

CO-C9a

Practice Assessment

1. Write the inverse and the contrapositive of the following statement:

If a polygon is a square, then it has 4 right angles.

Inverse:

$\sim P \rightarrow \sim Q$ If a polygon is not a square, then it does not have 4 right angles.

Contrapositive:

$\sim Q \rightarrow \sim P$ If it does not have 4 right angles, then the polygon is not a square.

2. Write the converse of the following statement. Then combine the statement and converse into a single biconditional statement.

If a triangle has 3 congruent sides, then it is an equilateral triangle.

Converse:

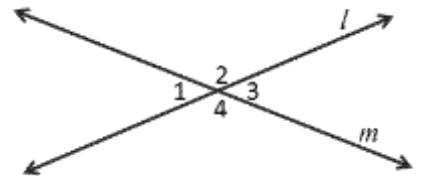
$Q \rightarrow P$ If it is an equilateral triangle, then the triangle has 3 congruent sides.

Biconditional: A triangle has 3 congruent sides if and only if it is an equilateral triangle.

$P \Leftrightarrow Q$

3. Given lines l and m which intersect to create four angles, write a paragraph to prove that $\angle 2 \cong \angle 4$.

(possible answer)



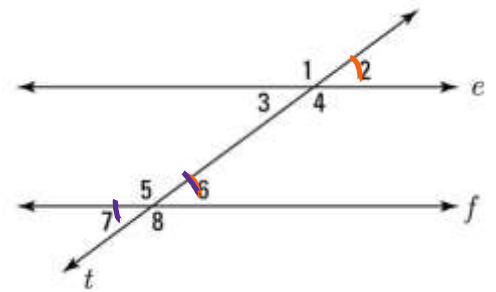
We are given lines l and m which intersect to create four angles and we wish to prove that vertical angles like $\angle 2$ and $\angle 4$ are congruent. We observe that $\angle 2 + \angle 3 = 180^\circ$ because they form a line. Likewise, $\angle 3 + \angle 4 = 180^\circ$ because they form a line. By the transitive property, $\angle 2 + \angle 3 = \angle 3 + \angle 4$. By subtracting $\angle 3$ from both sides, we are left with $\angle 2 \cong \angle 4$. QED

CO-C9b

Use the figure for 4 and 5.

4. For this problem only, it is given that $e \parallel f$. Write a paragraph that proves that $\angle 2 \cong \angle 7$.

(possible answer)

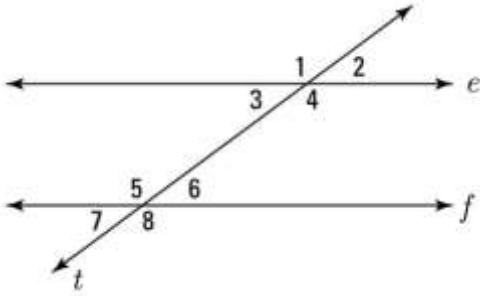


We are given that lines e and f are parallel with transversal t . We wish to prove that alternate exterior angles, like $\angle 2$ and $\angle 7$, are congruent. We observe that $\angle 2 \cong \angle 6$ because of the corresponding angles postulate. We can also state that $\angle 6 \cong \angle 7$ because they are vertical angles. By the transitive property, $\angle 2 \cong \angle 7$. QED

$\angle 2 \cong \angle 6$ (corresp. \angle 's ... "piano video")
 $\angle 6 \cong \angle 7$ (vertical \angle 's)
 $\Rightarrow \angle 2 \cong \angle 7$ (transitive prop)

$A \rightarrow B$
if: $B \rightarrow C$
then: $A \rightarrow C$

5. For this problem only, it is given that $\angle 4 + \angle 6 = 180^\circ$. Write a paragraph that proves that $e \parallel f$.
(possible answer)



We are given two lines e and f and a transversal t , and that $\angle 4 + \angle 6 = 180^\circ$. We wish to prove that lines e and f are therefore parallel. We observe that $\angle 2 + \angle 4 = 180^\circ$ because they make a line (linear pair). Along with the given and the transitive property, we can say that $\angle 4 + \angle 6 = \angle 2 + \angle 4$. By subtracting $\angle 4$ from both sides, we are left with $\angle 6 = \angle 2$. These two angles are corresponding, and we just proved that they are congruent. This is only true if lines e and f are parallel. QED.

NOTE: In order to prove that lines are parallel, you must conclude that a pair of angles are both corresponding and congruent. This is what we learned by making parallel lines with compass and straight edge.

Same slope \perp opposite recip slope: $\frac{a}{b} \perp -\frac{b}{a}$

6. Are the lines whose equations are given below parallel, perpendicular, or neither? Justify your answer using numerical evidence.

(Solve each for y to find slope)

$$\begin{cases} 2x - 6y = 18 \\ 3x + y = 6 \end{cases}$$

$2x - 6y = 18$
 $-6y = -2x + 18$
 $\frac{-6y}{-6} = \frac{-2x + 18}{-6}$
 $y = \frac{2}{6}x - 3$
 reduce fraction $y = \frac{1}{3}x - 3$ $m = \frac{1}{3}$

$3x + y = 6$
 $y = -3x + 6$ $m = -3$

these lines are perpendicular because their slopes are opposite reciprocals

7. Write the point-slope equation of a line that passes through $(-3, 4)$ and is parallel to $2x + 6y = 13$.

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

Point: (x_1, y_1)
Slope: m

Slope? solve for y.

$$2x + 6y = 13$$

$$6y = -2x + 13$$

$$\frac{6y}{6} = \frac{-2x + 13}{6}$$

$$y = -\frac{2}{6}x + \frac{13}{6}$$

$$y = -\frac{1}{3}x + \frac{13}{6}$$

$y - 4 = -\frac{1}{3}(x - (-3))$
 $y - 4 = -\frac{1}{3}(x + 3)$

