

Name: _____

Mod: _____

Honors Geometry SOL Review Packet – Counts as a TEST GRADE for QUARTER 4

This packet is to help you prepare for your upcoming SOL test in mid-May. It covers ALL topics that will be covered on the SOL.

Please follow ALL directions given to ensure you receive the maximum possible grade.

- 1) Answer ALL questions in each section
- 2) Highlight your final answers
- 3) Have your parent or guardian sign on the line below
- 3) Return your COMPLETED review packet on the due date of Friday May 2nd
(Late packets will only be accepted up until Tuesday May 13th)

Grade Breakdown

	Final Grade
G1: 4 points	
G2: 6 points	
G3: 9 points	
G4: 10 points	
G5: 6 points	
G6: 7 points	
G7: 4 points	
G8: 5 points	
G9: 6 points	
G10: 6 points	
G11: 6 points	
G12: 5 points	
G13: 6 points	
G14: 6 points	
Parent/Guardian Signature: 4 points	
Packet on Time(Due 5/2): 10 points	
Total: 100 points	

Parent/Guardian Signature: _____

Geometry SOL Review by Strand 2009 SOL Standards

G1: The student will construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include

- identifying the converse, inverse, and contrapositive of a conditional statement;
- translating a short verbal argument into symbolic form;
- using Venn diagrams to represent set relationships; and
- using deductive reasoning.

Notes and Formulas:

Conditional: A statement containing a hypothesis and conclusion in the form of if-then ($p \rightarrow q$)

Ex: If I study for my SOL, then I will pass

Counterexample: an example that proves a statement false

Ex: If x is even, then x is divisible by 4.

Counterexample: $x = 6$

Converse: When the hypothesis and conclusion in a conditional are switched ($q \rightarrow p$)

Ex: If I pass my SOL, then I studied.

Biconditional: When a conditional and its converse are both true you can combine them using if and only if (iff) ($p \leftrightarrow q$)

Inverse: When the hypothesis and conclusion of a conditional are negated ($\sim p \rightarrow \sim q$)

Ex: If I did not study for my SOL, then I will not pass

Contrapositive: When the hypothesis and conclusion of a conditional are switched and negated ($\sim q \rightarrow \sim p$)

Ex: If I do not pass my SOL, then I did not study

Law of Syllogism: If $p \rightarrow q$ and $q \rightarrow r$ are true statements, then $p \rightarrow r$ is a true statements

Ex: If I study, then I will pass my SOL.

If I pass my SOL, then my dad will buy me a video game.

If I study, then my dad will buy me a video game.

Law of Detachment: If a conditional is true and its hypothesis is true, then the conclusion is true ($p \rightarrow q$ is true, and p is true, then q is true)

Ex: If I study, I will pass my SOL.

I studied

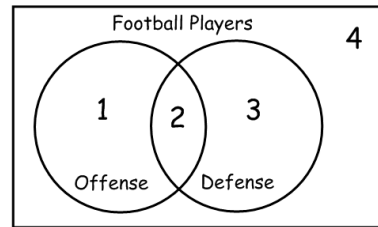
I will pass my SOL

Other Symbols:

\wedge = AND \vee = OR \therefore = Therefore

Practice:

- Using the Venn diagram below, choose which region (number) represents each statement.



- $\text{Offense} \wedge \text{Defense}$ _____
- $\text{Offense} \vee \text{Defense}$ _____
- $\text{Offense} \wedge \sim \text{Defense}$ _____
- $\sim \text{Offense} \wedge \sim \text{Defense}$ _____

- Which conclusion logically follows the true statements?

"If negotiations fail, the baseball strike will not end."

"If the baseball strike does not end, the World Series will not be played."

- If the baseball strike ends, the World Series will be played.
- If negotiations do not fail, the baseball strike will not end.
- If negotiations fail, the World Series will not be played.
- If negotiations fail, the World Series will be played.

- Let p represent $\sqrt{11} = z$, and let q represent z is a rational number.

Which is a representation of the statement below?

If $\sqrt{11} = z$, then z is not a rational number.

- $\sim p \rightarrow \sim q$
- $p \rightarrow q$
- $p \rightarrow \sim q$
- $\sim q \rightarrow \sim p$

- Which is the inverse of the sentence, "If Sam leaves, then I will stay."?

- If I stay, then Sam will leave.
- If Sam does not leave, then I will not stay.
- If Sam leaves, then I will not stay.
- If I do not stay, then Sam will not leave.

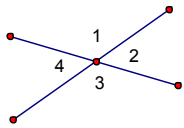
Geometry SOL Review by Strand 2009 SOL Standards

- G.2** The student will use the relationships between angles formed by two lines cut by a transversal to
- determine whether two lines are parallel;
 - verify the parallelism, using algebraic and coordinate methods as well as deductive proofs; and
 - solve real-world problems involving angles formed when parallel lines are cut by a transversal.

Notes and Formulas:

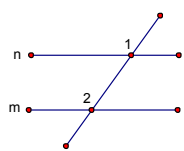
Complementary angles: sum of 90°

Supplementary angles: sum of 180°



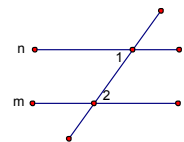
Vertical \angle s:
angles opposite each other at the intersection of 2 lines

CONGRUENT



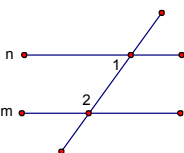
Corresponding \angle s: angles in the same position on parallel lines in relation to a

transversal
CONGRUENT



Alternate Interior \angle s: angles on opposite sides of the transversal, on the interior of the

parallel lines
CONGRUENT

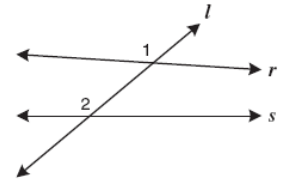


Same Side Interior \angle s: angles on the same side of the transversal, on the interior of the parallel lines

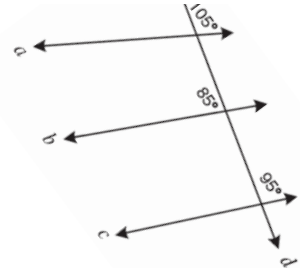
SUPPLEMENTARY

Practice:

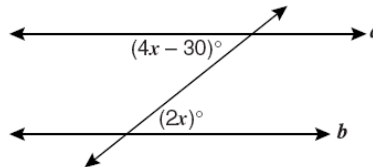
1. In the figure line l intersects lines r and s .
In the figure, $\angle 1$ and $\angle 2$ are



2. In this diagram, line d cuts three lines to form the angles shown.
Which two lines are parallel? _____

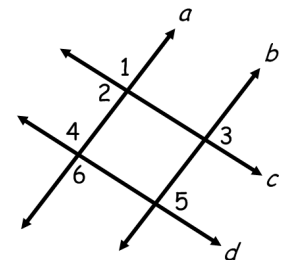


3. Which value for x will make a parallel to b ?



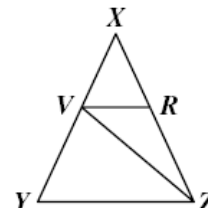
4. Lines a and b intersect lines c and d . Which of the following statements would prove that $a \parallel b$ and $c \parallel d$?

- A $\angle 1 \cong \angle 6$, $\angle 3 \cong \angle 5$
B $\angle 1 \cong \angle 6$, $\angle 4 + \angle 5 = 180^\circ$
C $\angle 1 \cong \angle 4$, $\angle 1 + \angle 2 = 180^\circ$
D $\angle 1 + \angle 3 = 180^\circ$, $\angle 1 + \angle 6 = 180^\circ$



5. The measure of $\angle YZV$ is 40° and the measure of $\angle XYZ$ is 65° .
Which of these angles *must* measure 40° in order for \overline{VR} to be parallel to \overline{YZ} ?

- A $\angle YVZ$
B $\angle ZVR$
C $\angle ZYV$
D $\angle VRX$



6. (Think About It) If you stand between a pair of railroad tracks and look down the tracks towards the horizon, are the tracks still parallel? Explain.

Geometry SOL Review by Strand

2009 SOL Standards

G3: The student will use pictorial representations, including computer software, constructions, and coordinate methods, to solve problems involving symmetry and transformation. This will include

- investigating and using formulas for finding distance, midpoint, and slope;
- applying slope to verify and determine whether lines are parallel or perpendicular;
- investigating symmetry and determining whether a figure is symmetric with respect to a line or a point; and
- determining whether a figure has been translated, reflected, rotated, or dilated, using coordinate methods.

Notes and Formulas:

Distance Formula:

Used to find the distance between 2 points

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint Formula:

Used to find the midpoint of a segment given the endpoints, or to find an endpoint given the midpoint

Looking for the midpoint: $m = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

Looking for an endpoint:

$$x_m = \left(\frac{x_1 + x_2}{2} \right); y_m = \left(\frac{y_1 + y_2}{2} \right)$$

Slope-Intercept Form: $y = mx + b$; m is the slope, while b is the y-intercept

Standard Form: $Ax + By = C$; graph using the x and y intercepts

X-intercept: substitute zero for y and the result is $(x, 0)$

Y-intercept: substitute zero for x and the result is $(0, y)$

Slope:

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}}$$

Parallel Lines:

Have congruent slopes and different y-intercepts

Perpendicular Lines

Have opposite reciprocal slopes

Transformations:

Translation = Slide

Rotation = Turn

Reflection = Mirror or Flip

Dilation = Shrink/Enlarge

Practice:

1. What is the slope of the line through $(-4, 1)$ and $(1, -9)$?

2. The distance between the points $(-2, -1)$ and $(-5, 3)$ is

_____?

3. A segment has endpoints $A(5, 2)$ and $B(3, -6)$. The coordinates of the midpoint of \overline{AB} are _____?

4. The coordinates of the midpoint of \overline{AB} are $(-4, 6)$, and the coordinates of A are $(-1, 2)$. What are the coordinates of B ?

5. Line m contains points $(1, 3)$ and $(2, 2)$. Which of the following pairs of points define a line perpendicular to line m ?

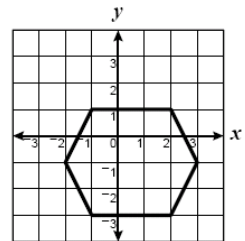
- | | |
|-------------------------|--------------------------|
| A $(0, 0)$ and $(1, 1)$ | C $(1, 1)$ and $(6, 2)$ |
| B $(0, 0)$ and $(1, 5)$ | D $(4, 0)$ and $(5, -5)$ |

6. Which describes a line parallel to $4x - 2y = 8$?

- | | |
|-------------------------------------|-----------------|
| A $3x - 6y = 14$ | C $y = 2x - 4$ |
| B through $(-6, 4)$ and $(-11, 10)$ | D $2x - y = 12$ |

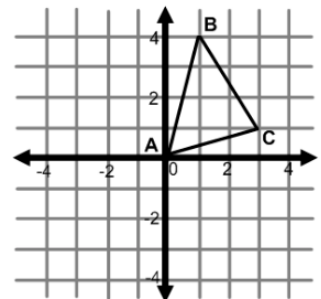
7. The hexagon in the drawing has a line symmetry through —

- $(-1, -3)$ and $(2, 1)$
- $(1, 1)$ and $(1, -3)$
- $(2, 3)$ and $(2, -3)$
- $(-2, -1)$ and $(3, -1)$



8. If $\triangle ABC$ is rotated about the origin 180° , what is the new coordinate of point C ? _____

9. If $\triangle ABC$ is translated down 3 and then reflected about the y-axis, what are the new coordinates of point A? _____


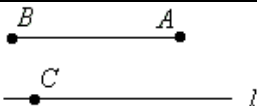
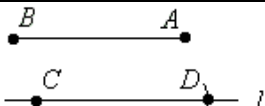


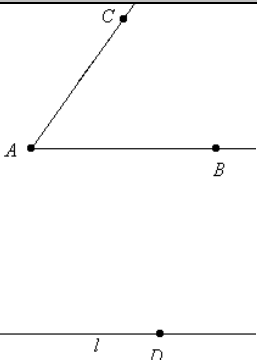
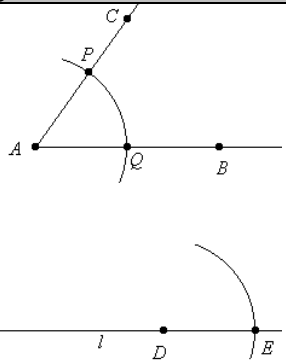
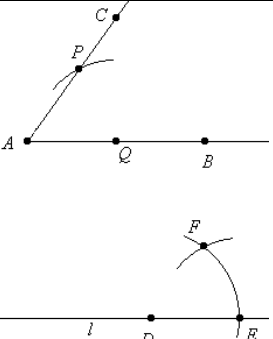
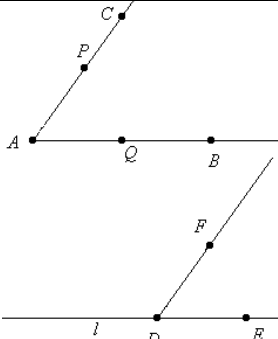
Geometry SOL Review by Strand
2009 SOL Standards

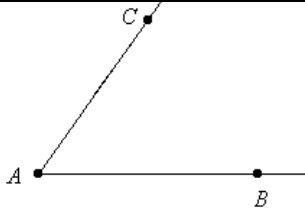
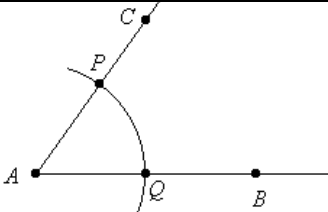
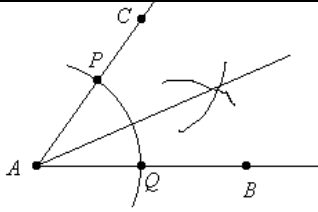
G.4 The student will construct and justify the constructions of


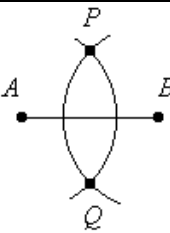
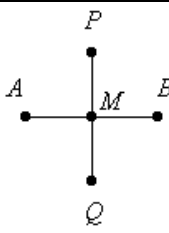
- a line segment congruent to a given line segment;
- the perpendicular bisector of a line segment;
- a perpendicular to a given line from a point not on the line;
- a perpendicular to a given line at a given point on the line;
- the bisector of a given angle;
- an angle congruent to a given angle; and
- a line parallel to a given line through a point not on the given line.

Notes and Formulas:

Problem: Construct a line segment congruent to a given segment.		
		
Given: Line segment \overline{AB}	Step 1: Choose any point C on line l .	Step 2: Use a compass to measure the distance AB , then draw an arc centered at C with radius AB that intersects l at point D .

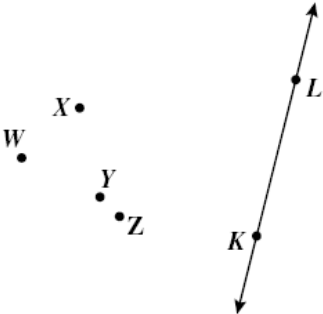
Problem: Construct an angle congruent to a given angle.	
	
Step 1: Choose any point D on line l .	Step 2: Draw an arc of any radius centered at A . Label the points of intersection P and Q . Create the same radius arc centered at D . Label the point of intersection E .
	
Step 3: Draw an arc centered at P through Q . Draw an arc centered at E with the same radius. Label the intersection point F .	Step 4: Draw ray \overrightarrow{DF} . $\angle EDF$ is congruent to $\angle BAC$

Problem: Construct the bisector of a given angle.		
		
Given: Angle $\angle BAC$	Step 1: Draw an arc of any radius centered at A . Label the points of intersection P and Q .	Step 2: Draw arcs of equal radius from P and Q . The line from A through their intersection bisects $\angle BAC$.

Problem: Construct the perpendicular bisector of a given line segment.		
		
Given: Line segment \overline{AB}	Step 1: Draw arcs centered on A and B that have the same radius greater than the distance to the midpoint. Label the intersections P and Q .	Step 2: Draw segment \overline{PQ} . Label its intersection with \overline{AB} as point M .

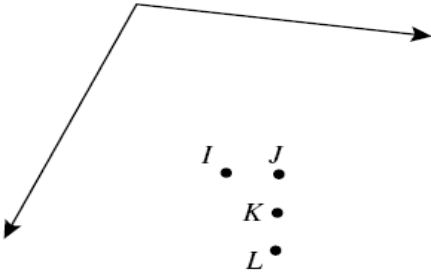
Practice:

1. Use your compass and straight edge to construct a line that is perpendicular to \overline{KL} and passes through point K . Which point lies on this line?

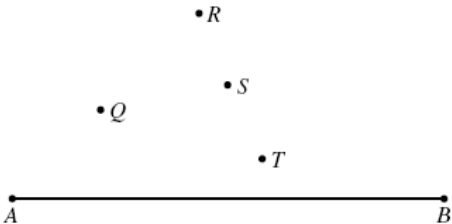


2. Use your compass and straightedge to construct the bisector of this angle.

Which point lies on the bisector?



3. Which point lies on the line perpendicular to \overline{AB} that bisects \overline{AB} ?



Geometry SOL Review by Strand
2009 SOL Standards

***#1-7 are REQUIRED!!**

On this paper and on a separate sheet of paper (if you run out of room), construct the following...

- 1) a congruent segment**
- 2) perpendicular bisector of a segment**
- 3) a perpendicular line to a given line through a point ON the line**
- 4) a perpendicular line to a given line through a point NOT on the line**
- 5) an angle bisector**
- 6) a congruent angle**
- 7) a line parallel to a given line through a point not on the given line**
- 8) an equilateral triangle inscribed in a circle
- 9) a square inscribed in a circle
- 10) a regular hexagon inscribed in a circle
- 11) a circumscribed circle about any type of triangle
- 12) an inscribed circle inside any type of triangle
- 13) a line tangent to a circle from a point outside of the circle

Geometry SOL Review by Strand
2009 SOL Standards

G.5 The student, given information concerning the lengths of sides and/or measures of angles in triangles, will

- order the sides by length, given the angle measures;
- order the angles by degree measure, given the side lengths;
- determine whether a triangle exists; and
- determine the range in which the length of the third side must lie.

These concepts will be considered in the context of real-world situations.

Notes and Formulas:

Triangle Inequality Theorem:

the sum of the lengths of two sides of a triangle must be longer than the length of the third.

If two sides of a triangle are not congruent, then the longer side is opposite the larger angle.

If two angles of a triangle are not congruent, then the larger angle is opposite the longer side.

Given two sides of a triangle, the third side must be:

- Less than the sum
- Greater than the difference

Ex: What could be the length of the 3rd side of a triangle with side lengths 6 and 8?

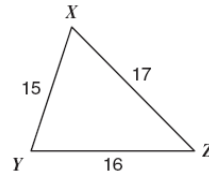
$$x > 2 \text{ and } x < 14$$

$$14 > x > 2$$

Practice:

1. Which angle has the least measure?

- All angles have the same measure.
- $\angle XYZ$
- $\angle ZXY$
- $\angle XZY$

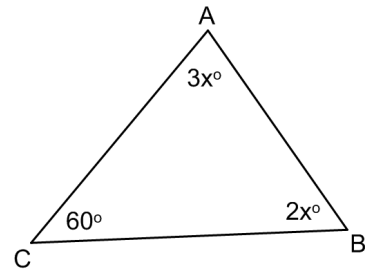


2. Three towns form a triangle on a map. angle formed at the point designating Afton is 48° , at Badenton 60° , and at Capeton 72° . Which lists the distances between towns in order, *greatest to least*?

- Afton to Badenton, Badenton to Capeton, Afton to Capeton
- Afton to Badenton, Afton to Capeton, Badenton to Capeton
- Afton to Capeton, Afton to Badenton, Badenton to Capeton
- Badenton to Capeton, Afton to Badenton, Afton to Capeton

3. Which of the following lists the sides of $\triangle ABC$ from least to greatest length?

_____ < _____ < _____



4. Which set of lengths could *not* be the lengths of the sides of a triangle?

- 7 in., 24 in., 30 in.
- 8 ft, 10 ft, 12 ft
- 4 cm, 5 cm, 9 cm
- 2 m, 3 m, 4 m

5. On a map, Tannersville, Chadwick, and Barkersville form a triangle. Chadwick is 70 miles from Tannersville and Barkersville is 90 miles from Tannersville. Which is a possible distance between Chadwick and Barkersville?

- 5 miles
- 10 miles
- 150 miles
- 200 miles

6. If two sides of a triangle are 15 cm and 9 cm, what is the range of possible lengths for the 3rd side?

Geometry SOL Review by Strand
2009 SOL Standards

G.6 The student, given information in the form of a figure or statement, will prove two triangles are congruent, using algebraic and coordinate methods as well as deductive proofs.

Notes and Formulas:

Congruence:

Triangle Congruence Theorems:

1. SSS
2. SAS
3. ASA
4. AAS
- **AAA and SSA do not prove congruence!!!**
5. HL – only in RIGHT Δ s
6. CPCTC – corresponding parts of congruent triangles are congruent

***REMEMBER!!**

- Vertical angles are always congruent
- Right angles are always congruent to each other
- Shared sides are congruent using the Reflexive Property
- In overlapping triangles, shared angles and sides are always congruent.
- If triangles are overlapping, the best way to solve is to separate the triangles and label the parts.

Isosceles Triangle Theorem:

If two sides of a triangle are congruent, their base angles are congruent.

Converse of Isosceles Triangle Theorem:

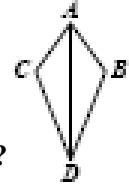
If two angles of a triangle are congruent, then the sides opposite those angles are congruent.

Practice:

Given: $\overline{AC} \cong \overline{AB}$
 $\overline{DC} \cong \overline{DB}$

1. What additional information can you deduce to prove these two triangles are congruent?

2. Which method could be used to prove $\triangle ABD \cong \triangle ACD$?



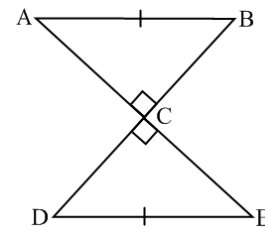
3. What additional information will allow you to prove the triangles congruent by the HL Theorem?

F $\angle A \cong \angle E$

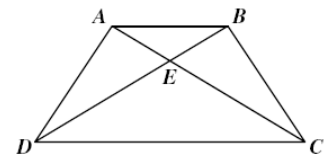
G $m\angle BCE = 90$

H $\overline{AC} \cong \overline{DC}$

J $\overline{AC} \cong \overline{BD}$

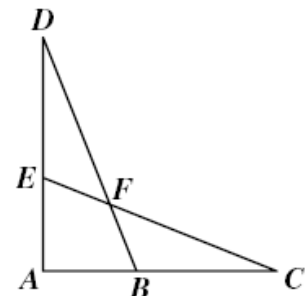


4. What additional information can you deduce to help you prove $\triangle DCA \cong \triangle CDB$?



5. Given: $\overline{AC} \cong \overline{BD}$; $\overline{AD} \cong \overline{BC}$
Which method could be used to prove $\triangle DCA \cong \triangle CDB$?

Given: $\overline{AD} \cong \overline{AC}$ and $\overline{AB} \cong \overline{AE}$



6. What additional information can you deduce to help you prove $\triangle ADB \cong \triangle ACE$?

7. Which method could be used to prove $\triangle ADB \cong \triangle ACE$?

Geometry SOL Review by Strand
2009 SOL Standards

G.7 The student, given information in the form of a figure or statement, will prove two triangles are similar, using algebraic and coordinate methods as well as deductive proofs.

Notes and Formulas:

Similarity:

Triangle Similarity Theorems:

1. AA~
2. SAS~
3. SSS~

****Angles are congruent, while sides must be proportional to prove similarity****

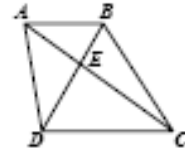
Similarity Ratio: the ratio between the corresponding sides of similar figures

1. Ratio of the perimeters is congruent to similarity ratio
2. Ratio of the areas is the (similarity ratio)²
3. Ratio of the volumes is the (similarity ratio)³

Practice:

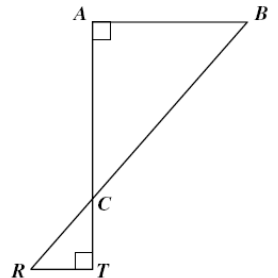
1. In quadrilateral $ABCD$, \overline{AB} is parallel to \overline{DC} and the diagonals intersect at E . Which statement is true?

- A No triangles in the figure are similar.
B $\triangle ADE$ is similar to $\triangle BCE$.
C $\triangle ABD$ is similar to $\triangle ABC$.
D $\triangle ABE$ is similar to $\triangle CDE$.



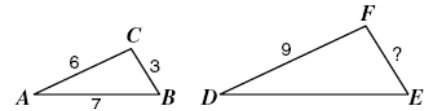
2. Which of the following correctly describes the relationship between the sides of $\triangle ABC$ and $\triangle TRC$?

- A $\frac{AB}{TR} = \frac{AC}{RC} = \frac{BC}{TC}$ C $\frac{AB}{AC} = \frac{BC}{RC} = \frac{TR}{TC}$
B $\frac{AC}{AB} = \frac{BC}{RC} = \frac{TR}{TC}$ D $\frac{AB}{TR} = \frac{AC}{TC} = \frac{BC}{RC}$

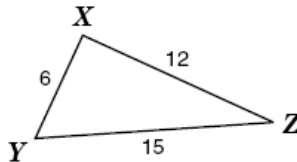


3. Triangles ABC and DEF are similar and have measurements as shown. What is the measure of EF ?

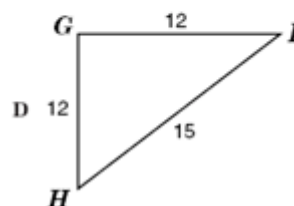
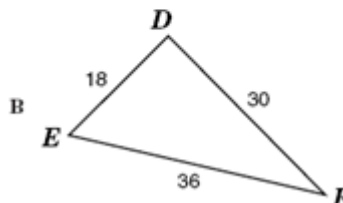
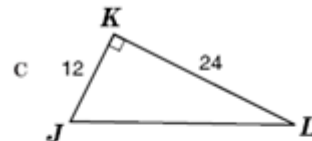
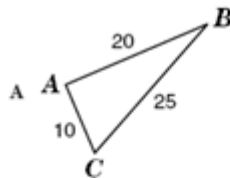
- A $\frac{21}{2}$ B $\frac{15}{2}$ C $\frac{9}{2}$ D $\frac{3}{2}$



4.



Which triangle is similar to $\triangle XYZ$?



Geometry SOL Review by Strand
2009 SOL Standards

G.8 The student will solve real-world problems involving right triangles by using the Pythagorean Theorem and its converse, properties of special right triangles, and right triangle trigonometry.

Notes and Formulas:

Pythagorean Theorem: a formula to find missing sides in right triangles

$$a^2 + b^2 = c^2$$

where **a** and **b** are legs
and **c** is the hypotenuse

****Find the hypotenuse FIRST
and substitute for c****

Special Right Triangles:

30-60-90

1. hypotenuse = 2(short leg)
2. long leg = (short leg) $\sqrt{3}$

45-45-90

1. hypotenuse = (leg) $\sqrt{2}$
2. leg = $\frac{\text{hypotenuse}}{\sqrt{2}}$

Trigonometry:

SOH-CAH-TOA

$$\sin x^\circ = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos x^\circ = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan x^\circ = \frac{\text{opposite}}{\text{adjacent}}$$

Geometric Mean = \sqrt{ab}

Finding the Altitude of a right

Δ :

Geometric mean of segments
of hypotenuse

1. A billboard is supported by 20-foot lengths of tubing at an angle of 60° . How far from the base of the billboard is the bottom end of the brace?

- A 5 ft
B 8.7 ft
C 10 ft
D 17.3 ft

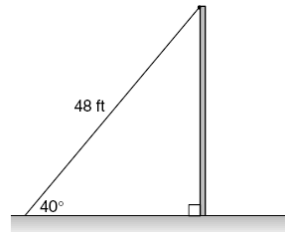
2. From a point 18 feet is stretched to an attachment 40 feet up the tower. To the nearest foot,

- A 58 ft
B 44 ft
C 36 ft
D 29 ft



from the base of a tower, a wire attachment 40 feet up the tower. how long is the wire?

- 3.



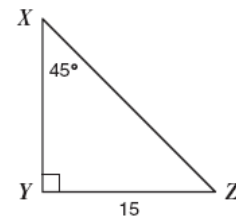
A cable 48 feet long stretches from the top of a pole to the ground. If the cable forms a 40° angle with the ground, which is closest to the height of the pole?

$\sin 40^\circ \approx 0.642$
 $\cos 40^\circ \approx 0.766$
 $\tan 40^\circ \approx 0.839$

- A 26.4 ft
B 30.9 ft
C 36.8 ft
D 40.3 ft

4. For the triangle represented by the above drawing, what is the length of \overline{XZ} ?

- A $\frac{15\sqrt{2}}{2}$ C $15\sqrt{2}$
B $\frac{15\sqrt{3}}{2}$ D $15\sqrt{3}$



5. If the lengths of the sides of a triangle are 16cm, 34 cm, and 30 cm which describes the triangle?

- A Acute
B Obtuse
C Right
D Cannot be a Triangle

Geometry SOL Review by Strand
2009 SOL Standards

G.9 The student will verify characteristics of quadrilaterals and use properties of quadrilaterals to solve real-world problems.

Notes and Formulas:

Parallelogram: quadrilateral with 2 pairs of parallel sides

1. Opposite sides of a parallelogram are congruent
2. Opposite angles of a parallelogram are congruent
3. Consecutive angles of a parallelogram are supplementary
4. Diagonals of a parallelogram bisect each other

Rhombus: parallelogram with 4 congruent sides

1. A diagonal of a rhombus bisects the angles of the rhombus
2. Diagonals of a rhombus are perpendicular

Rectangle: parallelogram with 4 right angles

1. Diagonals of a rectangle are congruent

Square: parallelogram that is both a rectangle and a rhombus

****Has all the properties of both rectangles and rhombuses****

Trapezoid: quadrilateral with exactly one pair of parallel sides

Isosceles Trapezoid: a trapezoid with 2 congruent legs

1. Diagonals of an isosceles trapezoid are congruent
2. Base angles of an isosceles trapezoid are congruent

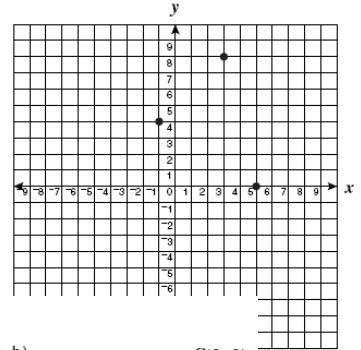
Kite: quadrilateral with 2 pairs of congruent, consecutive, non-parallel sides

1. Diagonals of a kite are perpendicular

Practice:

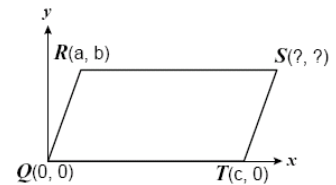
1. Three vertices of parallelogram $ABCD$ have coordinates $(-1, 4)$, $(3, 8)$, and $(5, 0)$. What are the coordinates of the other first-quadrant vertex?

- A $(-3, 12)$
B $(-1, 4)$
C $(1, 4)$
D $(9, 4)$



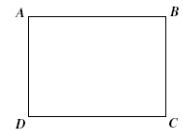
2. $QRST$ is a parallelogram. What are the coordinates of vertex S ?

- A (c, b)
B $(a + b, c)$
C $(c - a, b)$
D $(c + a, b)$

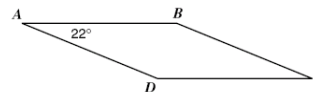


3. The quadrilateral $ABCD$ is a parallelogram. Which of the following pieces of information would prove that $ABCD$ is a rectangle?

- A $AC = BD$
B $AB = AD$
C $m\angle B = m\angle D$
D $\angle A$ and $\angle D$ are supplementary

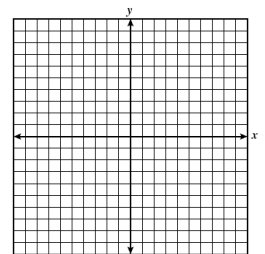


4. Quadrilateral $ABCD$ is a parallelogram. The measure of angle C is _____?



5. Three vertices of a square have coordinates $(5, 1)$, $(2, -2)$, and $(-1, 1)$. What are the coordinates of the fourth vertex?

- A $(-2, 2)$
B $(2, -2)$
C $(2, 4)$
D $(4, 2)$



6. Which of the following is *not* true about a parallelogram?

- A Any two opposite sides are congruent.
B Any two opposite angles are congruent.
C The diagonals bisect each other.
D Any two consecutive angles are complementary

Geometry SOL Review by Strand
2009 SOL Standards

G.10 The student will solve real-world problems involving angles of polygons.

Notes and Formulas:

Triangle Angle Sum Theorem:
the sum of the angles in a triangle is 180°

Regular Polygon: Polygon that is both equilateral and equiangular

n = number of sides

Central Angle: angle whose vertex is the center of the polygon
Central \angle of Regular Polygon: $\frac{360^\circ}{n}$

Interior Angles: angles on the inside of a polygon at its vertices whose sum is $(n - 2)180^\circ$

Exterior Angles: angles on the outside of a polygon formed by extending a side at its vertex
The sum of the exterior angles is always 360°

Regular Polygon: polygon with all equal sides and angles

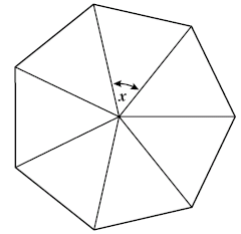
$$\text{Interior R} = \frac{(n - 2)180^\circ}{n}$$

$$\text{Exterior R} = \frac{360^\circ}{n}$$

Practice:

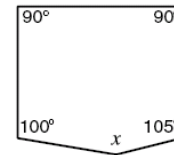
1. Which is the *closest* to the measure of a central angle x in this regular polygon?

- A 40°
B 45°
C 50°
D 60°

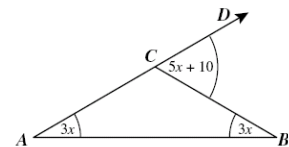


2. What is the value of x in the pentagon?

- A 90°
B 155°
C 245°
D 335°

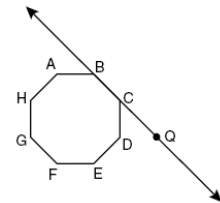


3. The figure has angle measures as shown. What is the measure of $\angle BCD$?



4. Figure $ABCDEFGH$ is a regular octagon. What is the measure of $\angle DCQ$?

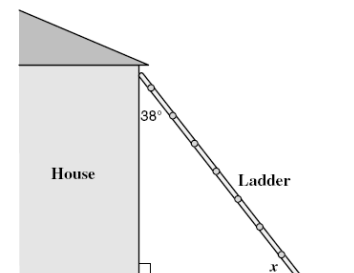
- A 135°
B 60°
C 45°
D 30°



5. If each interior angle of a regular polygon measures 120° , how many sides does the polygon have?

- A 14
B 12
C 8
D 6

6. A ladder is leaning against a house at an angle of 38° as shown in the diagram. What is the measure of the angle, x , between the ladder and the ground?



Geometry SOL Review by Strand 2009 SOL Standards

- G.11** The student will use angles, arcs, chords, tangents, and secants to
- investigate, verify, and apply properties of circles;
 - solve real-world problems involving properties of circles; and
 - find arc lengths and areas of sectors in circles.

Notes and Formulas:

Circumference: $2\pi r$

Arc Length: $\left(\frac{\text{central angle measure}}{360^\circ}\right)2\pi r$

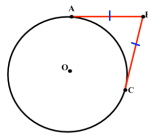
Area of Circles: πr^2

Area of Sectors: $\left(\frac{\text{central angle measure}}{360^\circ}\right)\pi r^2$

Area of Segment: area of sector – area of Δ

Tangent Lines:

Lines tangent to a circle from the same point outside the circle are equidistant.



The radius of a circle is perpendicular to the tangent line at the point of tangency

Central Angles: \cong to their arc length

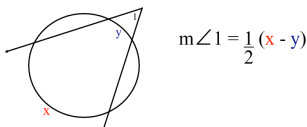
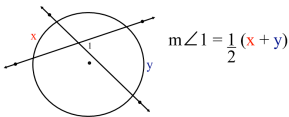
Inscribed Angles: $\frac{1}{2}$ of their intercepted arc

Angle Formed by Tangent and Chord: $\frac{1}{2}$ of its intercepted arc

Congruent Chords:

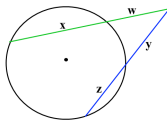
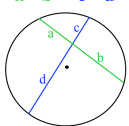
- Have congruent arcs
- Have congruent central angles
- Are equidistant from the center

Angle Measures:



Segment Lengths:

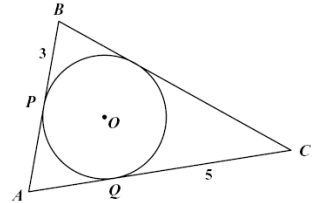
$$a \cdot b = c \cdot d \quad w(w + x) = y(y + z)$$



Practice:

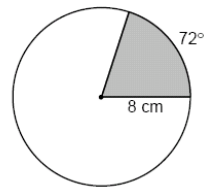
1. Triangle ABC is circumscribed about circle O . P and Q are points of tangency such that $BP = 3$ and $CQ = 5$. What is the measure of BC ?

- A 3
B 4
C 5
D 8



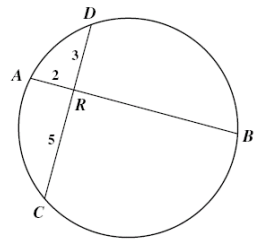
2. A circle has a radius of 8 centimeters. The measure of the arc of the shaded section is 72° . Which is closest to the area of the shaded section of the circle?

- A 10.1 cm^2
B 40.2 cm^2
C 50.3 cm^2
D 160.8 cm^2



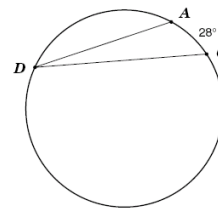
3. Chords \overline{AB} and \overline{CD} intersect at R . Using the values shown in the diagram, what is the measure of RB ?

- A 6
B 7.5
C 8
D 9.5



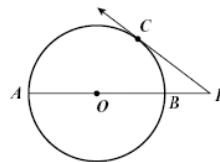
4. The measure of arc AC is 28° . What is the measure of $\angle ADC$?

- A 7°
B 14°
C 28°
D 56°



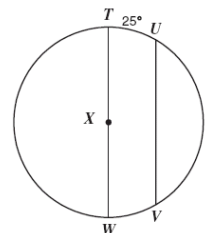
5. If $AP = 8$ and $PC = 4$, what is the measure of \overline{AB} , the diameter of this circle?

- A 2
B 4
C 6
D 8



6. \overline{TW} is a diameter of circle X , and \overline{TW} is parallel to \overline{UV} . If the measure of the arc TU is 25° , what is the degree measure of the arc UV ?

- A 115°
B 130°
C 155°
D 210°



Geometry SOL Review by Strand
2009 SOL Standards

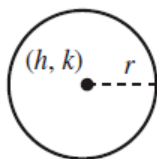
G.12 The student, given the coordinates of the center of a circle and a point on the circle, will write the equation of the circle.

Notes and Formulas:

Center of a circle: (h, k)

Radius of a circle: r

Standard Form of an Equation of a Circle:



$$(x - h)^2 + (y - k)^2 = r^2$$

WATCH YOUR SIGNS WHEN FINDING THE CENTER!

Example:

$$(x - 5)^2 + (y + 3)^2 = 49$$

Center: $(5, -3)$

Radius: 7

REVIEW:

Distance Formula:

Used to find the distance between 2 points

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint Formula:

Used to find the midpoint of a segment given the endpoints, or to find an endpoint given the midpoint

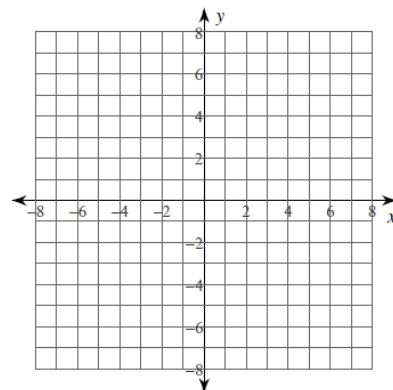
Looking for the midpoint:

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

Practice:

1. Graph the center of the circle and a point on the circle.

$$(x - 2)^2 + (y + 1)^2 = 16$$



2. Write the equation of each circle from the given information.

a. Center: $(8, -7)$; radius = 9

b. End of a diameter: $(-5, 9)$ and $(4, -3)$

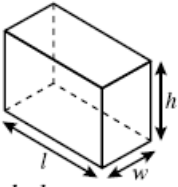
c. Center: $(0, 13)$; Area = 121π

d. Center: $(3, -8)$; Point on the circle: $(-9, -13)$

Geometry SOL Review by Strand
2009 SOL Standards

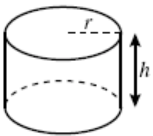
G.13 The student will use formulas for surface area and volume of three-dimensional objects to solve real-world problems.

Notes and Formulas:



$$V = lwh$$

$$S.A. = 2lw + 2lh + 2wh$$



$$V = \pi r^2 h$$

$$L.A. = 2\pi rh$$

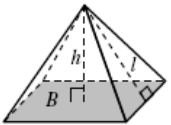
$$S.A. = 2\pi r(h + r)$$



$$V = \frac{1}{3} \pi r^2 h$$

$$L.A. = \pi rl$$

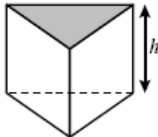
$$S.A. = \pi r(l + r)$$



$$V = \frac{1}{3} Bh$$

$$L.A. = \frac{1}{2} lp$$

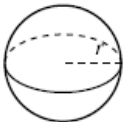
$$S.A. = L.A. + B$$



$$V = Bh$$

$$L.A. = hp$$

$$S.A. = L.A. + 2B$$



$$V = \frac{4}{3} \pi r^3$$

$$S.A. = 4\pi r^2$$

Ratios of Volume and Area:

Perimeter and Lengths:

Congruent to the similarity ratio

Area: (similarity ratio)²

Volume: (similarity ratio)³

Practice:

- What is the volume in cubic feet of a refrigerator whose interior is 4.5 feet tall, 2.5 feet wide, and 2 feet deep?
 - 15 cu ft
 - 19 cu ft
 - 22.5 cu ft
 - 25 cu ft
- What is the approximate volume of a can that is 5 inches tall and has a 2.5 inch diameter?
 - 19.6 cu in.
 - 24.5 cu in.
 - 39.3 cu in.
 - 98.1 cu in.
- What is the volume of a right square pyramid with a height of 3 centimeters and a base that measures 8 centimeters by 8 centimeters?
 - 64 cm³
 - 72 cm³
 - 144 cm³
 - 225 cm³
- A spherical paintball measures 1.5 centimeters in diameter. Approximately how much paint is in it?
 - 1.77 cm³
 - 7.07 cm³
 - 9.42 cm³
 - 14.13 cm³
- An aquarium tank is 3 feet long, 1 foot wide, and 2 feet high. How many gallons of water would it take to fill the tank two-thirds full? (A cubic foot is about 7.5 gallons)
 - 30
 - 40
 - 86
 - 4,860
- The ratios of the surface areas of two figures are 32:18. What is the ratio of their volumes?
 - 4:3
 - 16:9
 - 64:27
 - 4096:729

Geometry SOL Review by Strand
2009 SOL Standards

- G.14** The student will use similar geometric objects in two- or three-dimensions to
- compare ratios between side lengths, perimeters, areas, and volumes;
 - determine how changes in one or more dimensions of an object affect area and/or volume of the object;
 - determine how changes in area and/or volume of an object affect one or more dimensions of the object; and
 - solve real-world problems about similar geometric objects.

Notes and Formulas:

Proportions:

Set up a proportion with corresponding information and cross multiply to find missing information

HINT: Use proportions when you are given 3 pieces of similar information and are looking for the fourth

Ratios of Volume and Area:

Similarity Ratio: the ratio between the corresponding sides of proportional figures

Perimeter and Lengths:
Congruent to the similarity ratio

Area: (similarity ratio)²

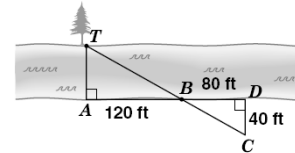
Volume: (similarity ratio)³

To find missing measurements, find the appropriate ratio and use to set up a proportion with the given information

Practice:

1. A surveyor made this sketch from measurements he made along a river. What is the distance across the river from point *A* to point *T*?

- A 60 ft
B 69.3 ft
C 84.9 ft
D 120 ft



2. A conical funnel has a capacity of one gallon. For another size funnel, the radius is tripled. What is the capacity of the larger funnel?
- A 3 gal.
B 9 gal.
C 27 gal.
D 81 gal.
3. Two trains leaving the same station at the same time are 6.5 miles apart after traveling for 4 hours. If they continue at the same rate and direction, how far apart will they be 3 hours later?
- A 4.88 mi
B 11.38 mi
C 13.0 mi
D 19.5 mi
4. Two similar prisms have volumes of 64 ft^3 and 125 ft^3 . If the surface area of the smaller prism is 48 ft^2 , what is the surface area of the larger prism?
- _____
5. The ratio of the circumference of two circles is $\frac{3}{2}$. The radius of the smaller circle is 8 inches. What is the radius of the larger circle?
- A $5\frac{1}{3}$ inches
B 6 inches
C 9 inches
D 12 inches
6. If the volume of a sphere is 48π and the radius is divided in half, what is the volume of the new sphere?