

Guide to the Geometry SOL Test

The geometry SOL will have 55 questions. Forty-five questions count toward your score and ten are “field” questions being tested by the state. The question numbers referenced below may be slightly different on your actual test because of the field questions being inserted at different locations each year, but the order will be as outlined. (**This information may have changed....but you can see the categories below**)

Released Geometry SOLs by Topic

Topic #	SOL 2000	SOL 2001	SOL 2002	SOL 2003	SOL 2004	SOL 2005	Mock I	Mock II
Estimation: angles	#1,3,4,5, 7,8,24,27,28	#1,2,3,4,5 6,27,29,32	#1,2,24, 27,28,29,31	#1,2,3,4,5 28,29,30,32,33	#1,6,7,24,28,29,3 0,31	#1,3,4,27,30	#1,2,3,6 26,27,29,33	#1,2,3,4,5, 28,29,30,33
Estimation: segments	#20,21, 22,23,26,33,38	#14,20,21,23, 23,30,33,39	#16,20, 21,23,30,32,39	#14,17, 18,22,24,31,39	#22,23,32	#31,32,39	#14,20,21, 22,23,25,31,32	#14,17, 18,22,24,31,39
Angles (general)	#1,2,3,27	#2,4,8,29	#1,3,29	#1,2,3,4,5,28	#1,3	#1,3	#1,3,4,5,27	#1,2,3,4,5,28
Angles with Parallels	#6,7,8	#1,3,7,8	#2,4,5,6,7,8	#3,7,8	#2,4,5,6,7,8	#2,5,6,8	#2,6,7,8	#3,7,8
Angles of Polygons	#4,6,28,29	#27,28	#25,27,28	#29,30	#28,29,30	#4,29,29,30	#28,29	#29,30
Triangle Inequalities	#17,18,19	#17,18,19	#17,18,19	#19,20,21	#18,19,20	#18,19,20	#16,17,18	#19,20,21
Quadrilaterals	#24,25,26	#5,24,25,26	#24,28	#24,25,26,27	#24,25,26,27	#7,24,26,27	#24,25,28	#24,26,28,27
Similar Triangles	#14,15,38	#14,15,23,38,39	#14,17,39	#13,14,15,23,39	#15,17,38,39	#12,16,38	#14,15,21,38	#13,14,15,23,39
Right Triangles	#20,21,22,23	#20,21,22	#20,21,22,23	#17,18,22	#21,22,23	#21,22,23,39	#20,22,23	#17,18,22
Circles	#30,31,32,33	#30,31,32,33	#30,31,32,33	#31,32,33	#31,32,33	#31,32,33	#30,31,32,33	#31,32,33
Surface Area/Volume	#37,38	#38,37	#35,36,37,38	#35,37,38	#36,37	#36,37	#34,36,37	#35,37,38
Symmetry/Transformations	#4,42	#41,42	#40,41	#40,41,42	#40,41,43	#40,43,45	#40,43,46	#40,41,42
Constructions	#9,10,11	#9,10,11	#9,10,11	#9,10,11	#9,10,11	#9,10,11	#9,10,11	#9,10,11
Conditional Statements	#12	[none]	#13	[none]	[none]	[none]	#13,19	[none]
Venn Diagrams / Logic	#13	#12,13	#12	#12,16	#12,13,14	#13,14,15	#12	#12,16
Coordinate Formulas	#40	#40	[none]	#43,44,45	#42,44,45	#25,40,41,44	#41,43,44	#43,44,45
Congruent Triangles	[none]	#16	#15	[none]	#15	#17	[none]	[none]
3-D Views	#34,35	#34,35	#34	#34,36	#34,35	#34,35	#35,39	#34,36

Lines and Angles (#1-11)

Complementary – 2 angles that add to 90.

Supplementary – 2 angles that add to 180.

Vertical Angles – 2 angles across from each other. Are Congruent

Linear Pair – 2 angles that combine to make a straight line. Are Supplementary

Parallel lines – Any 2 angles will be either congruent (equal) or supplementary (add to 180)

Constructions (#9-11)

- Congruent Segments – 2 segments of equal length – Measure with scratch paper and match.
- Congruent Angles – 2 angles of equal size – Trace on scratch paper and match.
- Perpendicular Bisector - 90° line in middle of segment. – Mark length on scratch paper, fold to find midpoint (mark it), use corner to show perpendicular from that midpoint.
- Perpendicular to a line from a point on the line - 90° line from segment through the point.
- Perpendicular to a line from a point not on the line - 90° line from segment through the point.

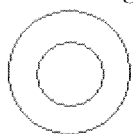
Triangles and Logic (#12-23)

Logic Statements

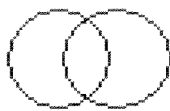
- **If ...then** – If (the hypothesis) then (the conclusion).
- **CO**nverse – **C**hange **O**rder of the hypothesis and the conclusion.
- **IN**verse – **I**nsert **N**ot into both the hypothesis and the conclusion.
- **CO**ntrapositive – longest word so most work - **C**hange **O**rder **and** **I**nsert **N**ot into both the hypothesis and the conclusion.

- **Symbols** –
 - ~ means NOT
 - ^ means AND
 - v means OR
 - → means THEN

- **Law of Syllogism** – 2 true conditional statements that make the third one true. The first 2 statements need to be arranged so the hypothesis of one and the conclusion are the same (these are crossed off). The final statement is then made from the remaining hypothesis and conclusion.
 - $1 \rightarrow 2$
 - $2 \rightarrow 3$
 - $1 \rightarrow 3$

Venn Diagrams -

ALL



SOME



NONE

Congruent Polygons – Corresponding (matching) Parts are congruent. Mark them on the picture. Need 3 pieces. Missing piece can be vertical angles, shared angles, or shared sides.

- Proofs
 - SSS – Side, Side, Side
 - ASA – Angle, Side, Angle (Side must be right between the 2 angles)
 - SAS – Side, Angle, Side
 - AAS – Angle, Angle, Side
 - HL – Hypotenuse – Leg (Must be a right triangle)

Similar Polygons - Corresponding (matching) ANGLES are congruent. Corresponding SIDES are proportional (then cross multiply).

- Proofs
 - SSS – Side, Side, Side
 - AA – Angle, Angle
 - SAS – Side, Angle, Side

Triangle Inequalities -

- Add 2 small sides together, it must be LARGER than the longest side.
- Smallest angle opposite shortest side. Shortest side opposite smallest angle.
- Largest angle opposite longest side. Longest side opposite largest angle.
- Find the range of the third side by subtracting then adding.

Right Triangles

- **Pythagorean Theorem** – $A^2+B^2=C^2$ If have 2 sides, use to find the third side. C is longest side.

- **SOHCAHTOA** – If have 1 side and 1 angle, use to find a second side.
Sine is Opposite over Hypotenuse, Cosine is Adjacent over Hypotenuse, Tangent is Opposite over Adjacent.

Polygons and Circles (#24-33)**Triangle Interior Angles** – 3 angles of a triangle add to 180.**Triangle Exterior Angles** – Exterior angle equals sum of remote interior angles.**Polygon Interior Angles** – $(n-2)180$ or start with a triangle and add 180 for each side you add:

$$3 \text{ sides} = 180 \rightarrow 4 \text{ sides} = 360 \rightarrow 5 \text{ sides} = 540 \rightarrow 6 \text{ sides} = 720 \rightarrow 7 \text{ sides} = 900$$

Polygon Exterior Angles – Always add up to 360 so using the number of sides (n)...

$$n = \frac{360}{\text{ext}\angle} \quad \text{and} \quad \text{ext}\angle = \frac{360}{n}$$

Parallelogram Rules

- **Parallelograms**
 - Opposite sides are parallel.
 - Opposite sides are congruent.
 - Opposite angles are congruent.
 - Consecutive angles are supplementary.
 - Diagonals bisect each other.
- **Rectangles** – special parallelogram so has 5 rules above plus...
 - All angles are 90.
 - Diagonals are congruent.
- **Rhombi** – special parallelogram so has 5 rules above plus...
 - All 4 sides congruent..
 - Diagonals are perpendicular.
 - Diagonals bisect corners.
- **Squares** – special parallelogram that is a rectangle and a rhombus so has all 10 rules above.

Circle Rules

- **Central Angles & Arcs** – Angle degree measure equals arc degree measure.
- **Inscribed Angles & Arcs** – Angle degree measure equals half of arc degree measure. Arc degree measure equals double of angle degree measure.
- **Chords & Arcs** – Congruent chords make congruent arcs.
- **Area (Whole and Partial) -**
 - Whole- $A = \pi r^2$
 - Partial- $A = \frac{\angle}{360} \pi r^2$
- **Interior Segments** – 2 parts of one chord multiplied equal the 2 parts of the other chord multiplied.
- **Exterior Segments** – Outside times the long equals the outside times the long.

Three-Dimensional Figures (#34-39)

Volume – Use formula sheet, carefully substitute the numbers for the variables.

Surface Area – Use formula sheet, carefully substitute the numbers for the variables.

Views – Imagine looking at the object from the different views.

Nets – Imagine folding it up (or use scrap paper).

Similar Triangles – Match up sides, write proportion, cross multiply to solve.

Ratio of circumference, area, and volume – Create a proportion with the ratio and the measurement(s),
a:b a²:b² a³:b³ cross-multiply to solve.

Coordinate Relations, and Transformations (#40-45)

Distance – Use scrap paper to measure. $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

Midpoint – Use the graph to find middle of the segment. $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

Slope – Rise over Run. $m = \frac{y_1 - y_2}{x_1 - x_2}$

Symmetry – Mirror image on both sides of the line.

Transformations

- **Translation** = Slide
- **Rotation** = Spin
- **Reflection** = Mirror Image

SOL Formulas to Memorize

Coordinate Formulas

$$\text{slope} = \frac{y - y}{x - x}$$

$$\text{midpoint} = \left(\frac{x + x}{2}, \frac{y + y}{2} \right)$$

$$\text{distance} = \sqrt{(x - x)^2 + (y - y)^2}$$

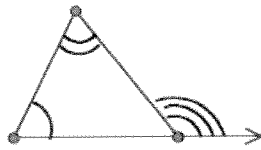
Conditional Statements

Converse: Change Order

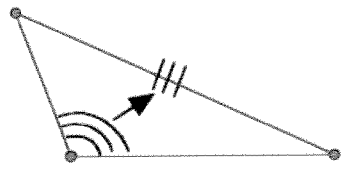
Inverse: Insert Not

Contrapositive: Change Order & Insert Not

Triangles



$$\text{int.} < + \text{int.} < = \text{ext.} <$$



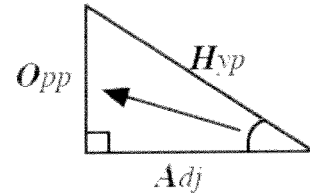
$$\text{biggest} < \text{opposite longest side}$$

Trigonometry: SOH CAH TOA

$$\sin \angle = \frac{O}{H}$$

$$\cos \angle = \frac{A}{H}$$

$$\tan \angle = \frac{O}{A}$$



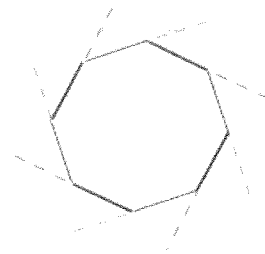
Polygons

sum of all int. <s
(n-2)180

each int. <
SUM n

sum of all ext. <s
360°

each ext. <
SUM n



Similar Shapes

small shape →

big shape →

$$\frac{\text{part}}{\text{part}} = \frac{\text{part}}{\text{part}}$$

(cross multiply)



$$\triangle ABC \sim \triangle DEF$$

Circles

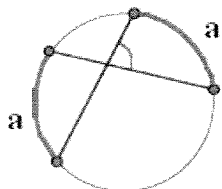
(angles)



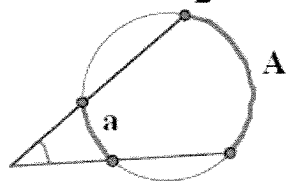
$$\angle = a$$



$$\angle = \frac{1}{2} a$$

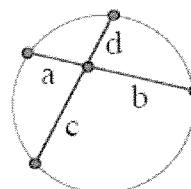


$$\angle = \frac{1}{2} (a + a)$$

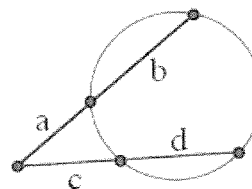


$$\angle = \frac{1}{2} (A - a)$$

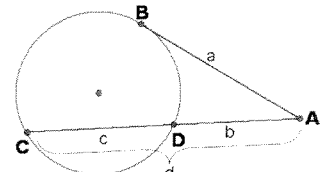
(segments)



$$(a)(b) = (c)(d)$$



$$(a)(a + b) = (c)(c + d)$$



$$a^2 = b \cdot d$$

