


Personal Math Trainer 

14.3 Proving Lines are Parallel - Class & Homework



1

Find the equation of the line.

The line is parallel to $y = -\frac{5}{7}x + 4$ and passes through the point $(-7, -1)$.

* Parallel Lines - 2 lines that never intersect



They have the same slope

$$m_1 = m_2$$

They have different y-intercepts

$$b_1 \neq b_2$$

Let (x_1, y_1)
 $(-7, -1)$ and $m = -\frac{5}{7}$.

Point-slope form

$$y - y_1 = m(x - x_1)$$

$$y + 1 = -\frac{5}{7}(x + 7) \text{ Substitute}$$

$$y + 1 = -\frac{5}{7}x + -\frac{5}{7} \cdot 7 \text{ Distribute}$$

$$y + 1 = -\frac{5}{7}x - 5 \text{ Simplify.}$$

$$y = -\frac{5}{7}x - 6 \text{ Solve for } y.$$

The equation of the line is

$$y = -\frac{5}{7}x - 6.$$

2

Find the equation of the line.

The line is perpendicular to $y = \frac{1}{7}x + 6$ and passes through the point (2, 8).

$$m_2 = -\frac{1}{m_1}, \text{ so } m_2 = -\frac{7}{1} = -7 \text{ and } (x_1, y_1) = (2, 8)$$

Point-slope form

$$y - y_1 = m(x - x_1)$$

$$y - 8 = -7(x - 2) \text{ Substitute}$$

$$y - \cancel{8} = -7x + 14 \text{ Distribute}$$

$$\frac{ + \cancel{8}}{y} = \frac{-7x + 14 + \cancel{8}}{-7x + 22} \text{ Solve for } y.$$

The equation of the line is

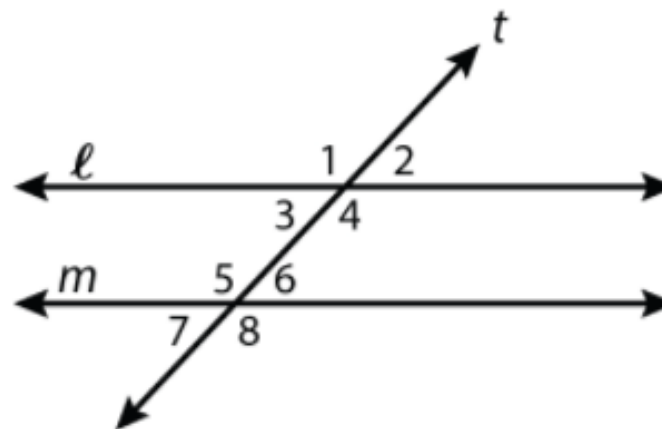
$$y = -7x + 22.$$

3

A proof for the Corresponding Angles Theorem is shown below. Next to each reason, choose the statement to which it applies.

Given: $\ell \parallel m$

Prove: $m \angle 3 = m \angle 7$



Statement

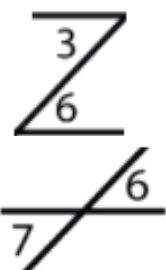
Reasons

1. $\ell \parallel m$

2. $m \angle 3 = m \angle 6$

3. $m \angle 6 = m \angle 7$

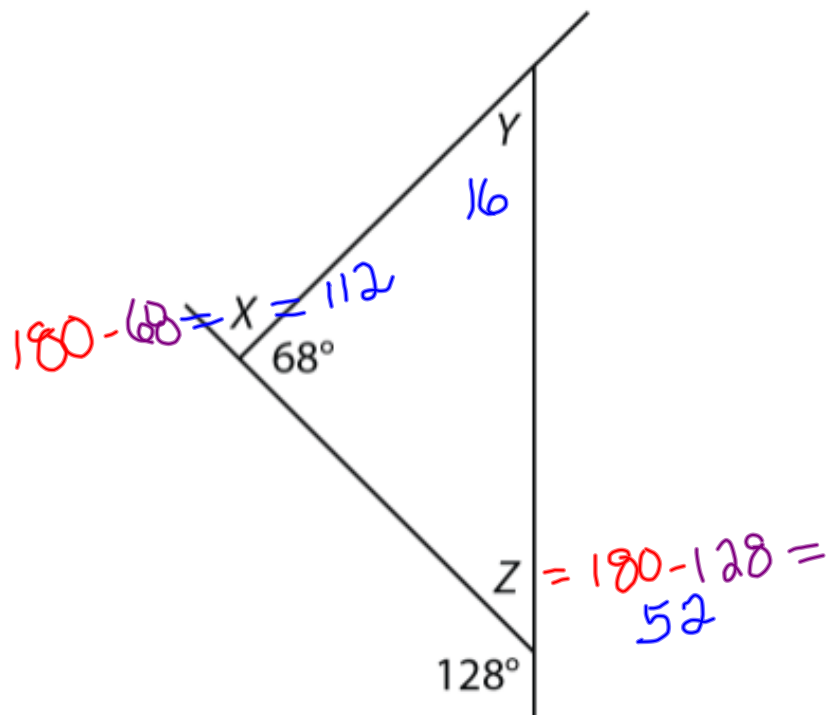
4. $m \angle 3 = m \angle 7$



- 3 ▼ Vertical Angles Theorem
- 1 ▼ Given
- 4 ▼ Substitution Property of Equality
- 2 ▼ Alternate Interior Angles Theorem

4

Is the angle measure true for the given triangle?
Select Yes or No for each statement.



$m \angle x = 128^\circ$ ▼

$m \angle z = 52^\circ$ ▼

$m \angle y = 52^\circ$ ▼

- Supplementary angles are two angles whose sum is 180° (or a straight angle).

$a + b = 180$

Triangle Sum Theorem

The sum of the three interior angles in a triangle is always 180° .

$\angle a + \angle b + \angle c = 180^\circ$

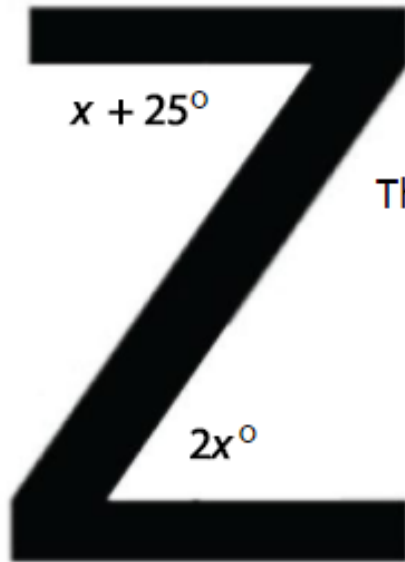
$112 + 52 + \angle y = 180$

$164 + \angle y = 180$
 -164 -164

$\angle y = 16$

5

What value of x makes the horizontal parts of the letter Z parallel?



The two angles in Z are alternate interior angles.

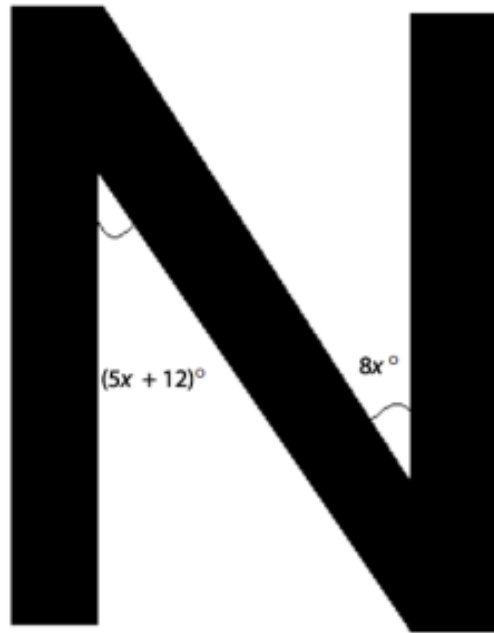
Therefore, they must be congruent to make the horizontal lines parallel.

$$\begin{array}{r} x + 25 = 2x \\ \underline{-x} \quad \underline{-x} \\ x = 25 \end{array}$$

When $x = 25$, the alternate interior angles are congruent and the horizontal parts of the letter Z are parallel.

6

What value of x makes the vertical parts of the letter N parallel?



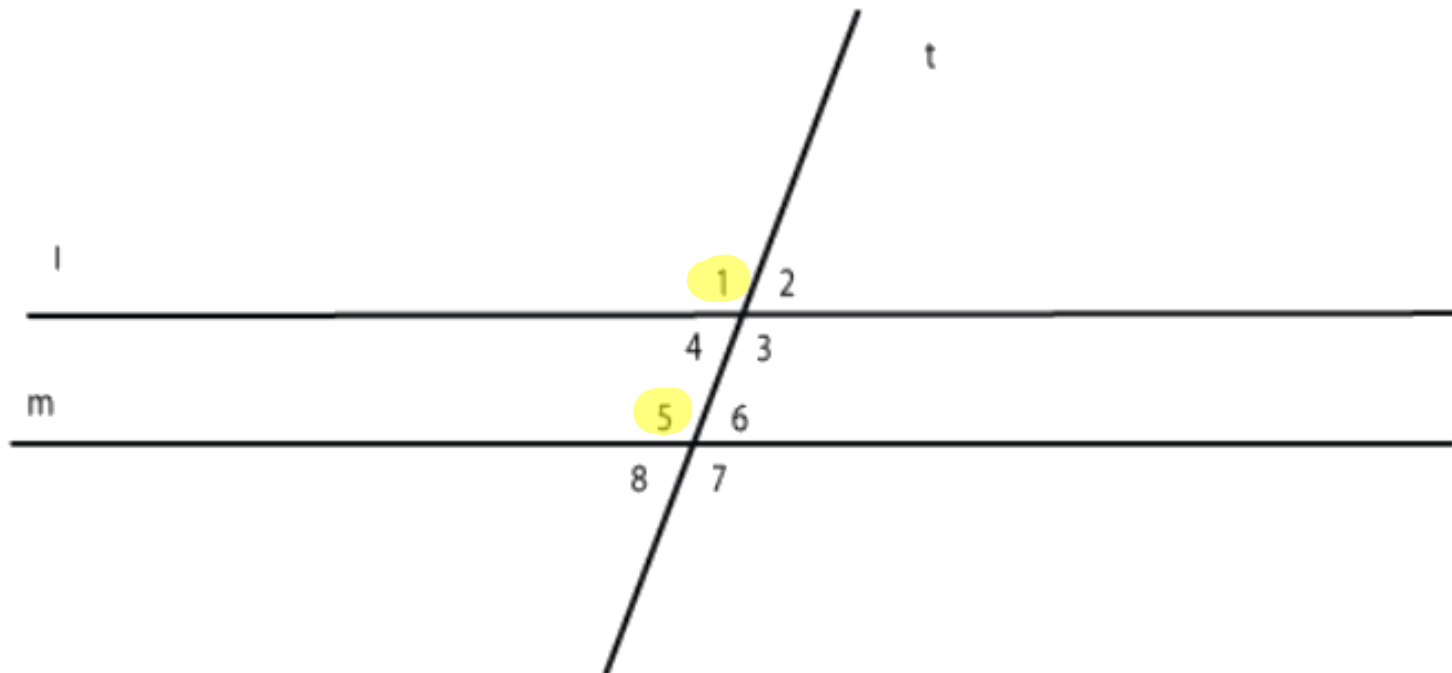
If the two angles in N are alternate interior angles. Then, they must be congruent to make the vertical lines parallel.

$$\begin{array}{r} 5x + 12 = 8x \\ \underline{-5x} \\ 12 = 3x \\ \underline{ = 3} \\ 4 = x \end{array}$$

When $x = 4$, the alternate interior angles are congruent and the horizontal parts of the letter N are parallel.

7

Use two of the given statements together to complete statements about the diagram to illustrate the **Corresponding Angles Theorem**. Then complete its



Lines and m are parallel.

$m \angle$ $+ m \angle 3 = 180^\circ$

$\angle 1 \cong \angle$

\angle $\cong \angle 6$

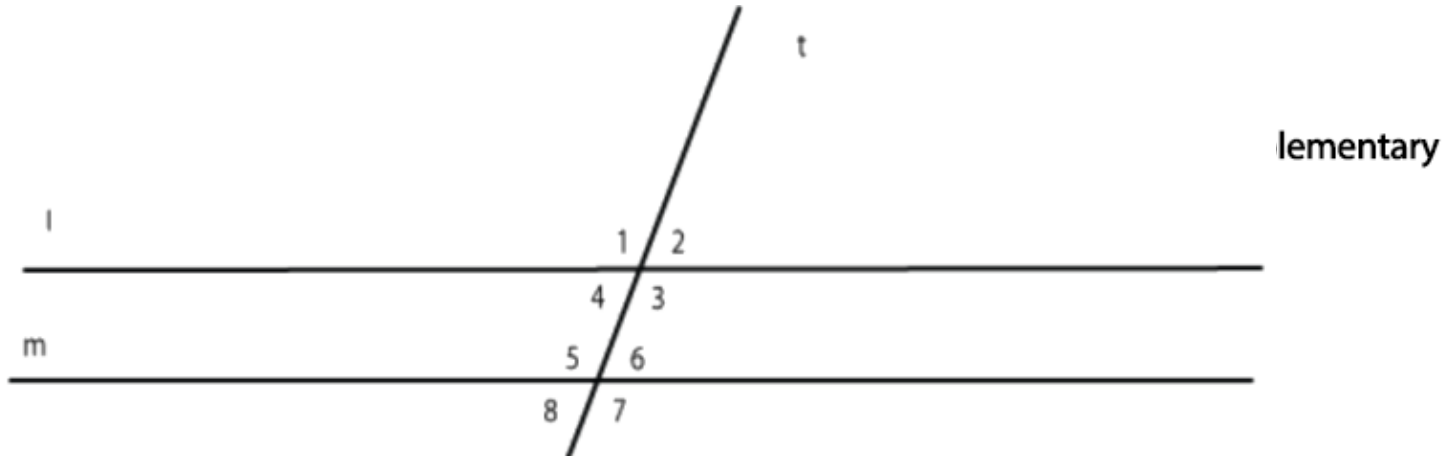
*Do not fill in, only for illustration purpose

By the theorem: If lines l and m are parallel , then $\angle 1 \cong \angle 5$.

By its converse: If $\angle 1 \cong \angle 5$, then lines l and m are parallel. .

8

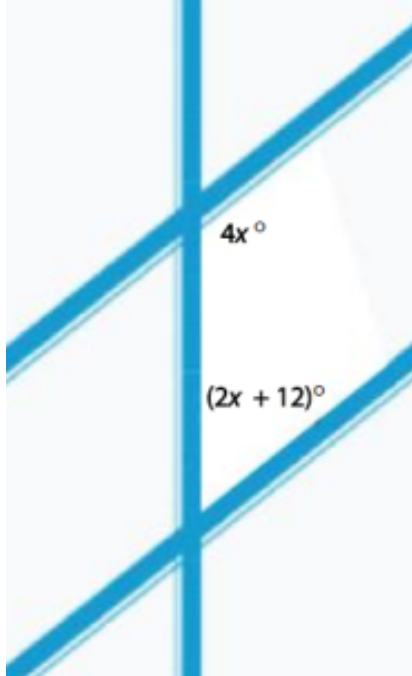
Drag and drop each angle-pair relationship under the theorem or postulate you could use to prove that lines l and m in the diagram are parallel.



Converse of the Corresponding Angles Theorem	Converse of the Same-Side Interior Angles Postulate	Converse of the Alternate Interior Angles Theorem
<div data-bbox="562 983 741 1066" style="border: 1px solid black; padding: 5px; margin-bottom: 20px;">$\angle 3 \cong \angle 7$</div> <div data-bbox="524 1246 707 1329" style="border: 1px solid black; padding: 5px;">$\angle 2 \cong \angle 6$</div>	<div data-bbox="882 1050 1256 1133" style="border: 1px solid black; padding: 5px; margin-bottom: 20px;">$m\angle 3 + m\angle 6 = 180^\circ$</div> <div data-bbox="922 1225 1270 1353" style="border: 1px solid black; padding: 5px;">$\angle 4$ and $\angle 5$ are supplementary</div>	<div data-bbox="1554 1046 1738 1129" style="border: 1px solid black; padding: 5px; background-color: yellow; margin-bottom: 20px;">$\angle 4 \cong \angle 6$</div> <div data-bbox="1482 1246 1666 1329" style="border: 1px solid black; padding: 5px;">$\angle 3 \cong \angle 5$</div>

9

An overpass intersects two lanes of a highway. What must the value of x be to ensure the two lanes are parallel?



The two angles between the lanes of a highway are same side interior angles.

Therefore, they must be supplementary to make the lanes parallel.

$$2x + 12 + 4x = 180$$

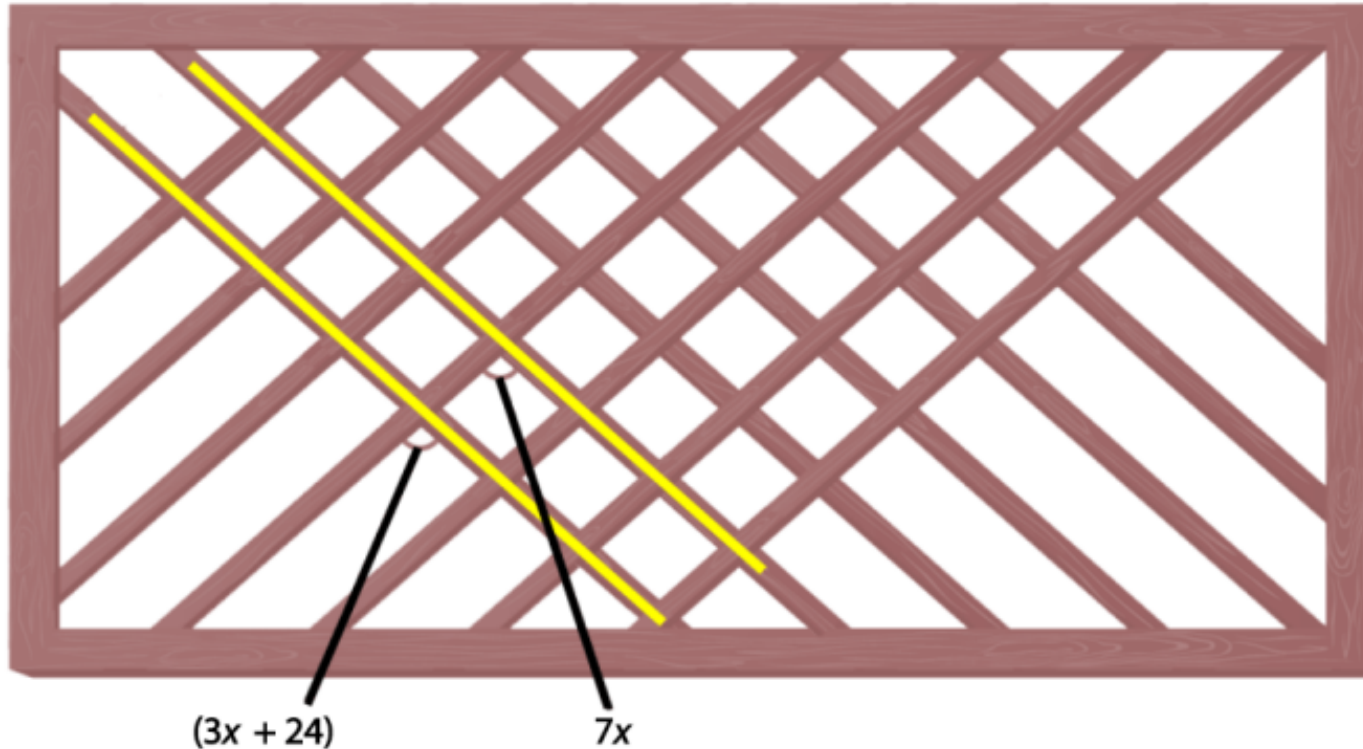
$$6x + 12 = 180$$

$$6x = 168$$

$$x = 28$$

When $x = 28$, the same-side interior angles are supplementary and the lanes are parallel.

- 10 A trellis consists of overlapping wooden slats. What must the value of x be in order for the two slats to be parallel?



What type of angles are the two angles? Corresponding Angles
Therefore, they must be congruent.

$$3x + 24 = 7x$$

$$24 = 4x$$

$$6 = x$$

When $x = 6$, the corresponding angles are congruent and the slats are parallel.