Geometry SOL Practice
Topic #2: Coordinate Formulas
Notes

Given: the ***coordinates*** of two points, determine the

- **slope** of containing the two points
- **midpoint** of the segment joining the two points
- the **distance** between the two points

generalization	example
Given: $A = (x_1, y_1)$ and $B = (x_2, y_2)$	Given: $\boldsymbol{A}$ = (-2, 3) and $\boldsymbol{B}$ = (4, -1)
slope $= \dfrac{y_1 - y_2}{x_1 - x_2}$	**slope** $= \dfrac{(3)-(-1)}{(-2)-(4)} = \dfrac{4}{-6} = -\dfrac{2}{3}$
midpoint $= \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$	**midpoint** $= \left(\dfrac{(-2)+(4)}{2}, \dfrac{(3)+(-1)}{2}\right) = \left(\dfrac{2}{2}, \dfrac{2}{2}\right) = (1,1)$
distance $= \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$	**distance** $= \sqrt{((-2)-(4))^2 + ((3)-(-1))^2} = \sqrt{(-6)^2 + (4)^2} = \sqrt{36+16} = \sqrt{52} = 7.21$

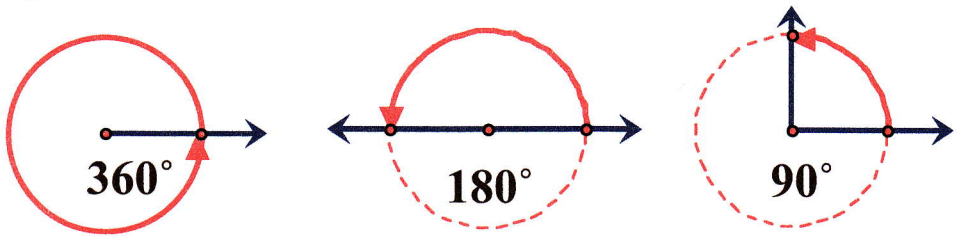
Slopes: Perpendicular Lines have opposite reciprocal slopes.

ex: $\frac{1}{2}$ & $-\frac{2}{1}$

ex: $-\frac{3}{4}$ & $\frac{4}{3}$

Geometry SOL Practice
Topic #3: Angles (general)
Notes

Angles are measured as a fractional amount of a full circle - 360°

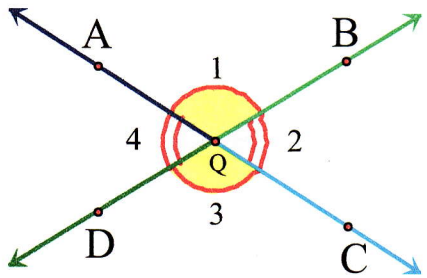


Terms:

- ***Complementary***: Two angles whose sum is **90°**
- ***Supplementary***: Two angles whose sum is **180°**

Angles form by Intersecting Lines:

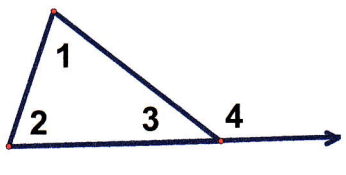
- Vertical (opposite) Angles are Congruent.
  - $\angle 1 \cong \angle 3, \angle 2 \cong \angle 4$
- Adjacent Angles are Supplementary.
  - $m\angle 1 + m\angle 2 = 180°$
  - $m\angle 2 + m\angle 3 = 180°$
  - Ect.

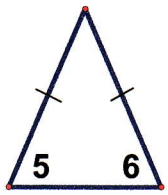


Triangles:

- The sum of the angles of a triangle is **180°.**
  - $m\angle 1 + m\angle 2 + m\angle 3 = 180°$

  Also: $m\angle 3 + m\angle 4 = 180°$
- Isosceles Triangles – base angles are congruent.
  - $\angle 5 \cong \angle 6$





Geometry SOL Practice
Topic #4: Angles with Parallel Lines
Notes

When parallel lines ***a*** and ***b*** (***a*** || ***b***) are intersected by a transversal line ***t***, eight angles are formed. These eight angles are grouped into two clusters: angles 1-4 (top cluster) and angles 5-8 (bottom cluster). The rules and vocabulary of angles with parallel lines are based on pairs of angles: one from the top cluster and one from the bottom cluster.

Note: Any two angles chosen are either ≅ or supplementary (sum is 180°).

Corresponding (≅) – angles in the same relative position in each cluster

Example: ∠1: upper left of top cluster

∠5: upper left of bottom cluster

Alternate Interior (≅) – angles between the parallel lines and on different sides of the transversal.

Example: ∠4: left interior of top cluster

∠6: right interior of bottom cluster

Alternate Exterior (≅) – angles outside of the parallel lines and on different sides of the transversal.

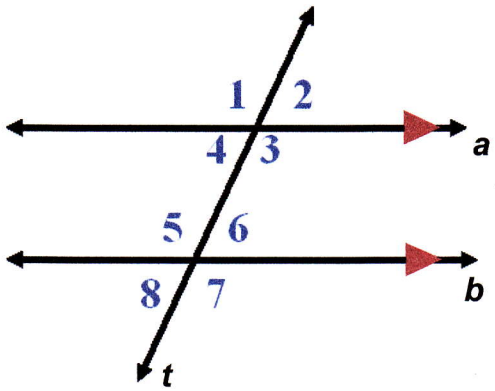
Example: ∠2: right exterior of top cluster

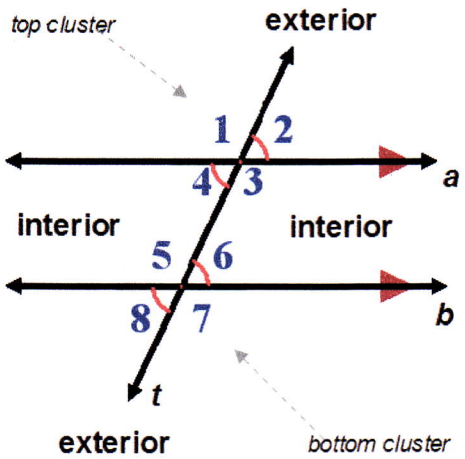
∠8: left exterior of bottom cluster

Consecutive Interior (180°) – angles between the parallel lines and on the same side of the transversal.

Example: ∠4: left interior of top cluster

∠5: left interior of bottom cluster

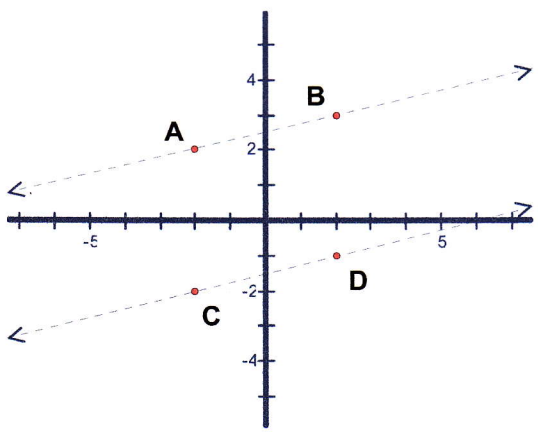




Slopes: Parallel Lines have ***equal*** slopes.
A = (-2, 2), B = (2,3), C = (-2,-2), D = (2,-1)

Slope of $\overleftrightarrow{AB} = \frac{(2)-(3)}{(-2)-(2)} = \frac{1}{4}$

Slope of $\overleftrightarrow{CD} = \frac{(-2)-(-1)}{(-2)-(2)} = \frac{1}{4}$



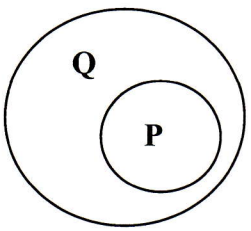
Geometry SOL Practice
Topic #1: Logic
Notes

Conditional Statements are sentences in if – then form.

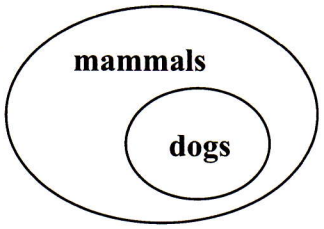
form	*generalization*	*example*
Original	If P , then Q.	If it's a dog, then it's a mammal.
Converse	If Q , then P.	If it's a mammal, then it's a dog.
Inverse	If ~P , then ~Q.	If it's ***not*** a dog, then it's ***not*** a mammal.
Contrapositive	If ~Q , then ~P.	If it's ***not*** a mammal, then it's ***not*** a dog.

Venn Diagrams are conditional statements in visual form.

If **P**, then **Q**.



If it's a dog, then it's a mammal.



Logic

Law of Syllagism is the transitive property using conditional statements.

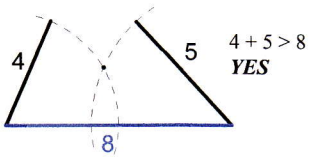
	generalization	*example*
Given	If **P**, then **Q**. If **Q**, then **R**.	If it's a dog, then it's a mammal. If it's a mammal, then it is warm-blooded.
Conclusion	If **P**, then **R**.	If it's a dog, then it's warm-blooded.

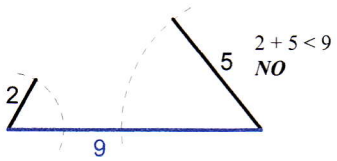
Law of Detachment

	generalization	*example*
Given	If **P**, then **Q**. An example of **P**.	If it's a dog, then it's a mammal. Spot is a dog.
Conclusion	The example applies to **Q**.	Spot is a mammal.

Geometry SOL Practice
Topic #7: Triangle Inequalities
Notes

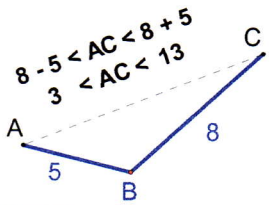
I. Given 3 segment lengths, will they make a triangle?





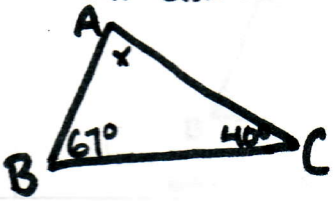
Generalization	Example	Example
a+b>c a+c>b b+c>a	Given: side 1 = 8 in side 2 = 10 in side 3 = 3 in 8+10>3 ✓ 10+3>8 ✓ 8+3>10 ✓ Yes!	Given: side 1 = 5 in side 2 = 9 in side 3 = 16 in 5+9>16 ✗ NO!

II. Given 2 sides of a triangle, what is the range of the third side?



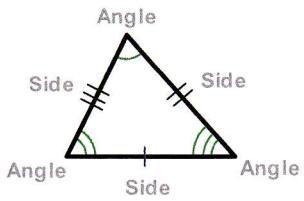
Generalization	Example
a+b>c a+c>b b+c>a	Given: side 1 = 11 in side 2 = 15 in 11+15>c 26>c 11+c>15 → c>4 15+c>11 → c>-4 4<c<26

III. Given the sides of a triangle, list the angles in order of size.
Given the angles of a triangle, list the sides in order of size.

Generalization	Example
Use the chart! S | ∠'s S M L	Given: m∠B = 67° + m∠C = 40° List the sides in order from shortest to longest.  x+67+40 = 180 x+107 = 180 -107 -107 x = 73°

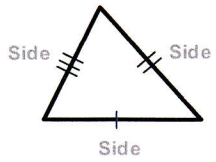
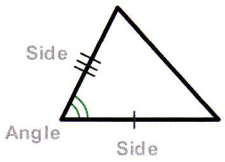
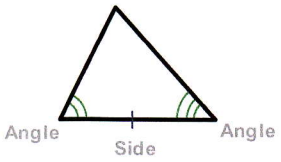
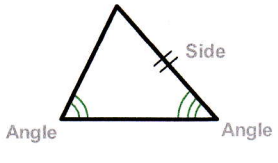
S	∠'s
S	$\overline{AB}$ C
M	$\overline{AC}$ B
L	$\overline{BC}$ A

Geometry SOL Practice
Topic #6: Congruent Triangles
Notes



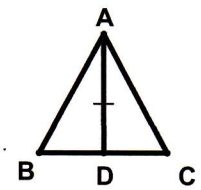
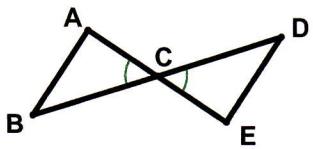
A triangle has six parts – 3 sides and 3 angles.
Between any two sides is an angle. Between any two angles is a side.

Methods: If the two triangles have the following markings, then choose that method.

Side, Side, Side All 3 sides congruent	**Side, Angle, Side** Two sides congruent and the angle between them.	**Angle, Side, Angle** Two angles congruent and the side between them.	**Angle, Side, Angle** Two angles congruent and the side ***not*** between them.
			

Hypotenuse Leg (ASS for right △s)

Note:

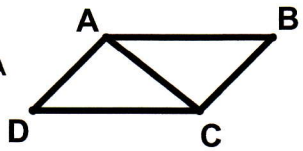
Reflexive Side – If two triangles share a side, then that side is to be marked as a congruent part. $\overline{AD}$ of $\triangle ADB$ is $\cong$ to $\overline{AD}$ of $\triangle ADC$ $\overline{AD} \cong \overline{AD}$	
Vertical Angles – If two triangles are formed by intersecting segments, then the vertical angles belonging to the triangles are to be marked. $\angle ACB \cong \angle ECD$	

Steps:

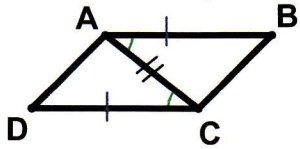
1. Mark the Given information.
2. Mark the Reflexive Side or Vertical Angles (if they are relevant).
3. Choose a method based on these markings.

Exanple:

Given: $\overline{AB} \cong \overline{CD}$
$\angle BAC \cong \angle DCA$
Prove: $\triangle ABC \cong \triangle CDA$

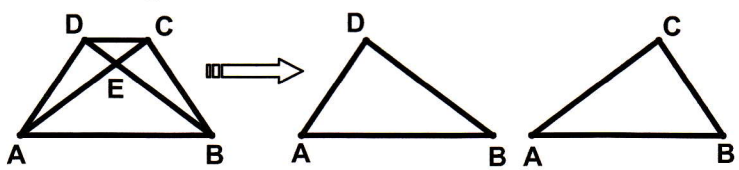


A. SSS
☑ B. SAS
C. ASA
D. AAS



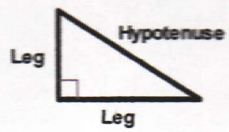
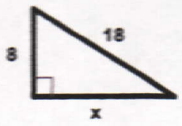
Hint: If the triangles overlap, redraw them as separate triangles and then follow the steps.

Prove: $\triangle ADB \cong \triangle BCA$



Geometry SOL Practice
Topic #10: Right Triangles
Notes

I. Pythagorean Theorem

Generalization	Example
 $Leg^2 + Leg^2 = Hyp^2$	 $8^2 + x^2 = 18^2$ $64 + x^2 = 324$ $x^2 = 260$ $x = \sqrt{260}$ $x \approx 16.12$

II. Trigonometry

Find x:

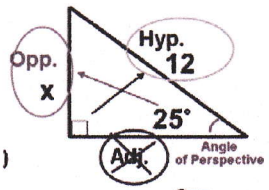
Step 1: Mark the "Angle of Perspective".

Step 2: Label the sides. (opp. / adj. / hyp.)

Step 3: Select a Trig. Ratio. (sin / cos / tan)

Step 4: Put the #s and the x into the equation.

Step 5: Solve.



$\sin 25^\circ = \frac{Opp.}{Hyp.}$

$\sin 25^\circ = \frac{x}{12}$

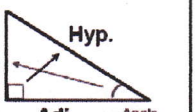
$x = 5.07$

SOH CAH TOA

$\sin \angle = \frac{Opp.}{Hyp.}$

$\cos \angle = \frac{Adj.}{Hyp.}$

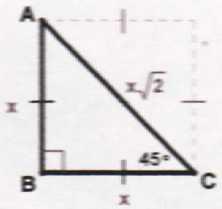
$\tan \angle = \frac{Opp.}{Adj.}$



$\sin 25^\circ = \frac{x}{12}$	$\sin 25^\circ = \frac{12}{x}$	$\sin x = \frac{12}{25}$
CHANGE "SOMETHING" TO A DECIMAL		
$0.4226 = \frac{x}{12}$	$0.4226 = \frac{12}{x}$	$\sin x = 0.48$
PUT A "1" UNDERNEATH		
$\frac{0.4226}{1} = \frac{x}{12}$	$\frac{0.4226}{1} = \frac{12}{x}$	$x = \sin^{-1}(0.48)$
CROSS MULTIPLY		
$x = 5.07$	$0.4226x = 12$	$x = 28.6854^\circ$
	$\frac{0.4226x}{0.4226} = \frac{12}{0.4226}$	
	$x = 28.4$	

III. Special Right Triangles (optional short cut)

45° - 45° - 90°



30° - 60° - 90°