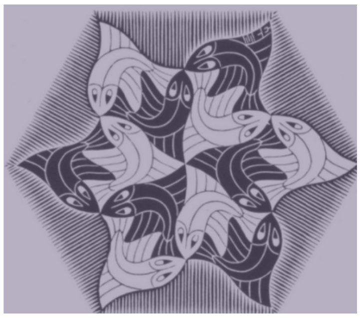
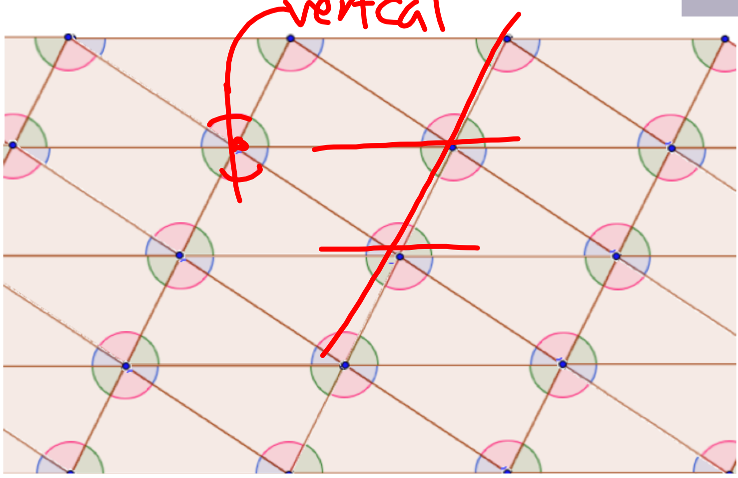
SECONDARY MATH II // MODULE 5
GEOMETRIC FIGURES – 5.6

5.6 Justification and Proof

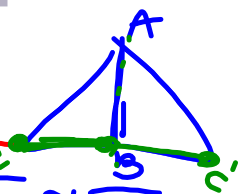
A Practice Understanding Task



vertcal



3 laws



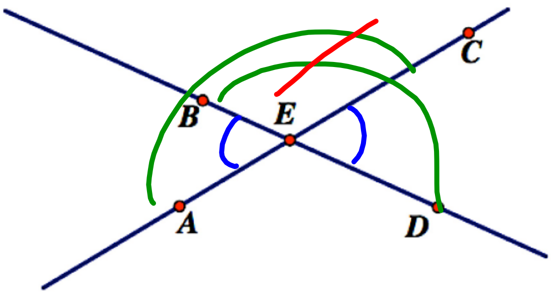
reflexive $\overline{AB} \cong \overline{AB}$

symmetric $\overline{CB} \cong \overline{BC}$

transitive if $a=b$, $b=c$ then $a=c$

Vertical Angles

When two lines intersect, the opposite angles formed at the point of intersection are called *vertical angles*. In the diagram, $\angle AEB$ and $\angle CED$ form a pair of vertical angles.



1. Given: $\overleftrightarrow{AC}$ and $\overleftrightarrow{BD}$ intersect at E.
Prove: $\angle AEB \cong \angle CED$

[Note: For each of the following proofs you may use any format you choose to write your proof: a flow proof diagram, a two-column proof, or a narrative paragraph.]

$\angle AEB + \angle BEC = 180°$ Supplementary

$\angle BEC + \angle CED = 180°$ "

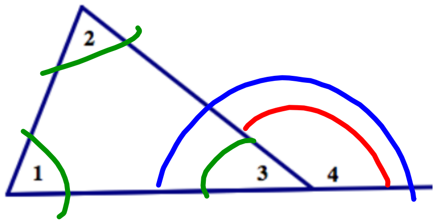
$\angle AEB + \cancel{\angle BEC} = \cancel{\angle BEC} + \angle CED$ Substitution

$- \angle BEC$ $\quad$ $- BEC$ Subtraction

$\angle AEB \cong \angle CED$.

Exterior Angles of a Triangle

When a side of a triangle is extended, as in the diagram below, the angle formed on the exterior of the triangle is called an *exterior angle*. The two angles of the triangle that are not adjacent to the exterior angle are referred to as the *remote interior angles*. In the diagram, $\angle 4$ is an exterior angle, and $\angle 1$ and $\angle 2$ are the two remote interior angles for this exterior angle.



2. Given: $\angle 4$ is an exterior angle of the triangle
Prove: $m\angle 4 = m\angle 1 + m\angle 2$

$\angle 1 + \angle 2 + \angle 3 = 180$ Interior Angle Sum theorem

$\angle 3 + \angle 4 = 180$ Supplementary

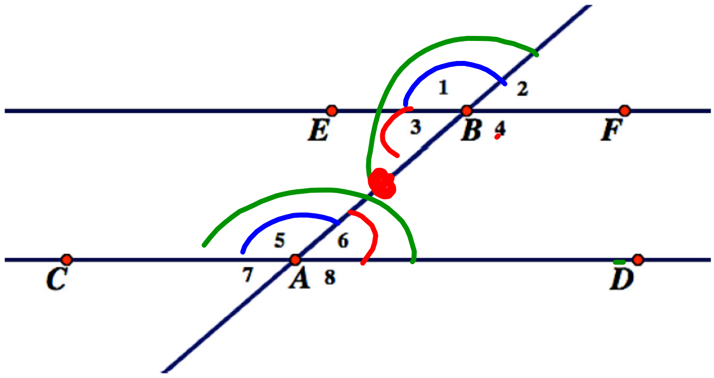
$\angle 1 + \angle 2 + \cancel{\angle 3} = \cancel{\angle 3} + \angle 4$ substitution

$-\angle 3 \quad -\angle 3$ subtraction

$\angle 1 + \angle 2 = \angle 4.$

Parallel Lines Cut By a Transversal

When a line intersects two or more other lines, the line is called a *transversal* line. When the other lines are parallel to each other, some special angle relationships are formed. To identify these relationships, we give names to particular pairs of angles formed when lines are crossed (or cut) by a transversal. In the diagram, ∠ 1 and ∠ 5 are called *corresponding angles*, ∠ 3 and ∠ 6 are called *alternate interior angles*, and ∠ 3 and ∠ 5 are called *same side interior angles.*



3. Given: $\overleftrightarrow{BF} \parallel \overleftrightarrow{AD}$

Prove: Corresponding angles ∠ 1 and ∠ 5 are congruent

① $\overleftrightarrow{AB}$ has a constant slope and $\overleftrightarrow{BF} \parallel \overleftrightarrow{AD}$ so <5 and <1, must make the same angle.

② Translate $\overline{CD}$ to $\overline{EF}$, all corresponding angles align, because $\overleftrightarrow{AB}$ has the same slope, so all corresponding angles are congruent

4. Given: $\overleftrightarrow{BF} \parallel \overleftrightarrow{AD}$

Prove: Alternate interior angles ∠ 3 and ∠ 6 are congruent

If A is rotated 180° about the midpoint between A and B. Then All angles around A align with the angles around B. So <3 ≅ <6

<1 ≅ <5 corresponding

<5 + <6 = 180 Supplementary

<1 + <3 = 180

<1 + <3 = <5 + <6 substitute

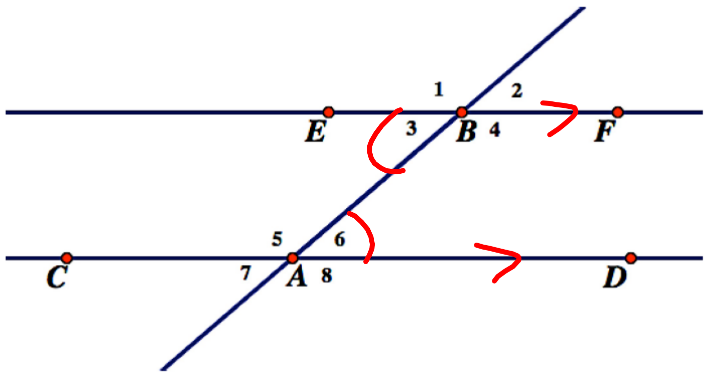
<1 + <3 = ~~<5~~ <1 + <6 substitution/transitive

−<1 −<1

$\boxed{<3 = <6}$ subtraction

5. Given: $\overleftrightarrow{BF} \parallel \overleftrightarrow{AD}$

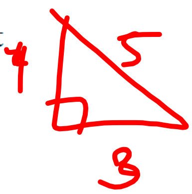
   Prove: Same-side interior angles $\angle 3$ and $\angle 5$ are supplementary



6. Given: Alternate interior angles $\angle 3$ and $\angle 6$ are congruent

   Prove: $\overleftrightarrow{EF} \parallel \overleftrightarrow{CD}$

   similar idea to pythagorean theorem proving if a triangle is a right triangle or not.



$3^2+4^2 \stackrel{?}{=} 5^2$

READY, SET, GO! Name Period Date

READY

Topic: Recalling features of the rigid-motion transformations

Complete each statement

1. When I use line segments to connect the corresponding points of a pre-image and the image in a translation, the line segments are parallel and congruent because each point moves in the same direction the same distance

2. When I use line segments to connect the corresponding points of a pre-image and the image in a reflection, the line of reflection is the ________________ of the segments because ________________

3. In a rotation, the corresponding points of the pre-image and the image are the same ________________ from the center of rotation because ________________

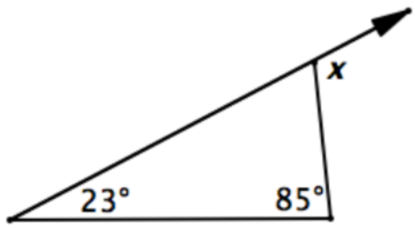
4. Translations, rotations, and reflections are rigid motion transformations because they maintain the same size & shape

SET

Topic: Solving for missing angles

Use what you know about vertical angles, exterior angles, and the angles formed by parallel lines and transversals to find the value of x in each of the diagrams.

5.



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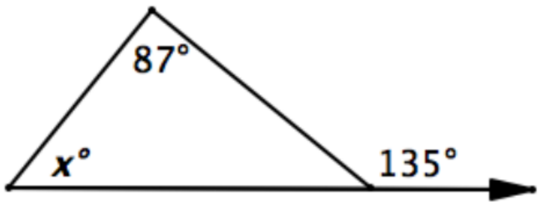

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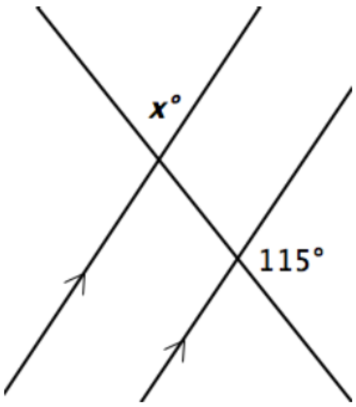

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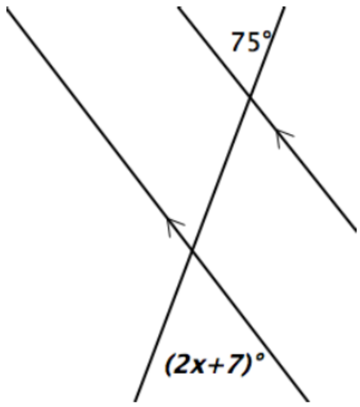
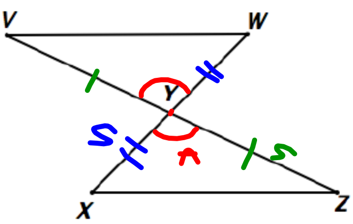


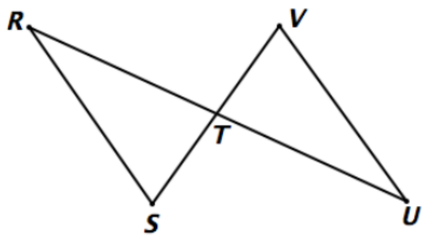
Prove each of the following.

9. Given: Y is the midpoint of $\overline{VZ}$ *and* $\overline{XW}$.
Prove: $\Delta VYW \cong \Delta ZYX$

S: $\overline{XY} \cong \overline{WY}$
A:
S:
$\Delta \cong \Delta$



10. Given $\angle R \cong \angle U$ and $\overline{ST} \cong \overline{VT}$.
Prove: $\Delta SRT \cong \Delta VUT$



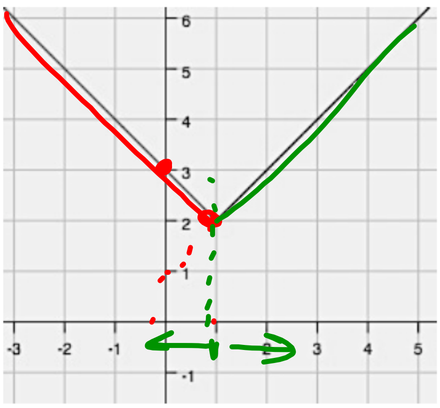
Start on 5.6 'go'

GO

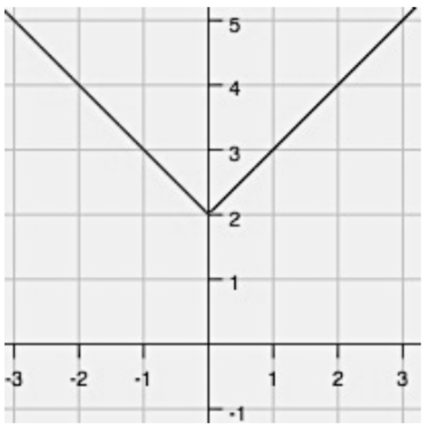
Topic: Connecting a piecewise defined equation with the corresponding absolute value equation

The graph of an absolute value function is given. A) Write the equation using absolute value notation. B) Then write the equation as a piecewise defined function.

15.



16.



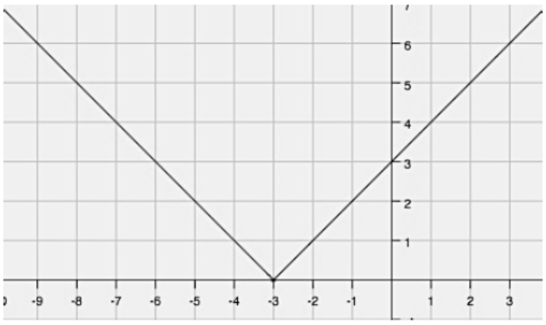
A. $y = |x-1| + 2$

B. $\begin{cases} -(x-1)+2, & x<1 \\ (x-1)+2, & x \geq 1 \end{cases}$

A.

B.

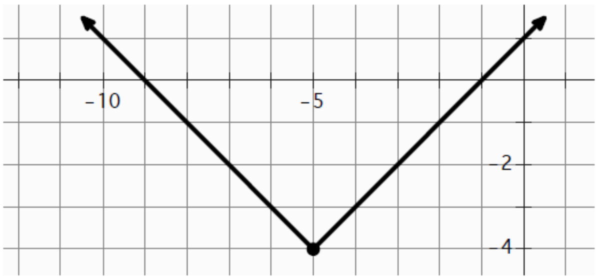
17.



A.

B.

18.



A.

B.