find the measure of the indicated angle that makes lines *u* and *v* parallel.



130°

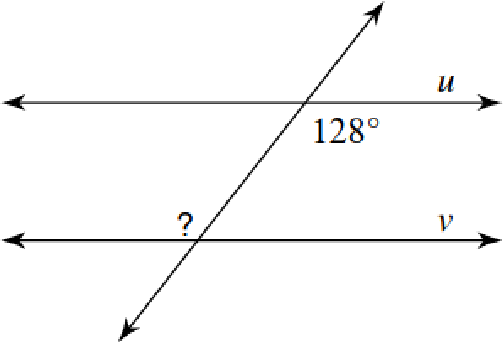
Example 1

Find the measure of the indicated angle that makes lines *u* and *v* parallel.



Example 1

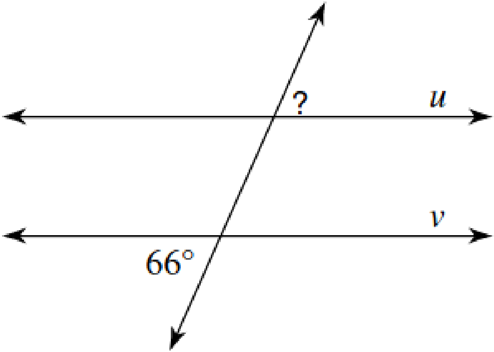
Find the measure of the indicated angle that makes lines *u* and *v* parallel.



128°

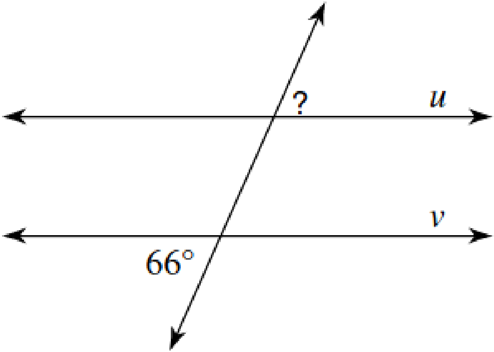
Example 1

Find the measure of the indicated angle that makes lines *u* and *v* parallel.



Example 1

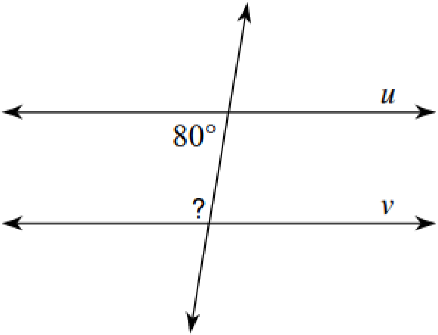
Find the measure of the indicated angle that makes lines *u* and *v* parallel.



66°

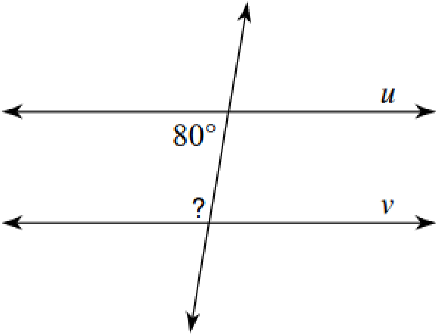
Example 1

Find the measure of the indicated angle that makes lines *u* and *v* parallel.



Example 1

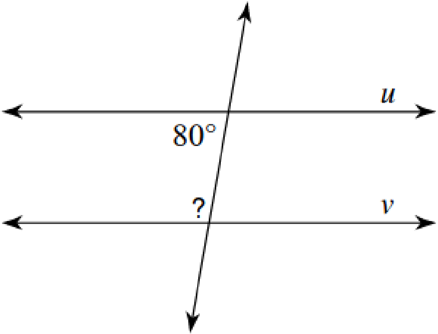
Find the measure of the indicated angle that makes lines *u* and *v* parallel.



$$x + 80^\circ = 180^\circ$$

Example 1

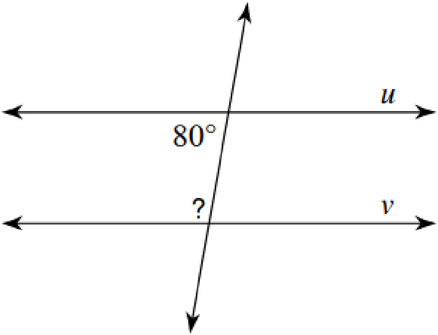
Find the measure of the indicated angle that makes lines u and v parallel.



$$x + 80^\circ = 180^\circ$$
$$x + 80^\circ - 80^\circ = 180^\circ - 80^\circ$$

Example 1

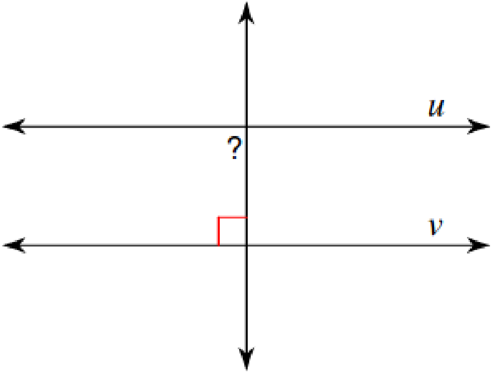
Find the measure of the indicated angle that makes lines u and v parallel.



$$x + 80^\circ = 180^\circ$$
$$x + 80^\circ - 80^\circ = 180^\circ - 80^\circ$$
$$x = 100^\circ$$

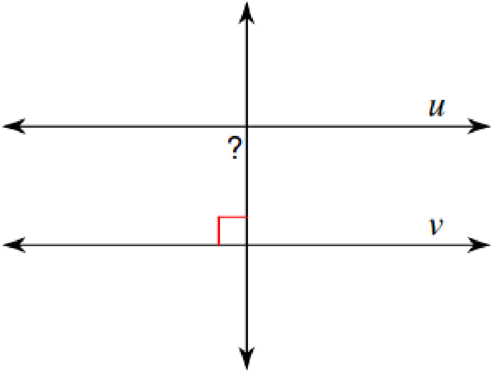
Example 1

Find the measure of the indicated angle that makes lines u and v parallel.



Example 1

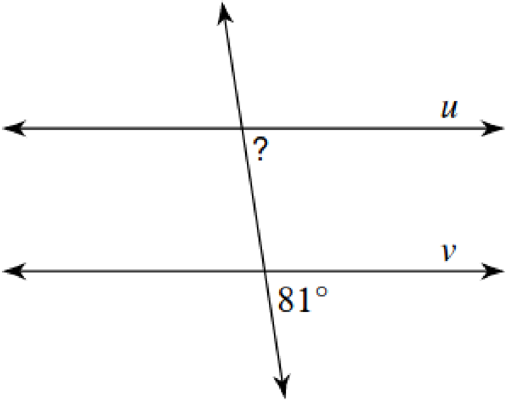
Find the measure of the indicated angle that makes lines *u* and *v* parallel.



90°

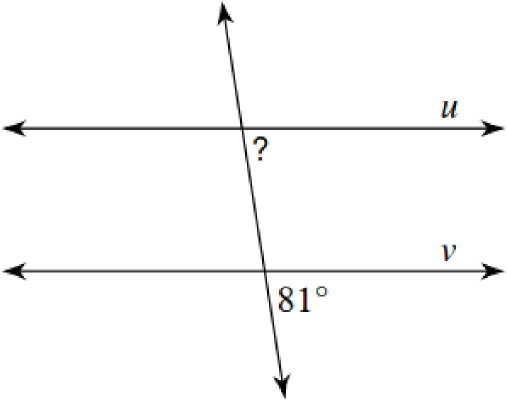
Example 1

Find the measure of the indicated angle that makes lines *u* and *v* parallel.



Example 1

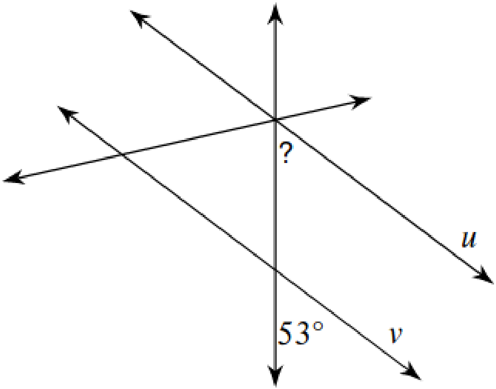
Find the measure of the indicated angle that makes lines *u* and *v* parallel.



81°

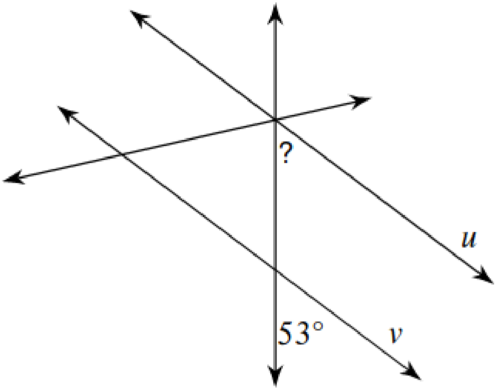
Example 1

Find the measure of the indicated angle that makes lines *u* and *v* parallel.



Example 1

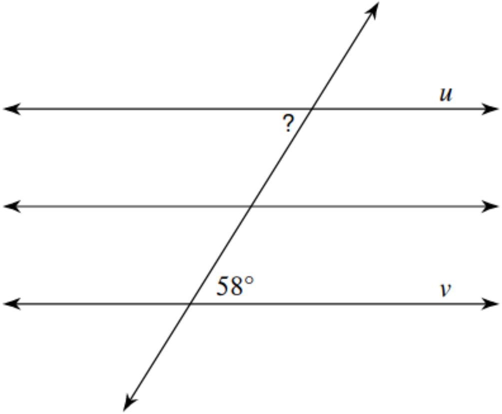
Find the measure of the indicated angle that makes lines *u* and *v* parallel.



53°

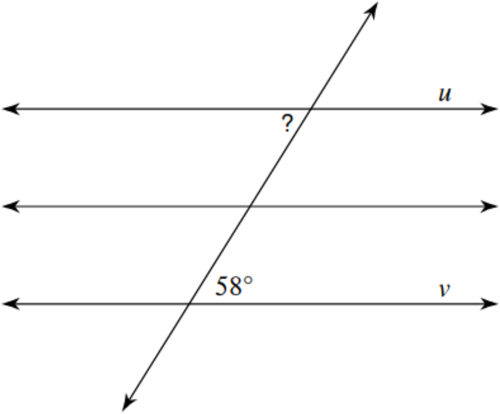
Example 1

Find the measure of the indicated angle that makes lines *u* and *v* parallel.



Example 1

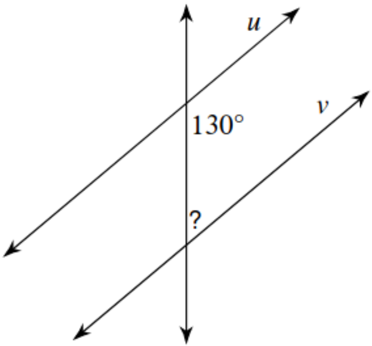
Find the measure of the indicated angle that makes lines u and v parallel.



58°

Example 1

Find the measure of the indicated angle that makes lines *u* and *v* parallel.



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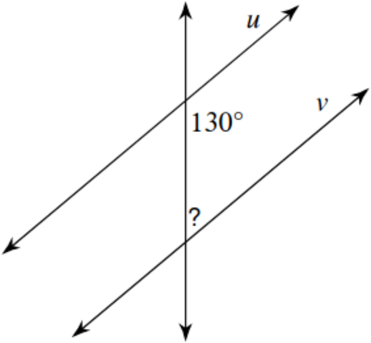
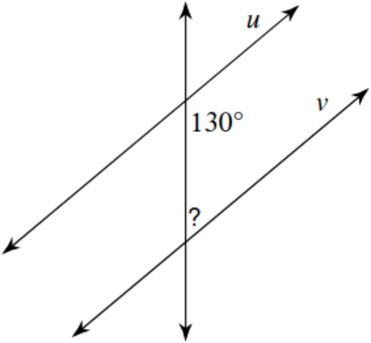


$$x + 130^\circ = 180^\circ$$

Example 1

Find the measure of the indicated angle that makes lines *u* and *v* parallel.



$$x + 130^\circ = 180^\circ$$
$$x + 130^\circ - 130^\circ = 180^\circ - 130^\circ$$

Example 1

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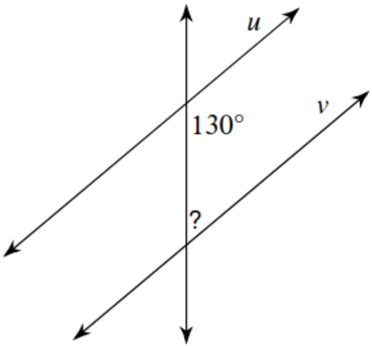
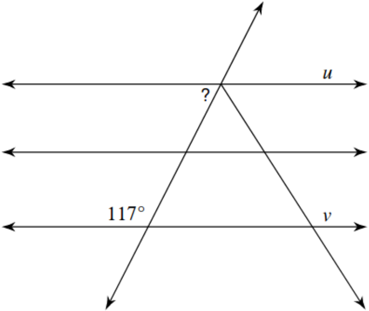


$$x + 130^\circ = 180^\circ$$
$$x + 130^\circ - 130^\circ = 180^\circ - 130^\circ$$
$$x = 50^\circ$$

Example 1

Find the measure of the indicated angle that makes lines *u* and *v* parallel.



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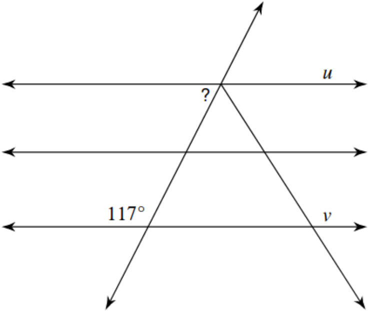
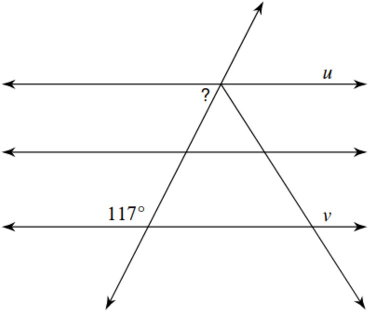


$$x + 117^\circ = 180^\circ$$

Example 1

Find the measure of the indicated angle that makes lines *u* and *v* parallel.



$$x + 117^\circ = 180^\circ$$
$$x + 117^\circ - 117^\circ = 180^\circ - 117^\circ$$

Example 1

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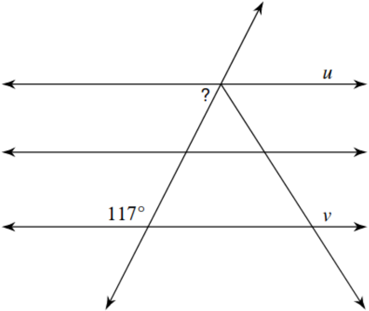
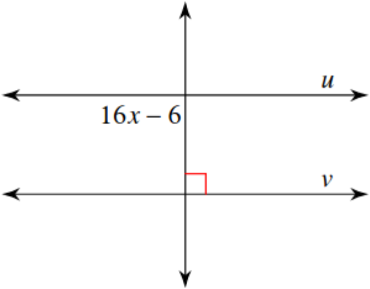


$$x + 117^\circ = 180^\circ$$
$$x + 117^\circ - 117^\circ = 180^\circ - 117^\circ$$
$$x = 63^\circ$$

Example 2

Find the value of x that makes lines u and v parallel.



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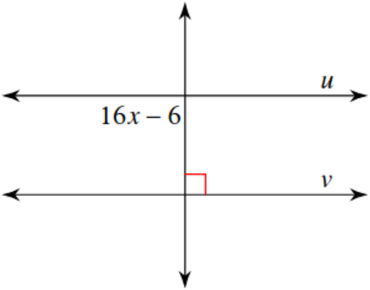
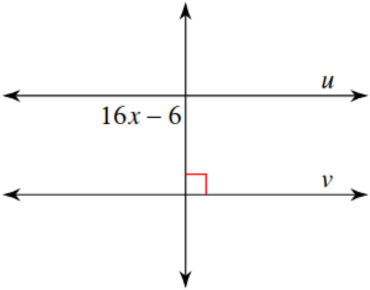


$$16x - 6 = 90$$

Example 2

Find the value of x that makes lines u and v parallel.



$$16x - 6 = 90$$
$$16x - 6 + 6 = 90 + 6$$

Example 2

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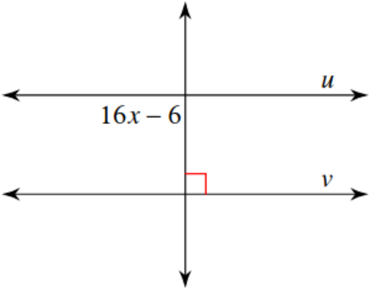

$$16x - 6 = 90$$
$$16x - 6 + 6 = 90 + 6$$
$$16x = 96$$

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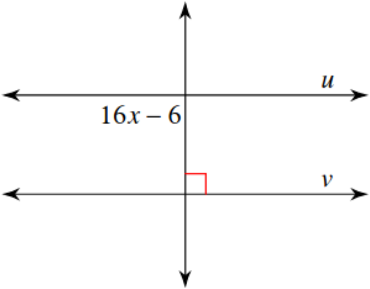
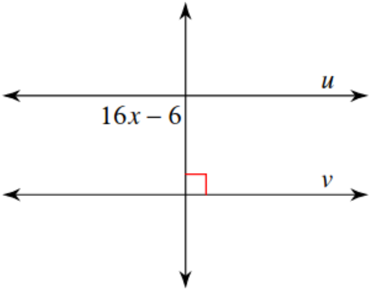


$$16x - 6 = 90$$
$$16x - 6 + 6 = 90 + 6$$
$$16x = 96$$
$$\frac{16x}{16} = \frac{96}{16}$$

Example 2

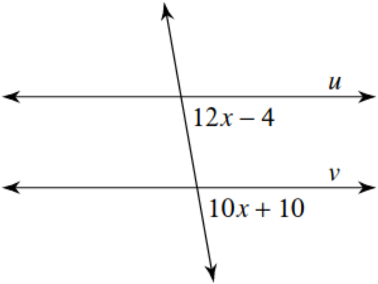
Find the value of x that makes lines u and v parallel.



$$16x - 6 = 90$$
$$16x - 6 + 6 = 90 + 6$$
$$16x = 96$$
$$\frac{16x}{16} = \frac{96}{16}$$
$$x = 6$$

Example 2

Find the value of *x* that makes lines *u* and *v* parallel.



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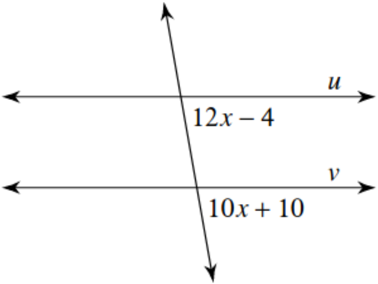
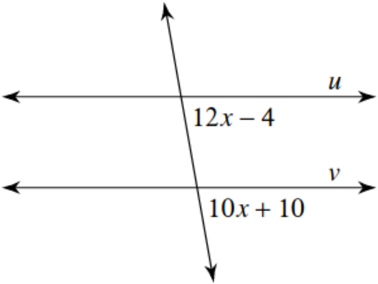
Find the value of x that makes lines u and v parallel.



$$12x - 4 = 10x + 10$$

Example 2

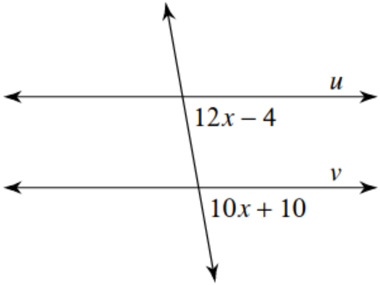
Find the value of x that makes lines u and v parallel.



$$12x - 4 = 10x + 10$$
$$12x - 10x - 4 + 4 = 10x - 10x + 10 + 4$$

Example 2

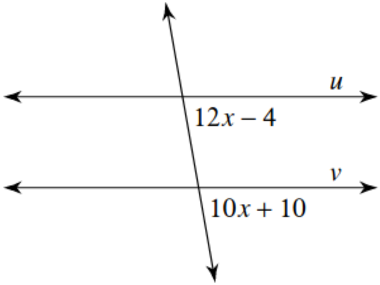
Find the value of x that makes lines u and v parallel.



$$12x - 4 = 10x + 10$$
$$12x - 10x - 4 + 4 = 10x - 10x + 10 + 4$$
$$2x = 14$$

Example 2

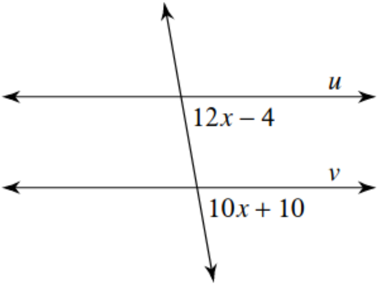
Find the value of x that makes lines u and v parallel.



$$12x - 4 = 10x + 10$$
$$12x - 10x - 4 + 4 = 10x - 10x + 10 + 4$$
$$2x = 14$$
$$\frac{2x}{2} = \frac{14}{2}$$

Example 2

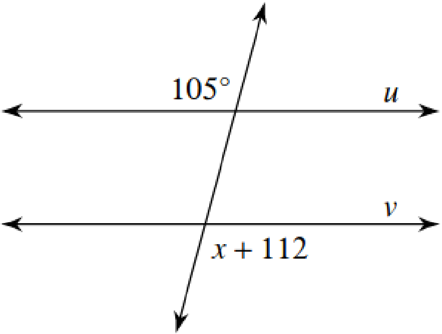
Find the value of x that makes lines u and v parallel.



$$12x - 4 = 10x + 10$$
$$12x - 10x - 4 + 4 = 10x - 10x + 10 + 4$$
$$2x = 14$$
$$\frac{2x}{2} = \frac{14}{2}$$
$$x = 7$$

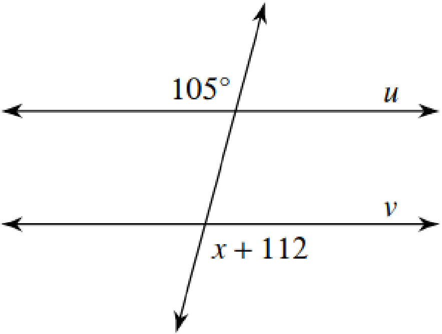
Example 2

Find the value of x that makes lines u and v parallel.



Example 2

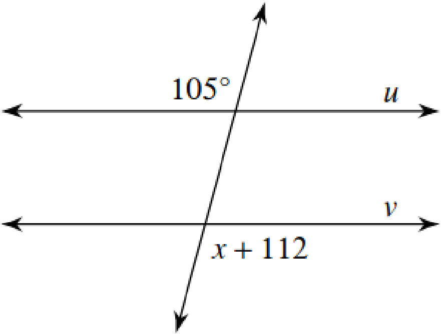
Find the value of x that makes lines u and v parallel.



$$x + 112 = 105$$

Example 2

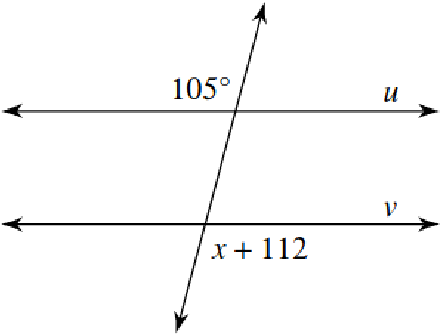
Find the value of x that makes lines u and v parallel.



$$x + 112 = 105$$
$$x + 112 - 112 = 105 - 112$$

Example 2

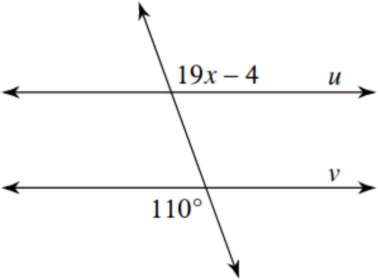
Find the value of x that makes lines u and v parallel.



$$x + 112 = 105$$
$$x + 112 - 112 = 105 - 112$$
$$x = -7$$

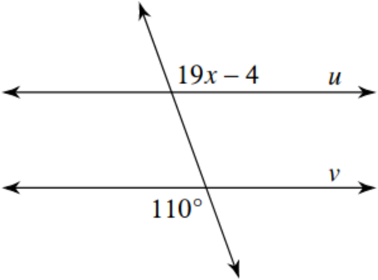
Example 2

Find the value of x that makes lines u and v parallel.



Example 2

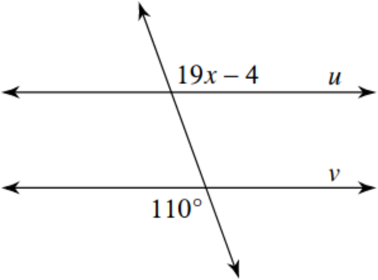
Find the value of x that makes lines u and v parallel.



$$19x - 4 = 110$$

Example 2

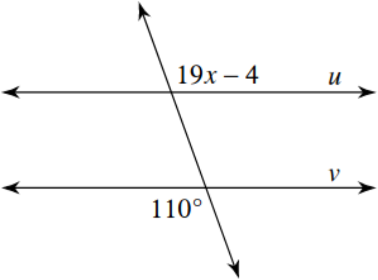
Find the value of x that makes lines u and v parallel.



$$19x - 4 = 110$$
$$19x - 4 + 4 = 110 + 4$$

Example 2

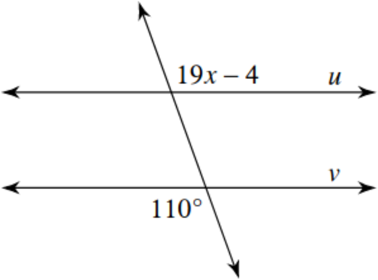
Find the value of x that makes lines u and v parallel.



$$19x - 4 = 110$$
$$19x - 4 + 4 = 110 + 4$$
$$19x = 114$$

Example 2

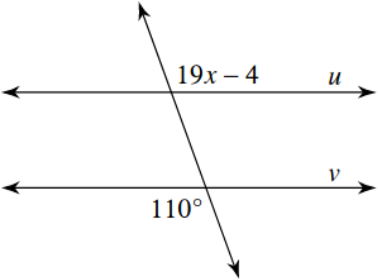
Find the value of x that makes lines u and v parallel.



$$19x - 4 = 110$$
$$19x - 4 + 4 = 110 + 4$$
$$19x = 114$$
$$\frac{19x}{19} = \frac{114}{19}$$

Example 2

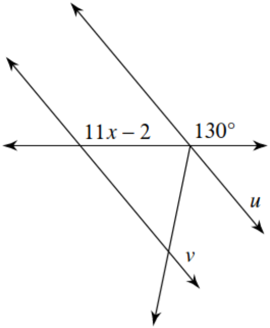
Find the value of x that makes lines u and v parallel.



$$
\begin{aligned}
19x - 4 &= 110 \\
19x - 4 + 4 &= 110 + 4 \\
19x &= 114 \\
\frac{19x}{19} &= \frac{114}{19} \\
x &= 6
\end{aligned}
$$

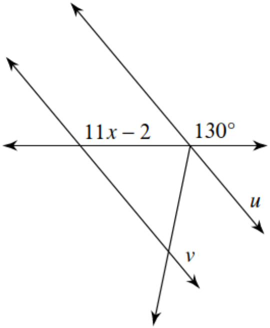
Example 2

Find the value of x that makes lines u and v parallel.



Example 2

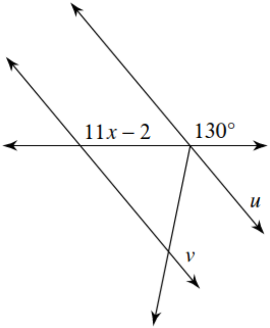
Find the value of x that makes lines u and v parallel.



$$11x - 2 = 130$$

Example 2

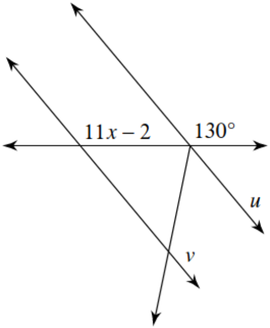
Find the value of x that makes lines u and v parallel.



$$11x - 2 = 130$$
$$11x - 2 + 2 = 130 + 2$$

Example 2

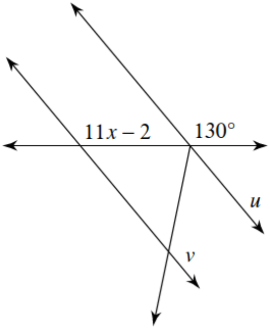
Find the value of x that makes lines u and v parallel.



$$11x - 2 = 130$$
$$11x - 2 + 2 = 130 + 2$$
$$11x = 132$$

Example 2

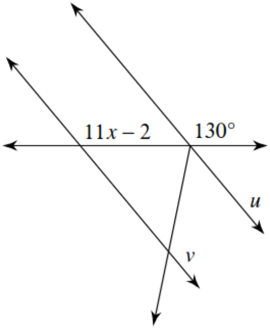
Find the value of x that makes lines u and v parallel.



$$11x - 2 = 130$$
$$11x - 2 + 2 = 130 + 2$$
$$11x = 132$$
$$\frac{11x}{11} = \frac{132}{11}$$

Example 2

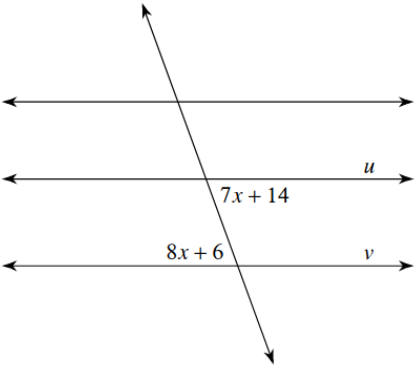
Find the value of x that makes lines u and v parallel.



$$11x - 2 = 130$$
$$11x - 2 + 2 = 130 + 2$$
$$11x = 132$$
$$\frac{11x}{11} = \frac{132}{11}$$
$$x = 12$$

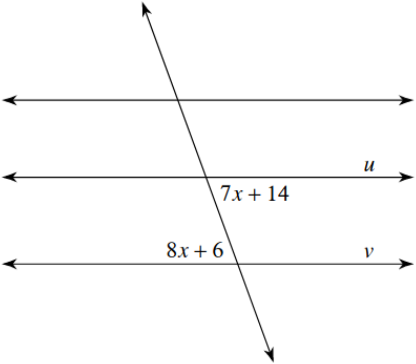
Example 2

Find the value of x that makes lines u and v parallel.



Example 2

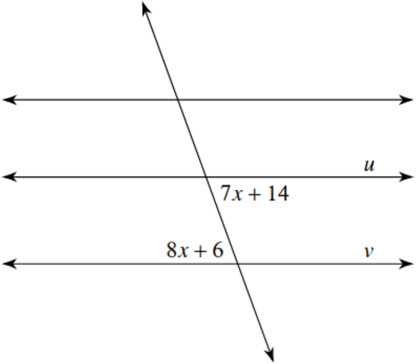
Find the value of x that makes lines u and v parallel.



$$8x + 6 = 7x + 14$$

Example 2

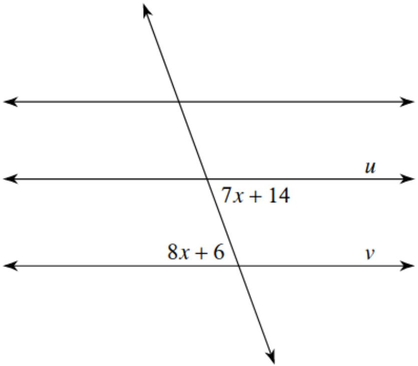
Find the value of x that makes lines u and v parallel.



$$8x + 6 = 7x + 14$$
$$8x - 7x + 6 - 6 = 7x - 7x + 14 - 6$$

Example 2

Find the value of x that makes lines u and v parallel.



$$8x + 6 = 7x + 14$$
$$8x - 7x + 6 - 6 = 7x - 7x + 14 - 6$$
$$x = 8$$

How to Prove if Two Lines are Perpendicular?

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1. If two lines are perpendicular to each other, then they form four right angles.

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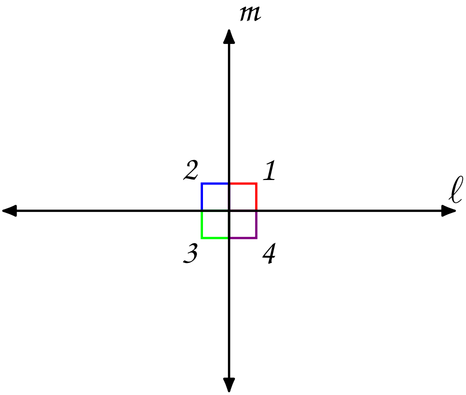
How to Prove if Two Lines are Perpendicular?

1. If two lines are perpendicular to each other, then they form four right angles.
2. If the angles in a linear pair are congruent, then the lines containing their sides are perpendicular.
3. If two angles are adjacent and complementary, the non-common sides are perpendicular.

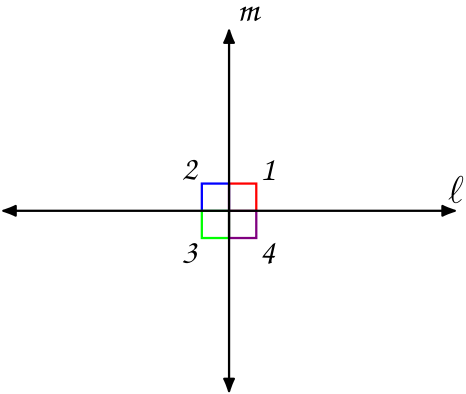
Theorem 1

If two lines are perpendicular to each other, then they form four right angles.



Theorem 1

If two lines are perpendicular to each other, then they form four right angles.

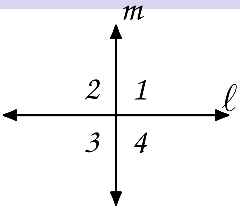


If $\ell \perp m$, then $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$ are right angles.

Proof of Theorem 1

Given: $\ell \perp m$

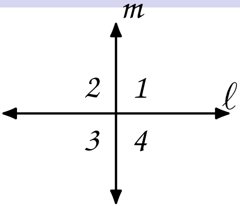
Prove: $\angle 1, \angle 2, \angle 3$, and $\angle 4$
are right angles



Proof of Theorem 1

Given: $\ell \perp m$

Prove: $\angle 1, \angle 2, \angle 3$, and $\angle 4$
are right angles



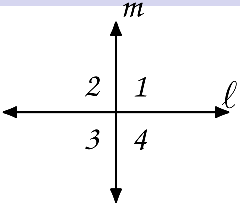
Proof:

Statements	Reasons

Proof of Theorem 1

Given: $\ell \perp m$

Prove: $\angle 1, \angle 2, \angle 3$, and $\angle 4$
are right angles



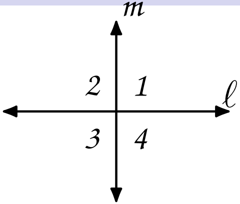
Proof:

Statements	Reasons
1. $\ell \perp m$	1. Given

Proof of Theorem 1

Given: $\ell \perp m$

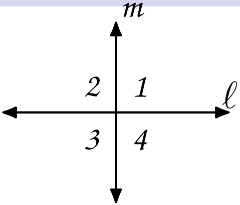
Prove: $\angle 1, \angle 2, \angle 3$, and $\angle 4$
are right angles



Proof:

Statements	Reasons
1. $\ell \perp m$	1. Given
2. $m\angle 1 = 90°$	2. Def. of Perpendicular lines

Proof of Theorem 1



Given: $\ell \perp m$

Prove: $\angle 1, \angle 2, \angle 3$, and $\angle 4$ are right angles

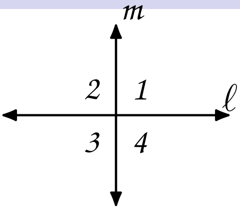
Proof:

Statements	Reasons
1. $\ell \perp m$	1. Given
2. $m\angle 1 = 90°$	2. Def. of Perpendicular lines
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair

Proof of Theorem 1

Given: $\ell \perp m$

Prove: $\angle 1, \angle 2, \angle 3$, and $\angle 4$
are right angles



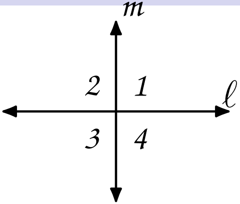
Proof:

Statements	Reasons
1. $\ell \perp m$	1. Given
2. $m\angle 1 = 90°$	2. Def. of Perpendicular lines
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair
4. $\angle 1$ and $\angle 2$ are supplementary	4. Linear Pair Postulate

Proof of Theorem 1

Given: $\ell \perp m$

Prove: $\angle 1, \angle 2, \angle 3$, and $\angle 4$
are right angles



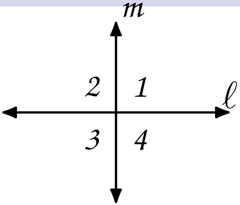
Proof:

Statements	Reasons
1. $\ell \perp m$	1. Given
2. $m\angle 1 = 90^\circ$	2. Def. of Perpendicular lines
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair
4. $\angle 1$ and $\angle 2$ are supplementary	4. Linear Pair Postulate
5. $m\angle 1 + m\angle 2 = 180^\circ$	5. Def. of Supplementary Angles

Proof of Theorem 1

Given: $\ell \perp m$

Prove: $\angle 1, \angle 2, \angle 3$, and $\angle 4$
are right angles



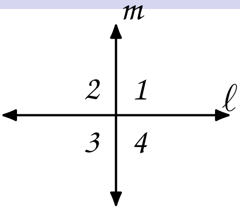
Proof:

Statements	Reasons
1. $\ell \perp m$	1. Given
2. $m\angle 1 = 90^\circ$	2. Def. of Perpendicular lines
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair
4. $\angle 1$ and $\angle 2$ are supplementary	4. Linear Pair Postulate
5. $m\angle 1 + m\angle 2 = 180^\circ$	5. Def. of Supplementary Angles
6. $90^\circ + m\angle 2 = 180^\circ$	6. Substitution Property

Proof of Theorem 1

Given: $\ell \perp m$

Prove: $\angle 1, \angle 2, \angle 3$, and $\angle 4$ are right angles



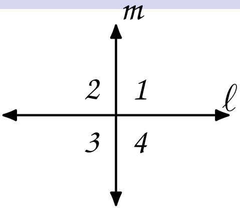
Proof:

Statements	**Reasons**
1. $\ell \perp m$	1. Given
2. $m\angle 1 = 90°$	2. Def. of Perpendicular lines
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair
4. $\angle 1$ and $\angle 2$ are supplementary	4. Linear Pair Postulate
5. $m\angle 1 + m\angle 2 = 180°$	5. Def. of Supplementary Angles
6. $90° + m\angle 2 = 180°$	6. Substitution Property
7. $m\angle 2 = 90°$	7. Subtraction Property

Proof of Theorem 1

Given: $\ell \perp m$

Prove: $\angle 1, \angle 2, \angle 3$, and $\angle 4$
are right angles



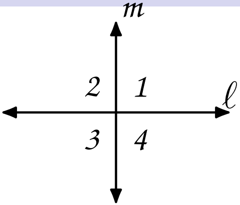
Proof:

Statements	Reasons
1. $\ell \perp m$	1. Given
2. $m\angle 1 = 90^\circ$	2. Def. of Perpendicular lines
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair
4. $\angle 1$ and $\angle 2$ are supplementary	4. Linear Pair Postulate
5. $m\angle 1 + m\angle 2 = 180^\circ$	5. Def. of Supplementary Angles
6. $90^\circ + m\angle 2 = 180^\circ$	6. Substitution Property
7. $m\angle 2 = 90^\circ$	7. Subtraction Property
8. $\angle 1 \cong \angle 3$ and $\angle 2 \cong \angle 4$	8. Vertical Angles theorem

Proof of Theorem 1

Given: $\ell \perp m$

Prove: $\angle 1, \angle 2, \angle 3$, and $\angle 4$ are right angles



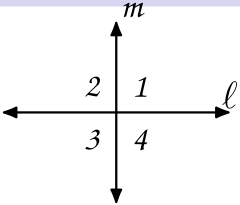
Proof:

Statements	Reasons
1. $\ell \perp m$	1. Given
2. $m\angle 1 = 90°$	2. Def. of Perpendicular lines
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair
4. $\angle 1$ and $\angle 2$ are supplementary	4. Linear Pair Postulate
5. $m\angle 1 + m\angle 2 = 180°$	5. Def. of Supplementary Angles
6. $90° + m\angle 2 = 180°$	6. Substitution Property
7. $m\angle 2 = 90°$	7. Subtraction Property
8. $\angle 1 \cong \angle 3$ and $\angle 2 \cong \angle 4$	8. Vertical Angles theorem
9. $m\angle 3 = 90°$ and $m\angle 4 = 90°$	9. Def. of Congruent Angles

Proof of Theorem 1

Given: $\ell \perp m$

Prove: $\angle 1, \angle 2, \angle 3$, and $\angle 4$
are right angles

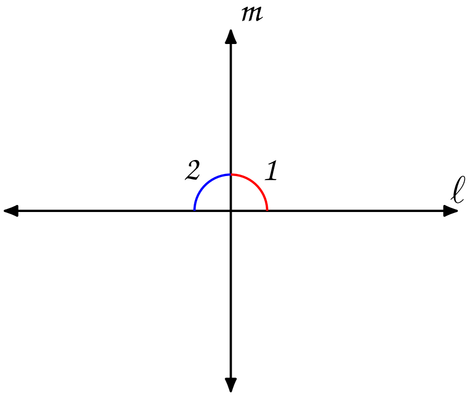


Proof:

Statements	Reasons
1. $\ell \perp m$	1. Given
2. $m\angle 1 = 90^\circ$	2. Def. of Perpendicular lines
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair
4. $\angle 1$ and $\angle 2$ are supplementary	4. Linear Pair Postulate
5. $m\angle 1 + m\angle 2 = 180^\circ$	5. Def. of Supplementary Angles
6. $90^\circ + m\angle 2 = 180^\circ$	6. Substitution Property
7. $m\angle 2 = 90^\circ$	7. Subtraction Property
8. $\angle 1 \cong \angle 3$ and $\angle 2 \cong \angle 4$	8. Vertical Angles theorem
9. $m\angle 3 = 90^\circ$ and $m\angle 4 = 90^\circ$	9. Def. of Congruent Angles
10. $\angle 1, \angle 2, \angle 3$, and $\angle 4$ are right angles	10. Def. of Right Angles

Theorem 2

If the angles in a linear pair are congruent, then the lines containing their sides are perpendicular.



Theorem 2

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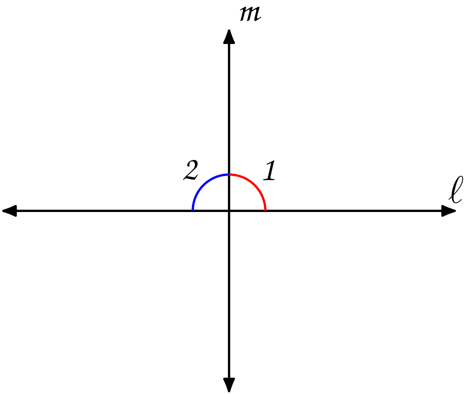
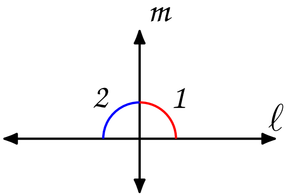


If $\angle 1 \cong \angle 2$, then $\ell \perp m$

Proof of Theorem 2

Given: $\angle 1 \cong \angle 2$

Prove: $\ell \perp m$

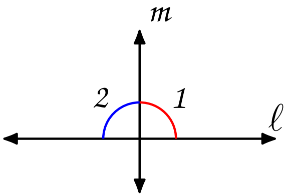


Proof of Theorem 2

Given: $\angle 1 \cong \angle 2$

Prove: $\ell \perp m$

Proof:



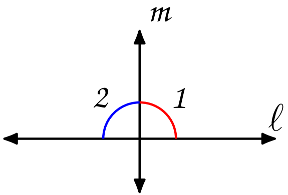
Statements	Reasons

Proof of Theorem 2

Given: $\angle 1 \cong \angle 2$

Prove: $\ell \perp m$

Proof:

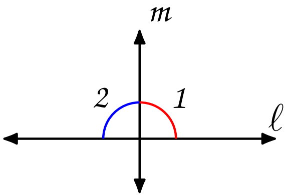


Statements	Reasons
1. $\angle 1 \cong \angle 2$	1. Given

Proof of Theorem 2

Given: $\angle 1 \cong \angle 2$

Prove: $\ell \perp m$



Proof:

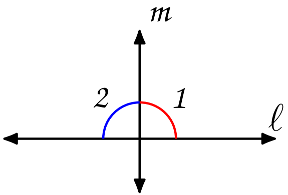
Statements	Reasons
1. $\angle 1 \cong \angle 2$	1. Given
2. $m\angle 1 = m\angle 2$	2. Def. of Congruent Angles

Proof of Theorem 2

Given: $\angle 1 \cong \angle 2$

Prove: $\ell \perp m$

Proof:



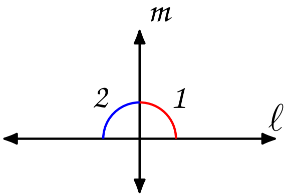
Statements	Reasons
1. $\angle 1 \cong \angle 2$	1. Given
2. $m\angle 1 = m\angle 2$	2. Def. of Congruent Angles
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair

Proof of Theorem 2

Given: $\angle 1 \cong \angle 2$

Prove: $\ell \perp m$

Proof:



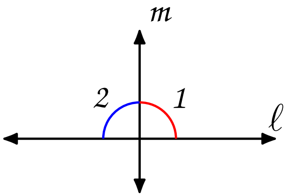
Statements	Reasons
1. $\angle 1 \cong \angle 2$	1. Given
2. $m\angle 1 = m\angle 2$	2. Def. of Congruent Angles
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair
4. $\angle 1$ and $\angle 2$ are supplementary	4. Linear Pair Postulate

Proof of Theorem 2

Given: $\angle 1 \cong \angle 2$

Prove: $\ell \perp m$

Proof:



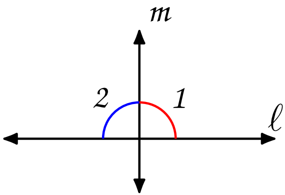
Statements	Reasons
1. $\angle 1 \cong \angle 2$	1. Given
2. $m\angle 1 = m\angle 2$	2. Def. of Congruent Angles
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair
4. $\angle 1$ and $\angle 2$ are supplementary	4. Linear Pair Postulate
5. $m\angle 1 + m\angle 2 = 180°$	5. Def. of Supplementary Angles

Proof of Theorem 2

Given: $\angle 1 \cong \angle 2$

Prove: $\ell \perp m$

Proof:



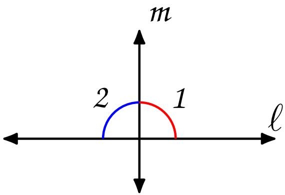
Statements	Reasons
1. $\angle 1 \cong \angle 2$	1. Given
2. $m\angle 1 = m\angle 2$	2. Def. of Congruent Angles
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair
4. $\angle 1$ and $\angle 2$ are supplementary	4. Linear Pair Postulate
5. $m\angle 1 + m\angle 2 = 180^\circ$	5. Def. of Supplementary Angles
6. $m\angle 1 + m\angle 1 = 180^\circ$	6. Substitution Property

Proof of Theorem 2

Given: $\angle 1 \cong \angle 2$

Prove: $\ell \perp m$

Proof:

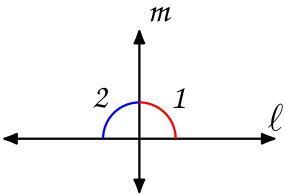


Statements	Reasons
1. $\angle 1 \cong \angle 2$	1. Given
2. $m\angle 1 = m\angle 2$	2. Def. of Congruent Angles
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair
4. $\angle 1$ and $\angle 2$ are supplementary	4. Linear Pair Postulate
5. $m\angle 1 + m\angle 2 = 180°$	5. Def. of Supplementary Angles
6. $m\angle 1 + m\angle 1 = 180°$	6. Substitution Property
7. $2m\angle 1 = 180°$	7. Simplification

Proof of Theorem 2

Given: $\angle 1 \cong \angle 2$

Prove: $\ell \perp m$



Proof:

Statements	**Reasons**
1. $\angle 1 \cong \angle 2$	1. Given
2. $m\angle 1 = m\angle 2$	2. Def. of Congruent Angles
3. $\angle 1, \angle 2$ form a linear pair	3. Def. of Linear Pair
4. $\angle 1$ and $\angle 2$ are supplementary	4. Linear Pair Postulate
5. $m\angle 1 + m\angle 2 = 180°$	5. Def. of Supplementary Angles
6. $m\angle 1 + m\angle 1 = 180°$	6. Substitution Property
7. $2m\angle 1 = 180°$	7. Simplification
8. $m\angle 1 = 90°$	8. Division Property

Proof of Theorem 2

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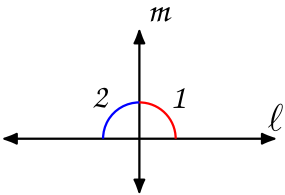

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8. $m\angle 1 = 90°$	8. Division Property
9. $\angle 1$ is a right angle	9. Def. of Right Angles

Proof of Theorem 2

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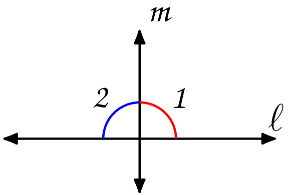

Statements	Reasons
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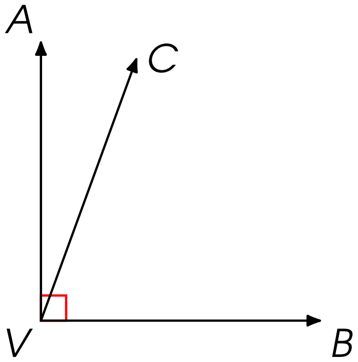
9. $\angle 1$ is a right angle	9. Def. of Right Angles
10. $\ell \perp m$	10. Def. of Perpendicular Lines

Theorem 3

If two angles are adjacent and complementary, then the non-common sides are perpendicular.



Theorem 3

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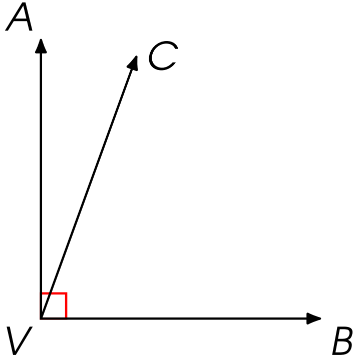
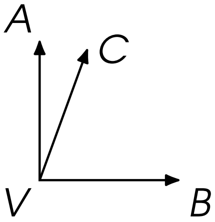


If $\angle CVB$ and $\angle AVC$ are complementary and adjacent, then $\overrightarrow{VA} \perp \overrightarrow{VB}$.

Proof of Theorem 3

Given: $\angle CVB$ and $\angle AVC$ are complementary

Prove: $\overrightarrow{VA} \perp \overrightarrow{VB}$



Proof of Theorem 3

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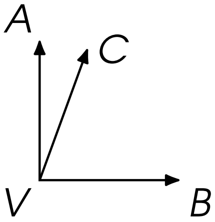

Statements	**Reasons**

Proof of Theorem 3

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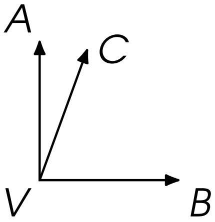

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1. $\angle CVB$ and $\angle AVC$ are complementary	1. Given

Proof of Theorem 3

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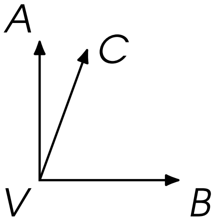


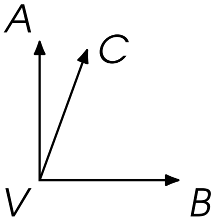
Statements	**Reasons**
1. $\angle CVB$ and $\angle AVC$ are complementary	1. Given
2. $m\angle CVB + m\angle AVC = 90^\circ$	2. Def. of Complementary Angles

Proof of Theorem 3

Given: $\angle CVB$ and $\angle AVC$ are complementary

Prove: $\overrightarrow{VA} \perp \overrightarrow{VB}$

Proof:



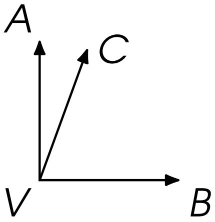
Statements	Reasons
1. $\angle CVB$ and $\angle AVC$ are complementary	1. Given
2. $m\angle CVB + m\angle AVC = 90°$	2. Def. of Complementary Angles
3. $m\angle AVB = m\angle CVB + m\angle AVC$	3. Angle Addition Postulate

Proof of Theorem 3

Given: $\angle CVB$ and $\angle AVC$
are complementary

Prove: $\overrightarrow{VA} \perp \overrightarrow{VB}$

Proof:



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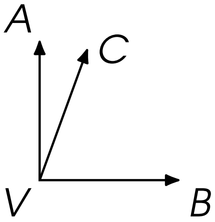
4. $m\angle AVB = 90°$	4. Transitive Property

Proof of Theorem 3

Given: $\angle CVB$ and $\angle AVC$ are complementary

Prove: $\overrightarrow{VA} \perp \overrightarrow{VB}$



Proof:

Statements	Reasons
1. $\angle CVB$ and $\angle AVC$ are complementary	1. Given
2. $m\angle CVB + m\angle AVC = 90°$	2. Def. of Complementary Angles
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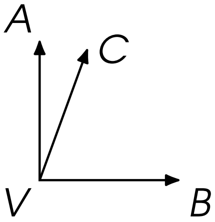
4. $m\angle AVB = 90°$	4. Transitive Property
5. $\angle AVB$ is a right angle	5. Def. of Right Angles

Proof of Theorem 3

Given: $\angle CVB$ and $\angle AVC$
are complementary

Prove: $\overrightarrow{VA} \perp \overrightarrow{VB}$

Proof:



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4. $m\angle AVB = 90°$	4. Transitive Property
5. $\angle AVB$ is a right angle	5. Def. of Right Angles
6. $\overrightarrow{VA} \perp \overrightarrow{VB}$	6. Def. of Perpendicular Lines

Thank you for attending the virtual class.