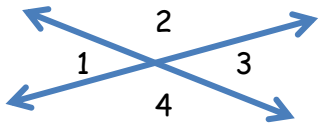
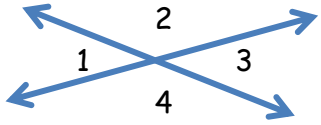
Angle Relationships Review



When two lines intersect, they form four angles with one point in common.

Angles that are opposite one another are VERTICAL ANGLES.
Some people say instead that VERTICAL ANGLES are angles that are across from one another.
Angles 1 and 3 are VERTICAL angles.
Angles 2 and 4 are VERTICAL angles.

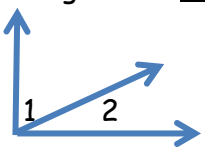
VERTICAL ANGLES are congruent which means they have the same measure.



If the measure of angle 1 is 45°, what is the measure of angle 3?
m<3 measures 45^0
If the measure of angle 2 is 135°, what is the measure of angle 4?
m<4 measures 135^0

ADJACENT ANGLES are not vertical angles; they are angles that are **NEXT** to one another.

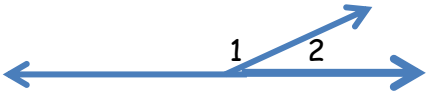
Two angles are COMPLEMENTARY if the sum of their measures is 90^0



If m<1 is 60^0, what is the measure of angle 2?
Complementary angles, so $90^0 - 60^0$ = m<2 measures 30^0

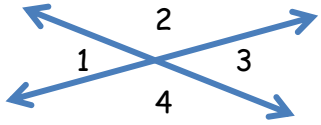
Angles M and N are complementary. If <M measures 35^0, find the measure of <N.
Complementary angles, so $90^0 - 35^0$ = m<N measures 55^0

Two angles are SUPPLEMENTARY if the sum of their measures is 180^0



If m<1 is 110^0, what is the measure of angle 2?
Supplementary angles, so $180^0 - 110^0$ = m<2 measures 70^0

Angles P and Q are supplementary. If <P measures 85^0, find the measure of <Q.
Supplementary angles, so $180^0 - 85^0$ = m<Q measures 95^0



Angles 2 and 3 are supplementary.
If <2 measures 101^0, find the m<3.
Supplementary angles, so $180^0 - 101^0$ = m<3 measures 79^0

Knowing that information, what is the measure of <1?
VERTICAL ANGLES are congruent which means they have the same measure.
If m<3 is 79^0, then the m<1 is also 79^0

What is the measure of < 4?
VERTICAL ANGLES are congruent which means they have the same measure.
If m<2 is 101^0, then the m<4 is also 101^0

COMPLEMENTARY IS A SUM OF 90^0 AND SUPPLEMENTARY IS A SUM OF 180^0

You can use your knowledge of vertical angles, complementary and supplementary to help you find any missing value of an angle.

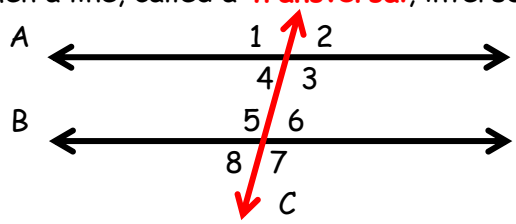
PARALLEL LINES

We already know that lines that are parallel have the same slopes and different y-intercepts. Parallel lines are two or more lines the same distance apart in a plane that do not intersect.

Line DE is parallel to line ST

Using symbols, $\overleftrightarrow{DE} \parallel \overleftrightarrow{ST}$

When a line, called a **transversal**, intersects two parallel lines, eight angles are formed.



Line C is the transveral line.

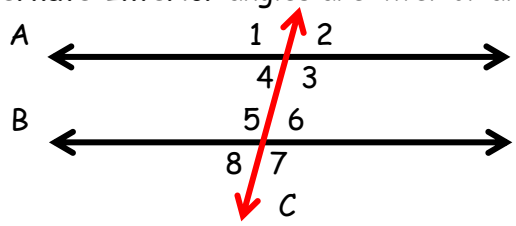
One way to classify these angles is as **Interior** angles or **Exterior** angles.

Interior Angles are inside the parallel lines: <3, <4, <5, <6

Exterior Angles are outside the parallel lines: <1, <2, <7, <8

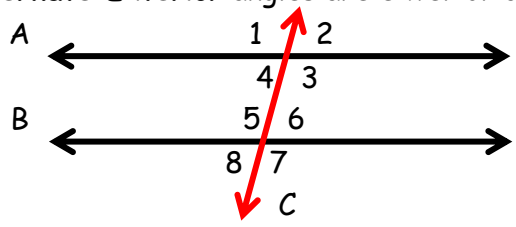
When we study the relationship between different angles, we can come up with further classifications.

Alternate Interior angles are interior angles found on opposite sides of the transversal.



Angles 4 and 6 are alternate interior angles
congruent angles which means they are =
Angles 3 and 5 are alternate interior angles
congruent angles which means they are =

Alternate Exterior angles are exterior angles found on opposite sides of the transversal.

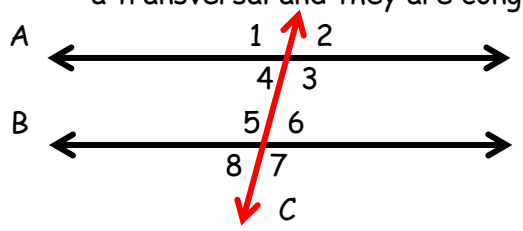


Angles 1 and 7 are alternate exterior angles
congruent angles which means they are =
Angles 2 and 8 are alternate exterior angles
congruent angles which means they are =

If the measure of <7 is 125^0, then the measure of <1 is also 125^0

If the measure of <2 is 35^0, then the measure of <8 is also 35^0

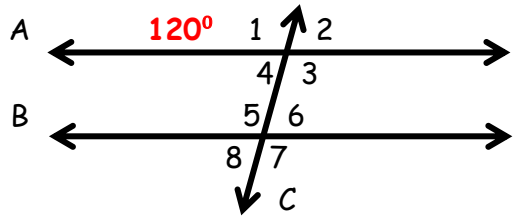
Corresponding Angles: angles that hold the same position on two different parallell lines cut by a transversal and they are congruent which means they have the same measures.



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

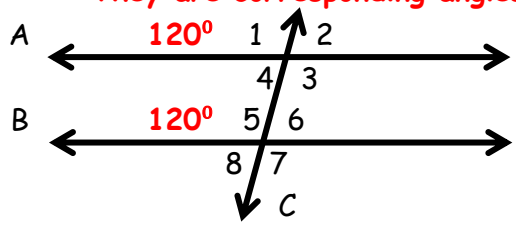
Basically, if you put line B on top of line A, you will see the corresponding angles and that they will be equivalent measures.

When you know the measure of one angle, you can figure out the measures of all the other angles



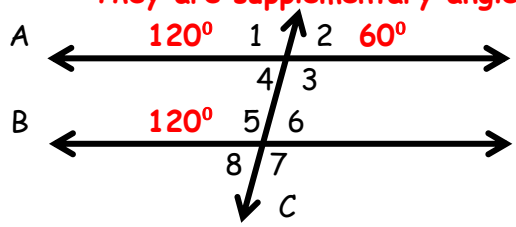
If angle 1 measures 120^0 , find the measure of angle 5

They are corresponding angles, so they are congruent: m<5 = 120^0



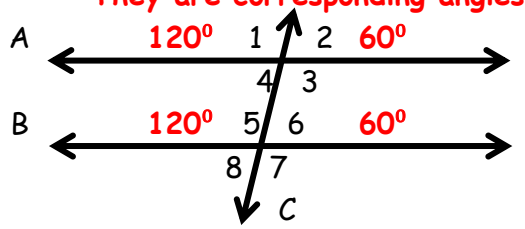
If angle 1 measures 120^0 , find the measure of angle 2

They are supplementary angles, so their sum is 180^0: m<2 = 60^0

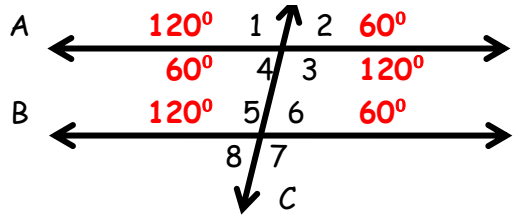


If angle 2 measures 60^0 , find the measure of angle 6

They are corresponding angles, so they are congruent: m<6 = 60^0



Knowing that vertical angles have equivalent measures, you will be able to figure out the REST of the missing measures now.

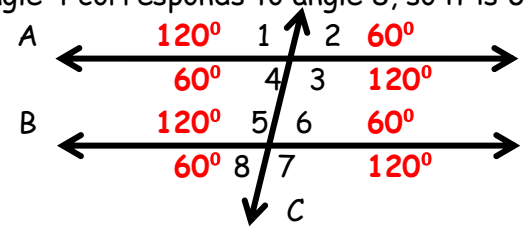


Angle 3 is vertical to Angle 1, so it is 120^0

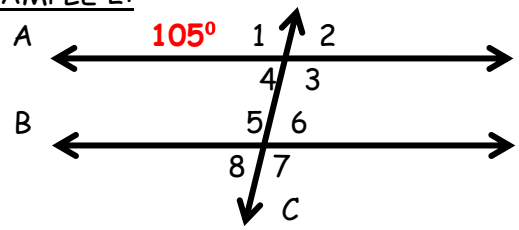
Angle 4 is vertical to Angle 2, so it is 60^0

Angle 3 corresponds to angle 7, so it is 120^0

Angle 4 corresponds to angle 8, so it is 60^0



EXAMPLE 2:



m<5: _____ ^{0}

m<2: _____ ^{0}

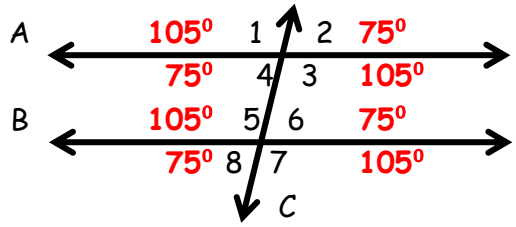
m<6: _____ ^{0}

m<4: _____ ^{0}

m<3: _____ ^{0}

m<8: _____ ^{0}

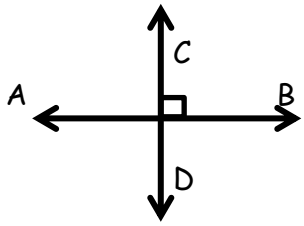
m<7: _____ ^{0}



If the vertical angles formed by two intersecting lines are right angles, the lines are said to be

PERPENDICULAR

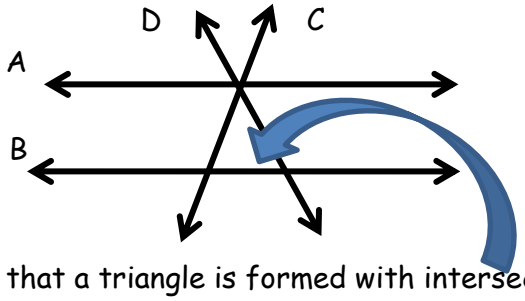
This means the angles are 90^0



Line AB is perpendicular to line CD

Using symbols, $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$

Let's look at a unique example where there are <u>two</u> transversals!



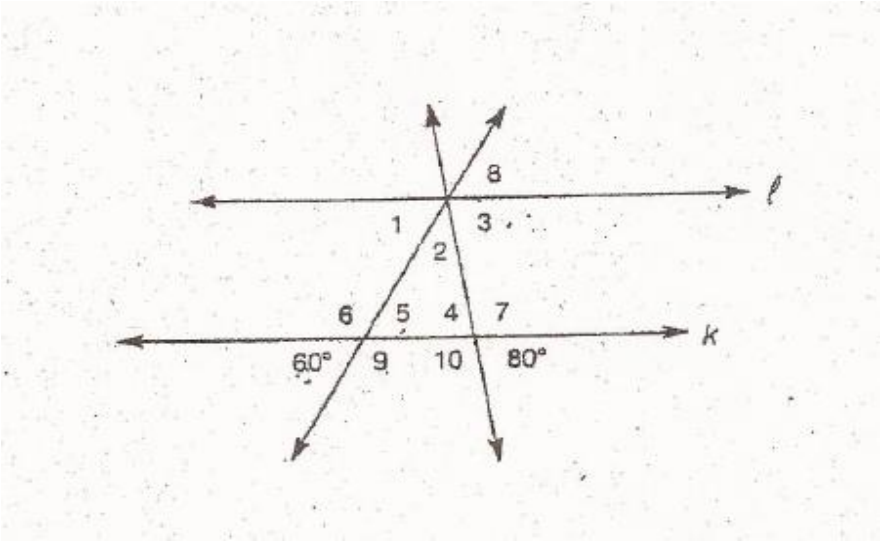
Notice that a triangle is formed with intersecting lines.

<u>REMINDER</u>: **The sum of the measures of the angles in a triangle equal 180^0**

Examples of possibilities: 60,60,60 OR 30,80,70 , etc.

*Sum just has to equal 180^0!

<u>Let's look at this problem…</u>



Start with the angles that are given using your knowledge of vertical angles.