Name _____

Converse Theorems with Parallel Lines and Transversals

Date _____ Period _____

Given two lines...with an intersecting transversal, line *t*
eight angles are created

```
        1   2
 ───────────────────── k
        3   4

        5   6
 ───────────────────── l
        7   8
          t
```

Given two lines...with an intersecting transversal, line *t*
eight angles are created

```
        1   2
 ───────────────────── k
        3   4

        5   6
 ───────────────────── l
        7   8
          t
```
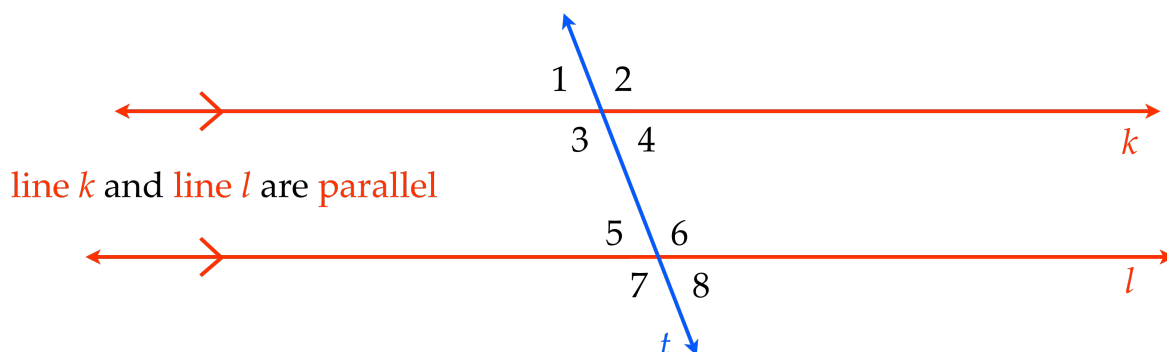
Corresponding Angles are angles at the same location at each intersection

∠2 and ∠6 are corresponding angles   ∠1 and ∠5 are corresponding angles
∠3 and ∠7 are corresponding angles   ∠4 and ∠8 are corresponding angles

Converse of Corresponding Angles Postulate

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

line k and line l are parallel

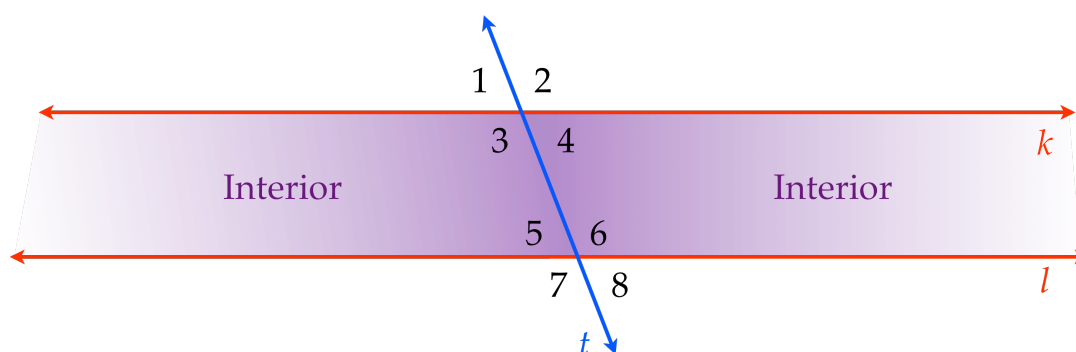Corresponding Angles are angles at the same location at each intersection

$$\angle 2 \cong \angle 6 \qquad \angle 1 \cong \angle 5$$
$$\angle 3 \cong \angle 7 \qquad \angle 4 \cong \angle 8$$

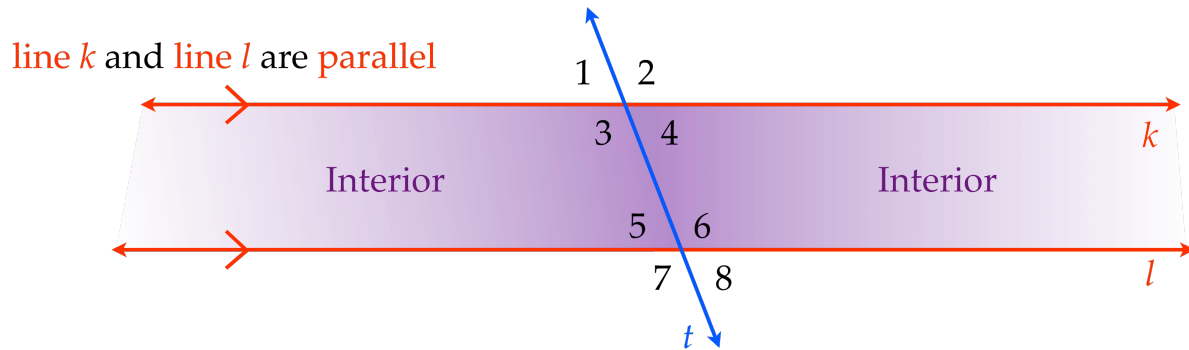Given two lines…with an intersecting transversal, line t
eight angles are created

Alternate Interior Angles are interior angles on alternate sides of the transversal.

∠3 and ∠6 are alternate interior angles   ∠4 and ∠5 are alternate interior angles

<p style="text-align:center">Converse of Alternate Interior Angles Theorem</p>
<p style="text-align:center">If two lines are cut by a transversal such that the alternate interior angles are congruent, then the two lines are parallel.</p>
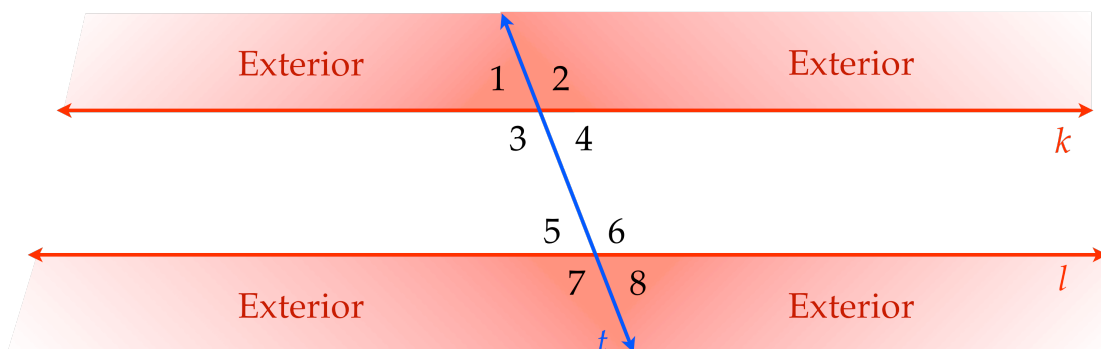
line *k* and line *l* are parallel

1 2
3 4

Interior   Interior

k

5 6
7 8

t

Alternate Interior Angles are interior angles on alternate sides of the transversal.

$$\angle 3 \cong \angle 6 \qquad\qquad \angle 4 \cong \angle 5$$

<p style="text-align:center">Given two lines…with an intersecting transversal, line *t*</p>
<p style="text-align:center">eight angles are created</p>

Exterior   1 2   Exterior

3 4

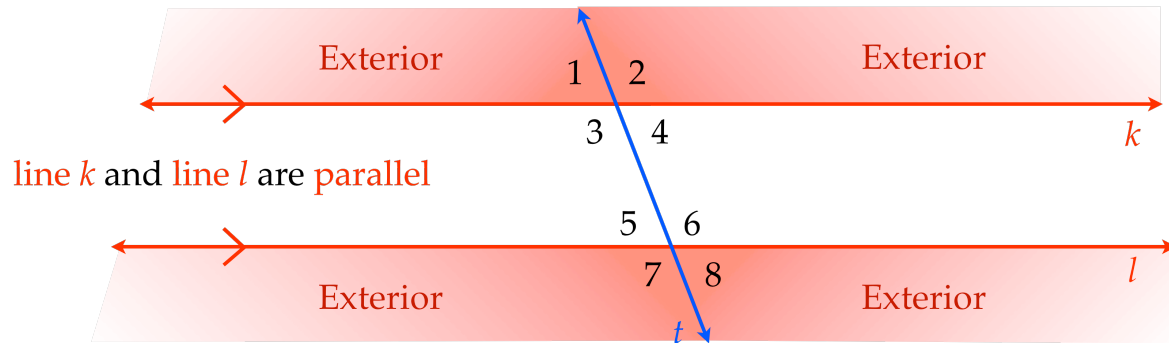*k*

5 6
7 8

Exterior   Exterior

l

t

Alternate Exterior Angles are exterior angles on alternate sides of the transversal.

∠2 and ∠7 are alternate exterior angles   ∠1 and ∠8 are alternate exterior angles

<p align="center" style="color:orange">Converse of Alternate Exterior Angles Theorem</p>

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

Exterior   1   2   Exterior

3   4   k

line k and line l are parallel
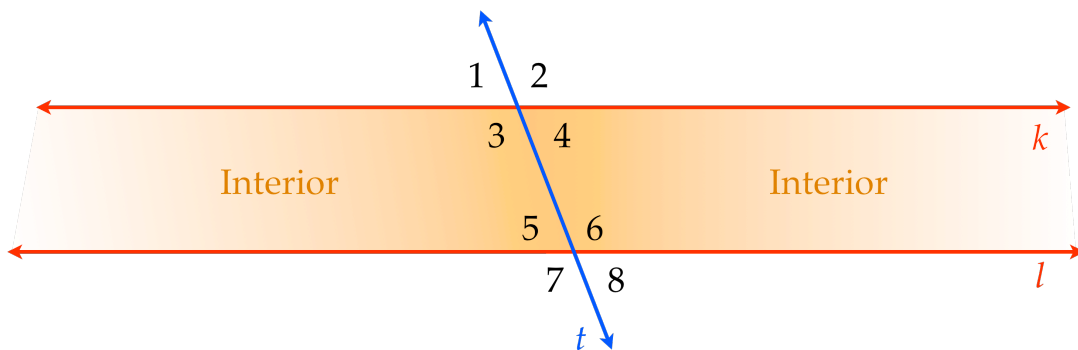
5   6

7   8   l

Exterior   Exterior

t

Alternate Exterior Angles are exterior angles on alternate sides of the transversal.

$\angle 2 \cong \angle 7$ $\angle 1 \cong \angle 8$

Given two lines…with an intersecting transversal, line t
eight angles are created

1   2

3   4   k

Interior   Interior

5   6

7   8   l

t
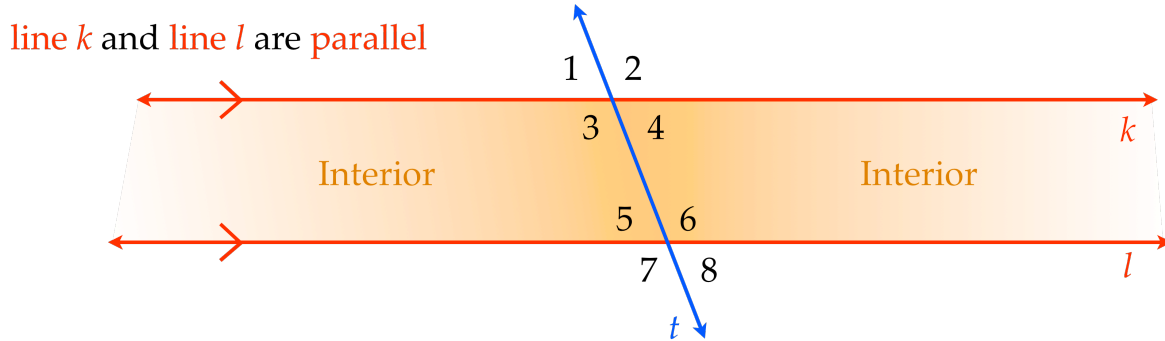
Same Side Interior angles are interior angles on the same side of the transversal.

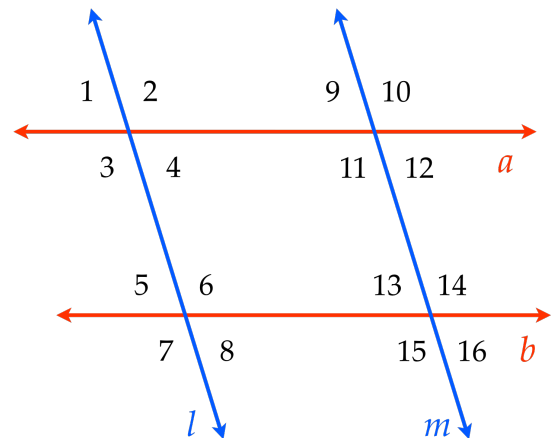$\angle 4$ and $\angle 6$ are same side interior angles $\angle 3$ and $\angle 5$ are same side interior angles

Converse of Same Side Interior Angles Theorem

If two lines are cut by a transversal such that same-side interior angles are supplementary, then the two lines are parallel.

line k and line l are parallel

```
        1   2
        3   4                              k
  Interior              Interior
        5   6
        7   8                              l
            t
```

Same Side Interior angles are interior angles on the same side of the transversal.

∠4 and ∠6 are supplementary   ∠3 and ∠5 are supplementary

What conclusions can be made from the following?
Give your reason.

∠9 ≅ ∠13

∠6 ≅ ∠15

∠2 ≅ ∠7

∠4 and ∠11 are supplementary.

```
                1   2        9   10
                                         a
                3   4        11  12
                5   6        13  14
                7   8        15  16     b
                  l            m
```
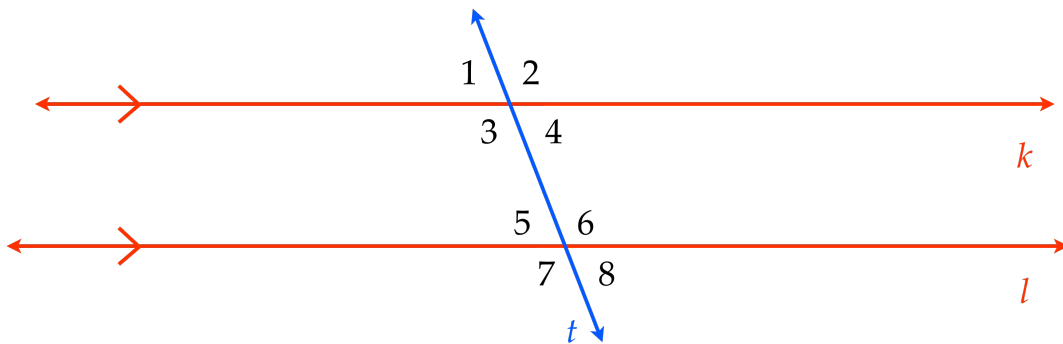
Given two lines... with an intersecting transversal, line *t*

if Corresponding Angles are congruent   if Alternate Exterior Angles are congruent

if Alternate Interior Angles are congruent   if Same Side Interior Angles are supplementary

then line *k* and line *l* are parallel