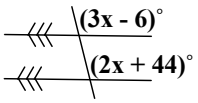
Name: _____ Per: _____

Solving for Angles Created by Transversals

To solve for the angles created by a transversal **when the lines are parallel**, use what you know about them…
The angles are either **congruent** & have **equal measures (vertical, corresponding, & alternate angles)**, or they **add to equal 180° (linear pair & unlisted angles)**.

If the lines **are not parallel**, then you **can only solve** for **vertical (congruent)** and **linear pair (equal 180°) angles**.

EXAMPLE:



The lines are PARALLEL.

The angles are CORRESPONDING (solvable if parallel).

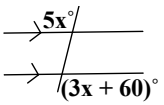
Can you solve for the angle measures (circle)? YES or NO
If no, circle: NOT POSSIBLE TO SOLVE.
If yes, circle one: The angles
ARE CONGRUENT or ADD TO EQUAL 180°
Now, solve for both angle measures.

Since they're congruent, I can set the measures EQUAL!

$$3x - 6 = 2x + 44$$
$$x - 6 = 44$$
$$x = 50$$

Plug it in… $3x - 6 = 3(50) - 6 = 150 - 6 = \mathbf{144}°$
$2x + 44 = 2(50) + 44 = 100 + 44 = \mathbf{144}°$

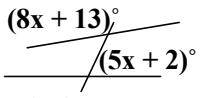
1.



The lines are _____.

The angles are _____.
Can you solve for the angle measures (circle)? YES or NO
If no, circle: NOT POSSIBLE TO SOLVE.
If yes, circle one: The angles
ARE CONGRUENT or ADD TO EQUAL 180°
Now, solve for both angle measures.

EXAMPLE:

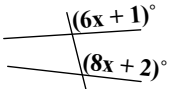


The lines are NOT PARALLEL.

The angles are UNLISTED (solvable if parallel).

Can you solve for the angle measures (circle)? YES or NO
If no, circle: NOT POSSIBLE TO SOLVE.
If yes, circle one: The angles
ARE CONGRUENT or ADD TO EQUAL 180°
~~Now, solve for both angle measures.~~

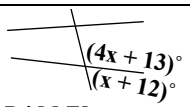
2.



The lines are _____.

The angles are _____.
Can you solve for the angle measures (circle)? YES or NO
If no, circle: NOT POSSIBLE TO SOLVE.
If yes, circle one: The angles
ARE CONRGUENT or ADD TO EQUAL 180°
Now, solve for both angle measures.

EXAMPLE:



The lines are NOT PARALLEL.

The angles are A LINEAR PAIR (always solvable).

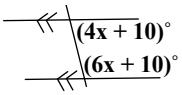
Can you solve for the angle measures (circle)? YES or NO
If no, circle: NOT POSSIBLE TO SOLVE.
If yes, circle one: The angles
ARE CONGRUENT or ADD TO EQUAL 180°
Now, solve for both angle measures.

Since they're linear, I can add the measures to equal 180°!

$$4x + 13 + x + 12 = 180$$
$$5x + 25 = 180$$
$$5x = 155$$
$$x = 31°$$

Plug it in… $4x + 13 = 4(31) + 13 = 124 + 13 = \mathbf{137}°$
$x + 12 = (31) + 12 = \mathbf{43}°$

3.



The lines are _____.

The angles are _____.
Can you solve for the angle measures (circle)? YES or NO
If no, circle: NOT POSSIBLE TO SOLVE.
If yes, circle one: The angles
ARE CONGRUENT or ADD TO EQUAL 180°
Now, solve for both angle measures.

Sometimes, these problems are written in words. Solving them works the same way. Are the lines parallel? What kind of angle pair are they? Can you solve for the angles?

If the angles are not solvable, then the answer is NOT POSSIBLE.

EXAMPLE:

$\angle ABC$ and $\angle EFB$ are corresponding angles on lines *m* and *n*. Line *m* || line *n*. $m\angle ABC = (5x - 3)^\circ$ and $m\angle EFB = (6x - 12)^\circ$. $m\angle EFB$ =?

The lines are parallel (that's what || means), and the angles are corresponding—it's solvable!
Corresponding means they're congruent. SO…

$$\angle ABC \cong \angle EFB$$
$$m\angle ABC = m\angle EFB$$
$$5x - 3 = 6x - 12$$
$$-3 = x - 12$$
$$9 = x$$
$$x = 9$$

Plug it in… $m\angle EFB = (6x - 12)^\circ = 6(9) - 12 = \mathbf{42}^\circ$

EXAMPLE:

$\angle 7$ and $\angle 8$ are a linear pair. $m\angle 7 = (9x + 7)^\circ$ and $m\angle 8 = (9x + 29)^\circ$. $m\angle 7$ =?

The angles are linear, so it doesn't matter if the lines are parallel. Linear means they add to equal 180°, so…

$$m\angle 7 + m\angle 8 = 180^\circ$$
$$(9x + 7) + (9x + 29) = 180$$
$$18x + 36 = 180$$
$$18x = 144$$
$$x = 8$$

Plug it in… $m\angle 7 = (9x + 7)^\circ = 9(8) + 7 = \mathbf{79}^\circ$

4. $\angle 9$ and $\angle 3$ are alternate exterior angles on line *s* and line *t*. Line *s* and line *t* are parallel. $m\angle 9 = (2x + 40)^\circ$ and $m\angle 3 = (3x - 5)^\circ$. $m\angle 9$ =?

5. $\angle 2$ and $\angle 4$ are same side interior angles on line *p* and line *q*. Line *P* || line *q*. $m\angle 2 = (8x - 3)^\circ$ and $m\angle 4 = (7x + 33)^\circ$. $m\angle 2$ =?

6. $\angle 5$ and $\angle 2$ are corresponding angles on lines *a* and *b*. Lines *a* and *b* are not parallel. $m\angle 5 = (10x - 4)^\circ$ and $m\angle 2 = (6x + 8)^\circ$. $m\angle 5$ =?

7. $\angle G$ and $\angle H$ are vertical angles. $m\angle G = (12x + 3)^\circ$ and $m\angle H = (9x + 9)^\circ$. $m\angle H$ =?

8. $\angle 7$ and $\angle 8$ are a linear pair. $m\angle 7 = (3x + 9)^\circ$ and $m\angle 8 = (5x + 3)^\circ$. $m\angle 8$ =?

9. $\angle 1$ and $\angle 2$ are corresponding angles on lines *k* and *l*. Line *k* || line *l*. $m\angle 1 = (14x - 10)^\circ$ and $m\angle 2 = 12x^\circ$. $m\angle 1$ =?