

NAME: INFORMATION TO COPY

Monica

Geometry Period: \_\_\_\_\_

## Geometry Regents (and Outcomes) Review

OUTCOME	PAGE
#1: Argues with different types of reasoning in order to prove or disprove a statement	3
#2: Discerns information about points, lines, and planes, including when they are parallel, perpendicular, intersecting or skew and uses appropriate notation and terminology	5
#3: Uses a straightedge and a compass to make precise constructions and can argue the validity of the construction	6 - 7
#4: Determines and uses the length and midpoint of a segment	2
#5: Graphically and algebraically discerns if lines are parallel or perpendicular on a coordinate plane and can identify the point of intersection of intersecting lines	4
#6: Concludes if two triangles are congruent and identifies corresponding parts	8
#7: Discerns and applies theorems and relationships within triangles and communicates those relationships	9
#8: Discerns and applies theorems and relationships within quadrilaterals and communicates those relationships	10
#9: Discerns and applies concepts of similarity in two triangles or polygons	11
#10: Discerns and applies concepts of perimeter, area, surface area, and volume for two and three dimensional figures	8
#11: Applies the Pythagorean Theorem, trigonometric ratios and investigates relationships in special right triangles	12
#12: Applies and justifies properties of transformations and concepts of symmetry	14
#13: Identifies parts and properties of circles and can precisely determine measurements of area, circumference, arc length, angles, tangents and secants	13, 16
#14: Writes, graphs and communicates equations of circles and can find the center and radius of a circle given the equation	16
#15: Concludes the conditions under which a compound statement is true and can write the inverse, converse, and contrapositive of a given statement	2
#16: Identifies polygons precisely and can determine angle sums and missing angle measures	4
#17: Graphs, solves, and communicates problems using compound loci, including on a coordinate plane	15

Date of Regents: Friday, June 20<sup>th</sup>, 2014 Time: 12:00 pm

## Midpoint and Distance Formulas

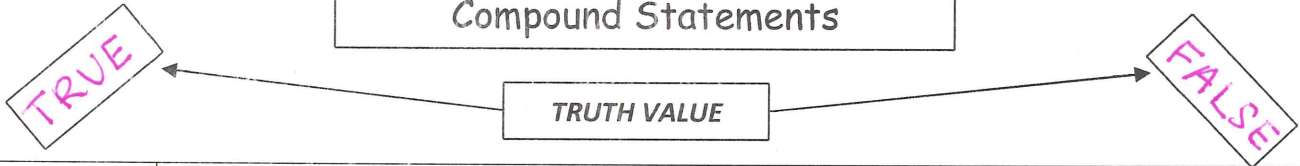
Given two distinct endpoints of a segment on coordinate plane,  $(x_1, y_1)$  and  $(x_2, y_2)$ , the midpoint of the segment can be determined by using:

$$\text{Midpoint} = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Given two distinct endpoints of a segment on coordinate plane,  $(x_1, y_1)$  and  $(x_2, y_2)$ , the length of the segment, or distance between the two points, can be determined by using:

$$\text{Distance or Length} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

## Compound Statements

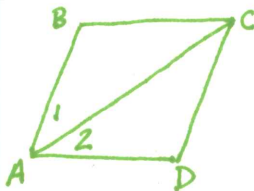
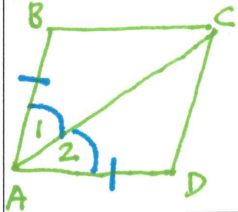


Type of Compound Statement	Definition	Properties
Disjunction	A compound statement using the word "or"	True when either or both statements are true
Conjunction	A compound statement using the word "and"	True only when both statements are true
Conditional	A compound statement using "if... then"	False ONLY when the hypothesis is true and the conclusion is false.
Biconditional	Compound statement combining 2 conditionals using "if and only if"	Only true when a conditional and its converse are true

<b>NEGATION</b>	the opposite truth value of a statement - "not"
<b>CONVERSE</b>	switch the hypothesis and conclusion
<b>INVERSE</b>	negate the hypothesis and negate the conclusion
<b>CONTRAPOSITIVE</b>	switch and negate both the hypothesis and conclusion

**Remember: A conditional and its contrapositive are always LOGICALLY EQUIVALENT! (They have the same truth value!)**

A PROOF is a logical argument that establishes the truth of a statement.

A proof should have the following components	Example						
Statement of the original problem	 <p>Given: Quadrilateral ABCD  <math>\overline{AD} \cong \overline{AB}</math>  <math>\angle 1 \cong \angle 2</math>            Prove: <math>\overline{CD} \cong \overline{CB}</math> } what we need to prove</p>						
Diagram, marked with the "given" information	 <p>* Very important step!</p>						
Re-statement of the "given" information	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; border-bottom: 1px solid black; text-align: center;">STATEMENTS</th> <th style="width: 50%; border-bottom: 1px solid black; text-align: center;">REASONS</th> </tr> </thead> <tbody> <tr> <td>1. <math>\overline{AD} \cong \overline{AB}</math></td> <td>1. Given</td> </tr> <tr> <td>2. <math>\angle 1 \cong \angle 2</math></td> <td>2. Given</td> </tr> </tbody> </table>	STATEMENTS	REASONS	1. $\overline{AD} \cong \overline{AB}$	1. Given	2. $\angle 1 \cong \angle 2$	2. Given
STATEMENTS	REASONS						
1. $\overline{AD} \cong \overline{AB}$	1. Given						
2. $\angle 1 \cong \angle 2$	2. Given						
Complete supporting reasons for each step in the proof	<table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 50%;">3. <math>\overline{AC} \cong \overline{AC}</math></td> <td style="width: 50%;">3. Reflexive Property</td> </tr> <tr> <td>4. <math>\triangle ABC \cong \triangle ADC</math></td> <td>4. SAS</td> </tr> <tr> <td>5.</td> <td>5.</td> </tr> </tbody> </table>	3. $\overline{AC} \cong \overline{AC}$	3. Reflexive Property	4. $\triangle ABC \cong \triangle ADC$	4. SAS	5.	5.
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The "prove" statement as the last statement	<table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 50%;">5. <math>\overline{CD} \cong \overline{CB}</math></td> <td style="width: 50%;">5. CPCTC</td> </tr> </tbody> </table>	5. $\overline{CD} \cong \overline{CB}$	5. CPCTC				
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### COMMONLY USED REASONS FOR PROOFS

Possible Statement	Possible Reason	Possible Statement	Possible Reason
$\angle BAC \cong \angle DAC$	Definition of a bisector	$\overline{AB} \perp \overline{CD}$	Definition of perpendicular
$\overline{AM} \cong \overline{BM}$	Definition of a bisector	$\overline{AM} + \overline{BM} = \overline{AB}$	Segment Addition Postulate
$\angle A \cong \angle A$	Reflexive Property	$\angle 1 + \angle 2 = 90$	Definition of Complementary Angles
$\overline{AB} \cong \overline{AB}$	Reflexive Property	$\angle 1 + \angle 2 = 180$	Definition of Supplementary Angles
$\angle ACB + \angle ACD = \angle BCD$	Angle Addition Postulate	$\overline{AM} \cong \overline{BM}$	Definition of a Midpoint
$\angle 1 + \angle 2 = \angle BAD$	Angle Addition Postulate	$\angle 1 \cong \angle 3$	Substitution

## Equations of Parallel and Perpendicular Lines

All linear equations can be expressed as  $y = mx + b$ ,  
 where  $m = \underline{\text{slope}}$  and  $b = \underline{y\text{-intercept}}$ .

Parallel lines have <u>the same</u> slopes. $y = 5x + 2$ $y = 5x - 3$ <p style="color: blue; font-style: italic;">same slope</p>	Perpendicular lines have <u>negative reciprocal</u> slopes. $y = 5x + 2$ $y = -\frac{1}{5}x - 3$ <p style="color: blue; font-style: italic;">negative reciprocals</p>
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## Classifying Polygons and their angles

The sum of the interior angles of a polygon with  $n$  sides is =  $(n-2) \times 180$

The sum of the exterior angles of a polygon with  $n$  sides is =  $360^\circ$

The measure of one interior angle of a regular polygon with  $n$  sides is =  $\frac{(n-2) \times 180}{n}$

The measure of one exterior angle of a regular polygon with  $n$  sides is =  $\frac{360}{n}$

$n$	Name of Polygon	Sum of Interior Angles	Measure of one interior angle in a regular $n$ -gon	Measure of one exterior angle in a regular $n$ -gon
3	triangle	$180^\circ$	$60^\circ$	$120^\circ$
4	quadrilateral	$360^\circ$	$90^\circ$	$90^\circ$
5	pentagon	$540^\circ$	$108^\circ$	$72^\circ$
6	hexagon	$720^\circ$	$120^\circ$	$60^\circ$
7	septagon/heptagon	$900^\circ$	$\approx 128.6^\circ$	$\approx 51.4^\circ$
8	octagon	$1080^\circ$	$135^\circ$	$45^\circ$
9	nonagon	$1260^\circ$	$140^\circ$	$40^\circ$
10	decagon	$1440^\circ$	$144^\circ$	$36^\circ$
12	dodecagon	$1800^\circ$	$150^\circ$	$30^\circ$