14.2 Transversals and Parallel Lines - Class & Homework

1 **Find the equation of the line.**

The line is parallel to $y = -\frac{4}{5}x + 3$ and passes through the point $(-5, -1)$. x_1, y_1

*In geometry, parallel lines are lines in a plane which do not meet; that is, always the same distance apart (called "equidistant"). They have the same slope but different y-intercepts.

The slope of the parallel line is $-\frac{4}{5}$.

Let $(x_1, y_1) = (-5, -1)$ and use point-slope form.

$y - y_1 = m(x - x_1)$ Point-slope form

$y - (-1) = -\frac{4}{5}(x - (-5))$ Substitute the values of m, x_1, and y_1.

$y + 1 = -\frac{4}{5}(x + 5))$ Simplify.

$y + 1 = -\frac{4}{5}x - 4$ Distribute

$-1 \quad -1$

$y = -\frac{4}{5}x - 5$ Solve for y.

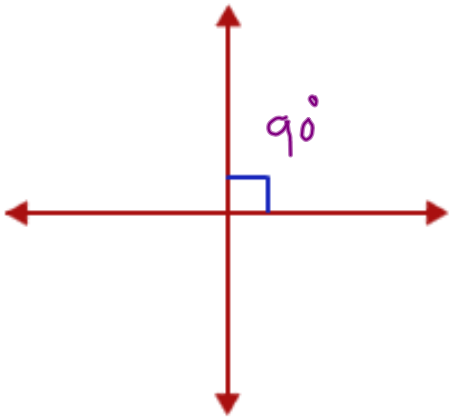
The equation of the line is $y = -\frac{4}{5}x - 5$.

2 Find the equation of the line.

The line is perpendicular to $y = \frac{1}{5}x + 4$ and passes through the point $(3, 7)$. x_1, y_1

*In geometry, the perpendicular line are two lines which meet at a right angle (90 degrees). Perpendicular line have slopes that are negative reciprocals of each other.

The slope of the perpendicular line is -5.



Let $(x_1, y_1) = (3, 7)$ and use point-slope form.

$y - y_1 = m(x - x_1)$ Point-slope form

$y - 7 = -5(x - 3)$ Substitute the values of m, x_1, and y_1.

$y - 7 = -5x + 15$ Simplify.

$+7 \qquad +7$

$y = -5x + 22$ Solve for y.

The equation of the line is $y = -5x + 22$.

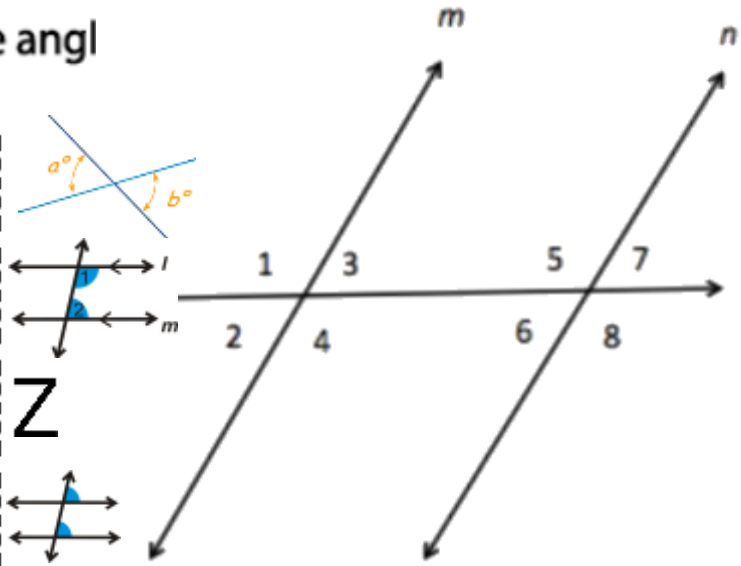
3 In the figure below, $m \parallel n$. Drag and drop each label into its corresponding box to show the appropriate angl

A. $\angle 1$ and $\angle 4$ — Vertical Angles

B. $\angle 3$ and $\angle 5$ — Same-Side Interior Angles

C. $\angle 3$ and $\angle 6$ — Alternate Interior Angles

D. $\angle 3$ and $\angle 7$ — Corresponding Angles



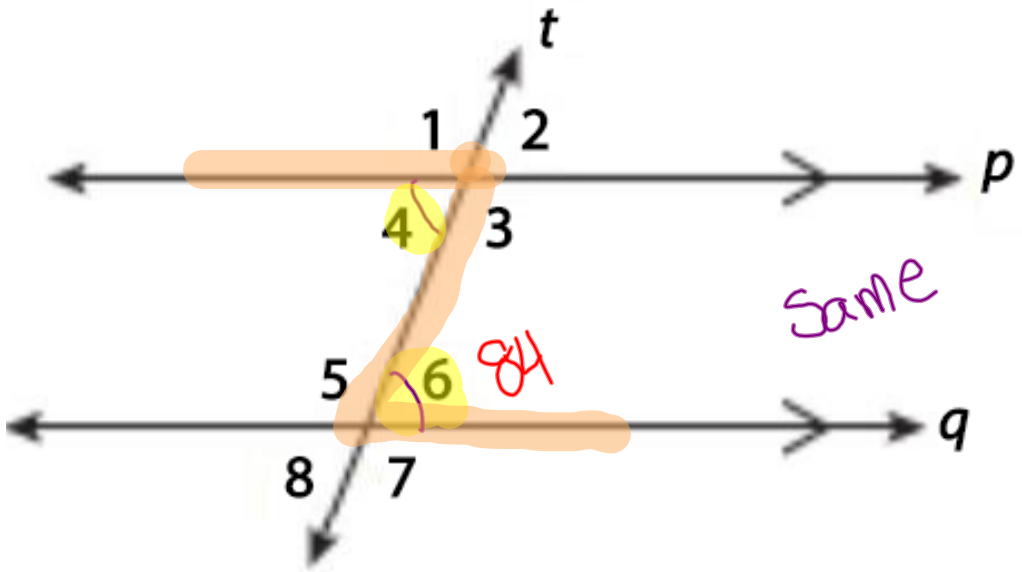
Recall that corresponding angles lie on the same side of the transversal and on the same sides of the intersected lines. So, choice D represents corresponding angles.

Recall that same-side interior angles lie on the same side of the transversal and between the intersected lines. So, choice B represents same-side interior angles. (Consecutive Interior Angles)

Recall that alternate interior angles are nonadjacent angles that lie on opposite sides of the transversal between the intersected lines. So, choice C represents alternate interior angles.

Recall that vertical angles are nonadjacent angles formed by a pair of intersected lines.
So, choice A represents vertical angles.

4 Use the figure to find the specified angle measure. In the figure, $p \parallel q$.

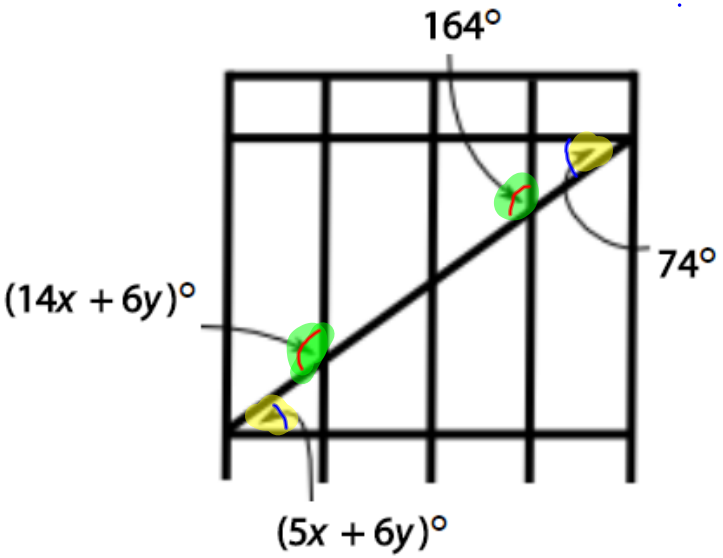


Suppose $m\angle 6 = 84°$. Find $m\angle 4$.

$m\angle 4 =$ 84 °, by the Alternate Interior Angles Theorem ▼.

*Recall the Alternate Interior Angles Theorem: If two parallel lines are cut by a transversal, then the pairs of alternate interior angles are equal in measure.

5 In the diagram of a gate, the horizontal bars are parallel and the vertical bars are parallel. Find x and y. Complete the explanation indicating which postulates and/or theorems were used to find the values.



System of Equations

$14x + 6y = 164$

$-1(5x + 6y) = 74(-1)$

$14x + 6y = 164$

$-5x - 6y = -74$

$9x = 90$

$x = 10$

$(14x + 6y)° =$ 164 ° by the Corresponding Angles Theorem and

$(5x + 6y)° =$ 74 ° by the Alternate Interior Angles Theorem .

Substitute 10 for x in one of the equations to find y.

$5x + 6y = 74$

$5(10) + 6y = 74$

$6y = 24$

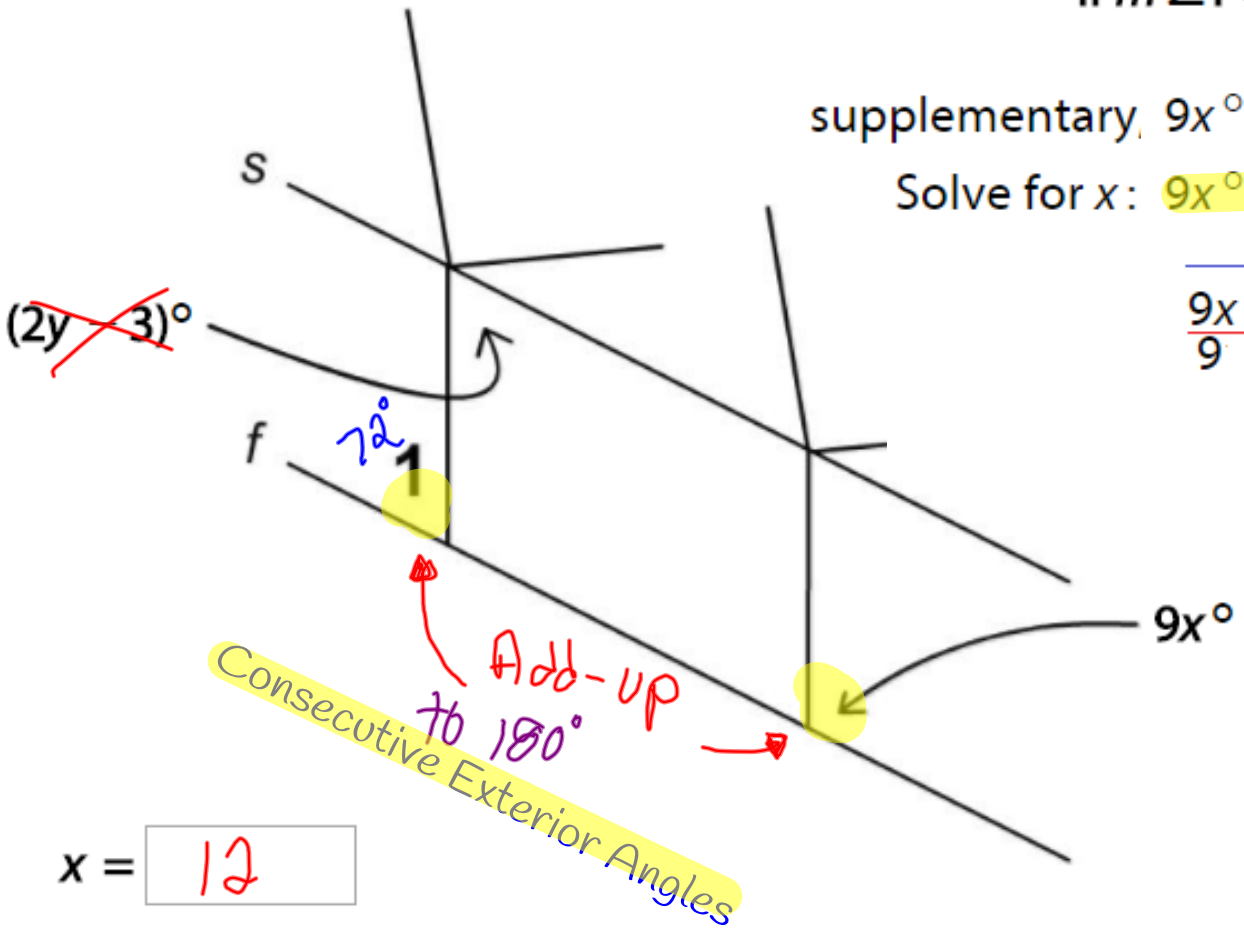
$y = 4$

$x =$ 10

$y =$ 4

6 In the diagram of movie theater seats, the incline of the floor, f, is parallel to the seats, s.

If $m\angle 1 = 72°$, what is x?



supplementary $9x° + m\angle 1 = 180°$

Solve for x: $9x° + 72° = 180°$

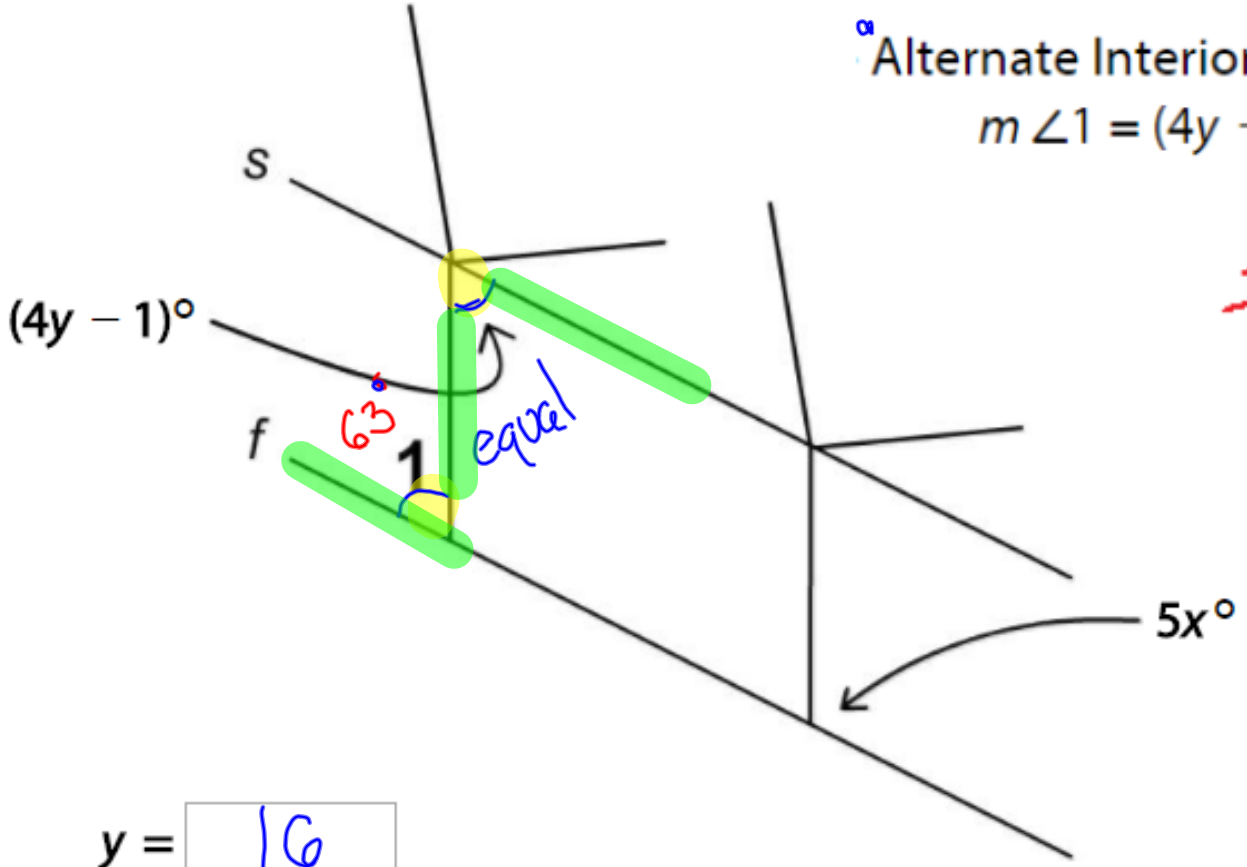
$-72 \quad -72$

$\frac{9x}{9} = \frac{108}{9}$

$x = 12$

$x =$ 12

7 In the diagram of movie theater seats, the incline of the floor, f, is parallel to the seats, s.



If $m\angle 1 = 63°$, what is y?

a Alternate Interior Angles Theorem.

$m\angle 1 = (4y - 1)°$

63 = 4y − 1

+1 +1

64 = 4y

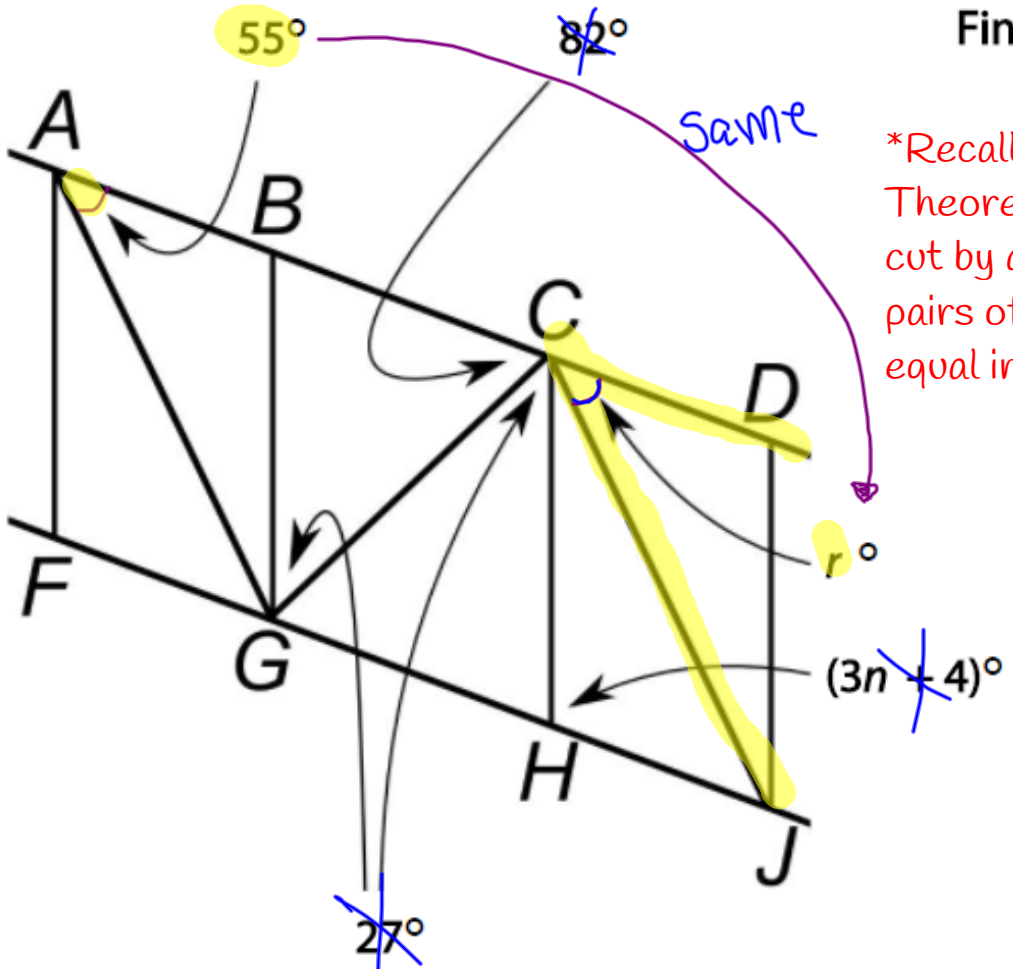
4 4

16 = y

63° equal

$y =$ 16

8 In the diagram of the staircase railing below, $\overline{AG} \parallel \overline{CJ}$ and $\overline{AD} \parallel \overline{FJ}$.

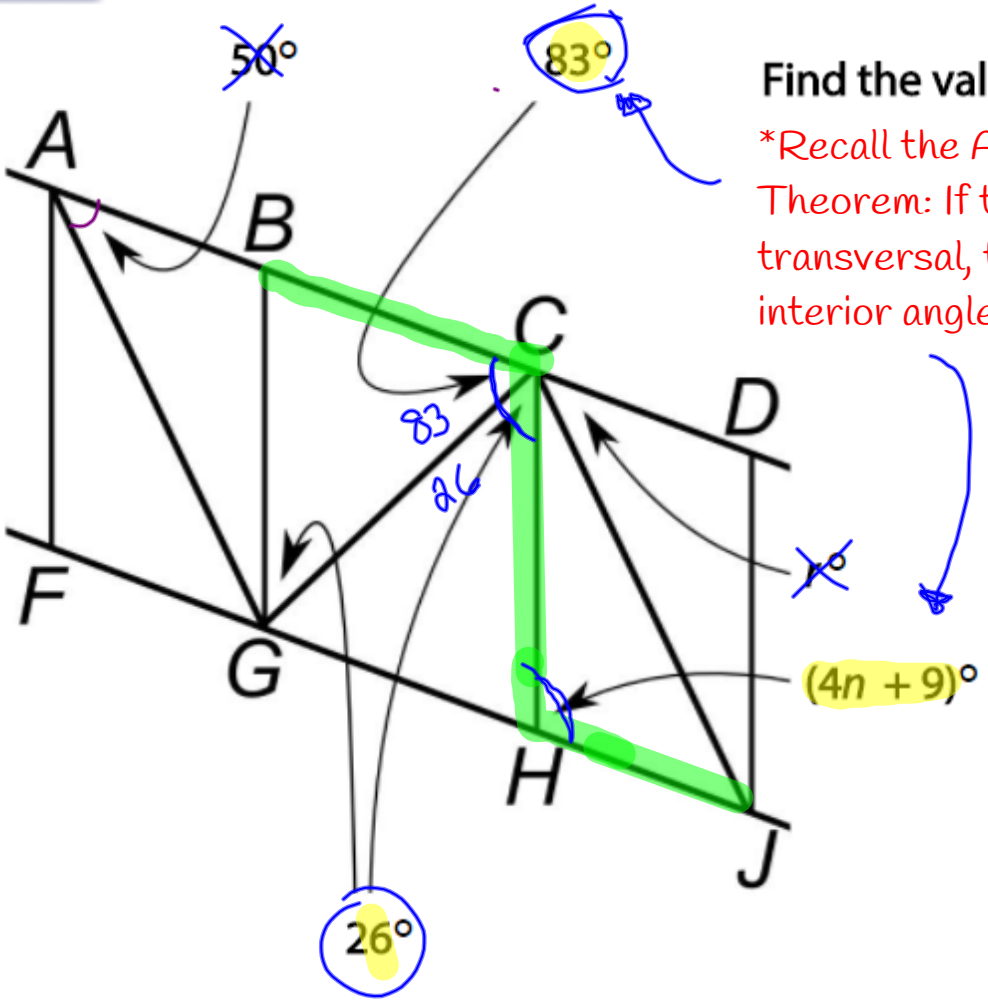


Find the measure of $\angle DCJ$.

*Recall the Corresponding Angles Theorem: If two parallel lines are cut by a transversal, then the pairs of corresponding angles are equal in measure.

$m\angle DCJ =$ 55 °, by the Corresponding Angles Theorem ▼.

9 In the diagram of the staircase railing below, $\overline{AG} \parallel \overline{CJ}$ and $\overline{AD} \parallel \overline{FJ}$.



Find the value of n.

*Recall the Alternate Interior Angles Theorem: If two parallel lines are cut by a transversal, then the pairs of alternate interior angles are equal in measure.

$\angle CHJ$ and $\angle BCH$ are alternate interior angles.

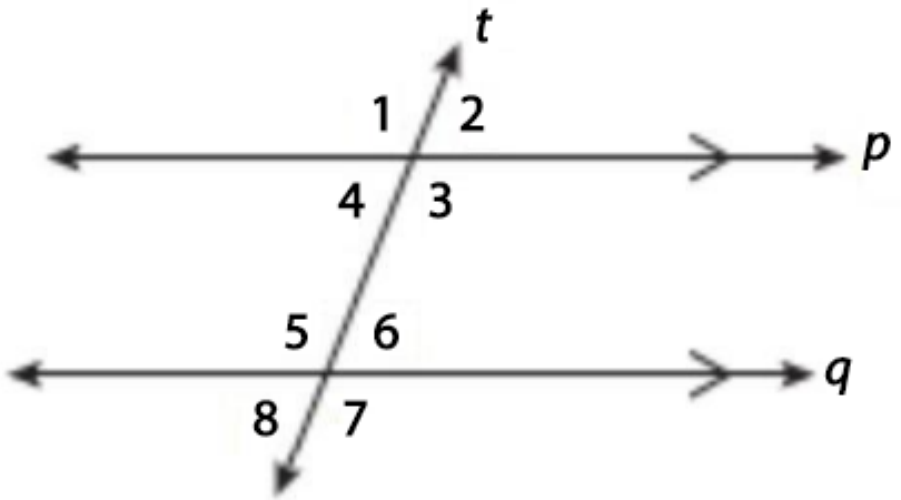
$$m\angle BCH = 83^\circ + 26^\circ$$
$$= 109$$

$$4n + 9 = 109$$
$$4n = 100$$
$$n = 25$$

$n =$ 25, by the Alternate Interior Angles Theorem ▼.

10 Complete a proof in paragraph form for the Alternate Interior Angles Theorem.

Given: $p \parallel q$
Prove: $m\angle 4 = m\angle 6$



You are given that $p \parallel q$, so using the Same-Side Interior Angles Postulate, you know that $\angle 4$ and $\angle 5$ are supplementary. When angles are supplementary, the sum of their measures is 180°. You can write this as $m\angle 4 + m\angle 5 = 180°$. When you look at the given diagram, you see that $\angle 6$ and $\angle 5$ form a line, and so they are a linear pair, which makes them supplementary. You can write this as $m\angle 6 + m\angle 5 = 180°$. Using the Substitution Property of Equality, you can substitute 180° in $m\angle 4 + m\angle 5 = 180°$ with $m\angle 6 + m\angle 5$. This results in $m\angle 4 + m\angle 5 = m\angle 6 + m\angle 5$. Using the Subtraction Property of Equality, you can subtract $m\angle 5$ from both sides. So, $m\angle 4 = m\angle 6$.