



Geometry A Study Guide Credit by Exam for Credit Recovery or Acceleration

The exam you are interested in taking is designed to test your proficiency in the relevant subject matter. You should be thoroughly familiar with the subject matter before you attempt to take the exam. This CBE CR/A Study Guide can help you prepare for the exam by giving you an idea of what you need to review. You can check your familiarity level by reviewing the Texas Essential Knowledge and Skills (TEKS) for this course. (See below.) To refine your skills, you can refer to any of the state-adopted textbooks.

Texas Essential Knowledge and Skills (TEKS)

Every question that appears on this exam is derived from the knowledge and skills statements and student expectations within the Texas-mandated standards, the Texas Essential Knowledge and Skills (TEKS). You can view the TEKS for this exam online via the following link: <http://ritter.tea.state.tx.us/rules/tac/chapter111/ch111c.html#111.41> Refer to section (c), Knowledge and skills, 1A–9B. Throughout this guide, you'll see TEKS references. These refer to the numbers listed under (c) Knowledge and skills; for example, 1A or 3B.

Materials Needed

You will need to bring a graphing calculator. The formula sheet at the end of this study guide will be provided during the exam. You can also bring this formula sheet with you to your exam. If you are taking a print exam, you must bring a #2 pencil to complete the exam. You will receive a computer-graded answer sheet when you arrive at the testing center. The proctor will provide scratch paper.

Exam Structure

You will be allowed **3 hours** to complete this exam. The Geometry A exam consists of 55 multiple-choice questions worth a total of 100 points. The exam covers a wide variety of topics. To help you study, we have isolated 8 key topics and provided study tips and sample questions for each. You can expect several multiple-choice questions on each of the following topics:

- Topic 1:** Plan and Solve Real-world Problems
- Topic 2:** Coordinate Geometry
- Topic 3:** Logical Argumentation
- Topic 4:** Geometric patterns, Conjectures, and Constructions
- Topic 5:** Proofs and Congruencies
- Topic 6:** Dilations and Similar Triangles
- Topic 7:** Proofs and Applications of Similarity Theorems
- Topic 8:** Trig Ratios and Special Right Triangles

Formula Chart

You will be provided with the following formula chart. Familiarize yourself with these formulas and how to use them to solve problems based on the TEKS above.

Scholastic Honesty

When you arrive at the testing center you will be asked to carefully read the exam rules and sign a statement agreeing to take the exam in accordance with the rules. This is called the Examinee's Certification. The following is a copy of these rules:

Examinee's Certification

This certification must be signed *before* the exam is administered and then returned with the completed examination attached, or credit for the exam will not be given.

Scholastic dishonesty is a serious academic violation that will not be tolerated. Scholastic dishonesty encompasses, but is not limited to:

- copying from another student's work;
- using an unauthorized testing proctor or taking the exam at an unauthorized testing location;
- using materials not authorized by a testing proctor;
- possessing materials that are not authorized by a testing proctor, such as lessons, books, or notes;
- knowingly using or soliciting, in whole or Topic, the contents of an unadministered test;
- collaborating with or seeking aid from another student without authorization during the test;
- substituting for another person, or permitting another person to substitute for oneself, in taking a course test or completing any course-related assignment;
- using, buying, stealing, or transporting some or all of the contents of an unadministered test, test rubric, homework answer, or computer program.

Evidence of scholastic dishonesty will result in a grade of *F* on the examination and an *F* in the course (if applicable).

At the testing center, you will be asked to sign a statement that says you have read the above and agree to complete the examination with scholastic honesty.

General Study Tips

The bulleted lists and sample questions in this study guide can assist you in preparing for the exam. It is a fairly complete guide for studying, but does not cover every item on the test. Ultimately, you should use the TEKS to guide your exam preparation.

Additional Study Tips

The following information provides direction for your studies. For each part, you will find study tips and sample questions to give you a general idea of the types of questions you can expect to see on the exam.

Topic 1: Plan and Solve Real-world Problems

This is a broad topic that can relate to any type of question. Students should show the ability to create a plan for problem-solving, explain their reasoning, and solve problems arising in everyday life.

Study Tips for Topic 1:

This topic relates to TEKS 1A–1G. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

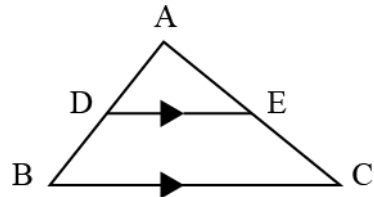
- Solve word problems about the workplace and every day interactions in society
- Justify your solution to a problem
- Explain if a solution is or is not reasonable
- Create and use tables, graphs, number lines, Venn Diagrams and other representations to organize information

Sample Questions for Topic 1:

The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the **BEST** responses to the following questions.

1. Derek plans to hang a shelf in his attic. The walls are sloped and meet at the peak point A , as shown in the figure below where wall AB is 7 feet long and wall AC is 9 feet long. A hole for shelf DE is drilled on wall AB 4 feet up the wall so that $BD = 4$. Since Derek wants the shelf to be parallel to floor BC , where should he drill hole E ?



- A. 3.11 feet up the wall from C .
- B. 3.86 feet up the wall from C .
- C. 5.14 feet up the wall from C .
- D. 5.75 feet up the wall from C .

Topic 2: Coordinate Geometry

This topic relates to your understanding of how to use the Cartesian coordinate system to solve problems. You will need to be familiar with how to use certain formulas, given on the formula chart, such as midpoint, distance, and slope.

Study Tips for Topic 2:

This topic relates to TEKS 2A–2C. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

- Determine the length of a line segment on a number line and on a coordinate plane
- Describe the connection between the distance formula and the Pythagorean Theorem
- Use the slope formula and the midpoint formula to solve real world problems
- Describe how to derive the formulas for midpoint, distance, and slope
- Determine whether two lines (or line segments) are parallel, perpendicular, or neither by comparing their slopes
- Determine an equation of a line that passes through a given point and is parallel or is perpendicular to a given line

Sample Questions for Topic 2:

The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the **BEST** responses to the following questions.

2. Given $\triangle DEF$ with $D(3, 4)$, $E(1, 2)$, and $F(5, 0)$, find the equation that contains the perpendicular bisector of \overline{EF} .
 - A. $y = x - 2$
 - B. $y = 2x - 5$
 - C. $y = 3x - 8$
 - D. $y = -x + 2.5$

Topic 3: Logical Argumentation

This topic relates to your understanding of how to use the vocabulary for logical argumentation as well as how to use deductive reasoning to verify or contradict conjectures and statements.

Study Tips for Topic 3:

This topic relates to TEKS 4A–4D. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

- Compare, contrast, and give examples of postulates, conjectures, theorems, undefined terms, and definitions
- When given a conditional “if-then” statement, identify the converse, inverse, and contrapositive of the conditional
- Determine whether the statements are true or false. For example, if a given conditional statement is true, would the converse also be true? Is that always the case?
- Identify biconditional statements and express the connection they have to a statement and its converse
- Use a counterexample to prove a conjecture is false
- Familiarize yourself with the basic meanings of Euclidean geometries and spherical geometries, specifically with the definitions of parallel lines and of triangle angle sums in both types of geometries

Sample Questions for Topic 3:

The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

3. Assume the conditional statement below is true. Then answer the question that follows.
Conditional Statement: *If something is a blip, then it is also a blop.*

Given that the above conditional statement is true, which of these must be true?

- A. the inverse
- B. the converse
- C. the contrapositive
- D. none of these is true

4. A bearded old man with flying reindeer flies in a triangular pattern starting at the North Pole, then directly south to City A on the equator, then straight West to City B which is also on the equator, and lastly straight North back to the North Pole where he can finally get some rest.

Given that the shape of the Earth can be approximated by spherical geometries, which of these is a possible sum of the 3 angles formed by this triangle?

- A. 85°
- B. 95°
- C. 175°
- D. 185°

Topic 4: Geometric patterns, Conjectures, and Constructions

This topic relates to your understanding of how geometric objects are constructed using a compass and straight edge as well as how to make and test conjectures about geometric properties.

Study Tips for Topic 4:

This topic relates to TEKS 5A–5D. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

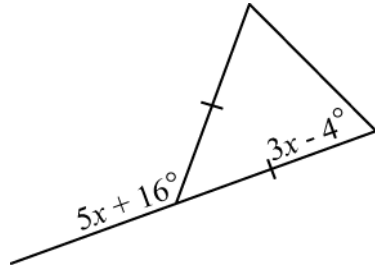
- Make conjectures about angles formed by parallel lines intersected by transversals, triangle congruence criteria, diagonals, interior and exterior angles of polygons, and special segments and angles of circles
- Identify, explain, and problem solve using constructions of congruent segments, segment bisector, angle bisector, perpendicular lines, perpendicular bisector, and parallel lines through a given point
- State and use the triangle inequality theorem
- Use the triangle inequality theorem to solve problems

Sample Questions for Topic 4:

The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

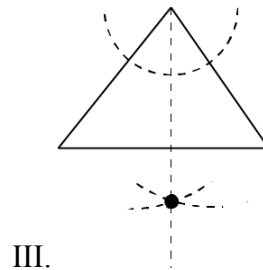
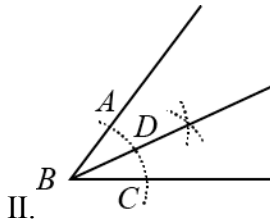
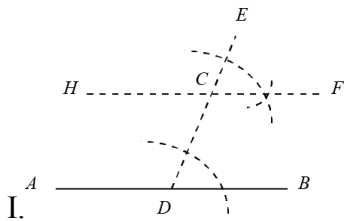
DIRECTIONS: Select the **BEST** responses to the following questions.

5. Solve for x in the diagram.



- A. 15°
- B. 18°
- C. 21°
- D. 24°

6. Which of the images below illustrates a construction of an angle bisector?



- A. I only
- B. II only
- C. II and III
- D. I, II, and III

Topic 5: Proofs and Congruencies

This topic relates to your understanding of how to verify and use theorems about angles, segments and triangles. This topic includes properties and proofs of congruent triangles.

Study Tips for Topic 5:

This topic relates to TEKS 6A–6E. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

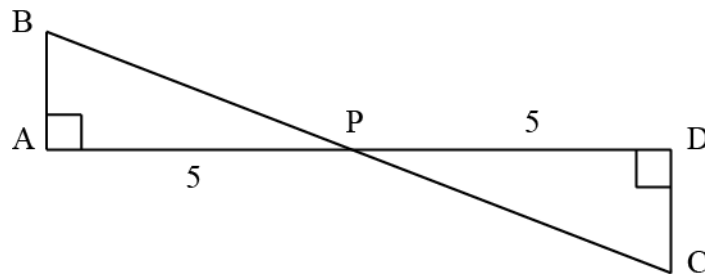
- Identify, verify, and use properties of intersecting lines and segments to solve problems. For example, you will be asked about vertical angles, parallel lines cut by a transversal, and the distance between the endpoints of a segment and a given point on its perpendicular bisector
- Complete proofs about triangle congruence. You should be able to identify steps and justifications for each step in a 2-column proof
- Use SAS, ASA, SSS, AAS, and HL to prove triangles are congruent
- Identify corresponding parts of congruent triangles
- Verify theorems about the relationships in triangles. For example, you will be asked about proofs of the Pythagorean Theorem, triangle angle sums, base angles of isosceles triangles, midsegments and medians and you should be able to recognize when you need to use one of these properties to solve a problem
- Prove whether or not a quadrilateral is a parallelogram, a rectangle, a square, or a rhombus

Sample Questions for Topic 5:

The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the **BEST** responses to the following questions.

7. You are trying to prove that the two triangles below are congruent. Which of the following properties is **LEAST** useful?



- A. Vertical Angles
- B. Angle-Side-Angle
- C. Angle-Angle-Side
- D. Pythagorean Theorem

Topic 6: Dilations and Similar Triangles

This topic relates to your understanding of identifying similar figures and using them to solve problems.

Study Tips for Topic 6:

This topic relates to TEKS 7A and 7B. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

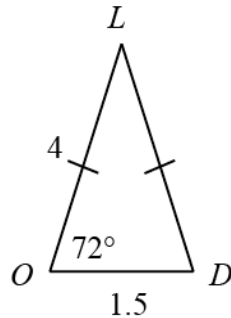
- Use dilations to identify similar figures and their congruent angles
- Write proportions given two similar figures and use them to solve problems
- Apply the Angle-Angle criterion for similar triangles to solve problems

Sample Questions for Topic 6:

The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the **BEST** responses to the following questions.

8. $\triangle OLD$ below needs to be enlarged by a scale factor of 4 so that $\triangle OLD \sim \triangle NEW$. Which of these best describes the resulting $\triangle NEW$?



- A. $EW = 6, m\angle N = 72^\circ$
- B. $EW = 6, m\angle N = 18^\circ$
- C. $NE = 16, m\angle W = 72^\circ$
- D. $NE = 16, m\angle W = 108^\circ$

Topic 7: Proofs and Applications of Similarity Theorems

This topic relates to your understanding of using deductive reasoning to prove theorems about triangles. You will be expected to complete two-column proofs.

Study Tips for Topic 7:

This topic relates to TEKS 8A and 8B. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

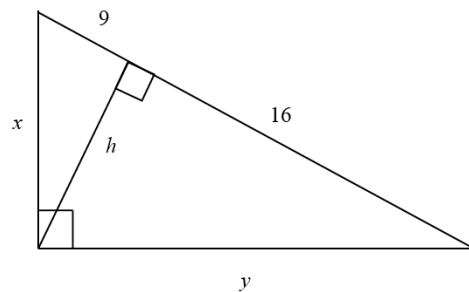
- Understand and use the triangle proportionality theorem to solve problems
- Prove theorems about triangles
- Given a right triangle and an altitude drawn to its hypotenuse, identify the similar triangles created
- Given a right triangle and an altitude drawn to its hypotenuse, use the concept of geometric mean and write proportions to solve problems

Sample Questions for Topic 7:

The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the **BEST** responses to the following questions.

9. Determine the approximate length of the altitude, h . Round your answer to the nearest hundredth.



- A. 12.0
- B. 13.2
- C. 15.0
- D. 18.4

Topic 8: Trig Ratios and Special Right Triangles

This topic relates to your understanding using trigonometric ratios and special right triangles to determine missing side lengths and angles of right triangles.

Study Tips for Topic 8:

This topic relates to TEKS 9A and 9B. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

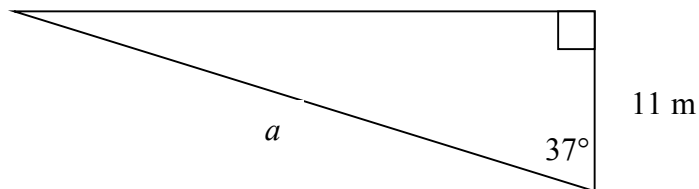
- Familiarize yourself with the right triangle formulas on the formula chart and before test day, be sure to know how to use each of them to solve problems
- Use sine, cosine, and tangent ratios to write equations and solve problems
- Use Pythagorean theorem and recognize common sets of Pythagorean Triples and their multiples (e.g. 5-12-13 and 10-24-26)
- Apply the relationships given in the formula chart for special 30-60-90 and 45-45-90 right triangles to solve problems

Sample Questions for Topic 8:

The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the **BEST** responses to the following questions.

10. What is the approximate length of side a ?

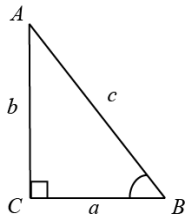
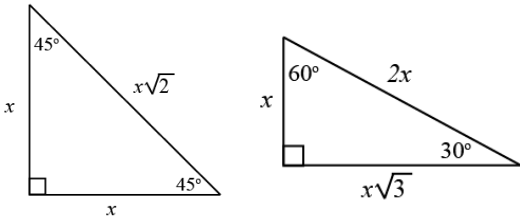


- A. 6.62 m
- B. 8.78 m
- C. 13.77 m
- D. 18.21 m

Answer Key

Item Number	Correct Answer	TEKS expectation
1	C	1A, 1B, 8A
2	B	2B, 2C
3	C	4B
4	D	4D
5	D	5A
6	C	5B
7	D	6B
8	C	7A
9	A	8B
10	C	9A

Geometry Formula Sheet

Coordinate Geometry		
Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	Slope of a line: $m = \frac{y_2 - y_1}{x_2 - x_1}$	
Midpoint Formula: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$	Slope-Intercept Form of an Equation: $y = mx + b$	
Standard Form of a Linear Equation: $Ax + By = C$	Point-Slope Form of an Equation: $y - y_1 = m(x - x_1)$	
Perimeter and Circumference		
Perimeter of a rectangle: $P = 2l + 2w$ or $P = 2(l + w)$	Circumference: $C = 2\pi r$ or $C = \pi d$	
Area	Surface Area	
Rectangle or Parallelogram: $A = bh$	Prism:	$Lateral SA = Ph$ $Total SA = Ph + 2B$
Regular Polygon: $A = \frac{1}{2}aP$	Cylinder:	$Lateral SA = 2\pi rh$ $Total SA = 2\pi rh + 2\pi r^2$
Triangle: $A = \frac{1}{2}bh$	Pyramid:	$Lateral SA = \frac{1}{2}Pl$ $Total SA = \frac{1}{2}Pl + B$
Trapezoid: $A = \frac{1}{2}(b_1 + b_2)h$	Cone:	$Lateral SA = \pi rl$ $Total SA = \pi rl + \pi r^2$
Circle: $A = \pi r^2$	Sphere:	$Total SA = 4\pi r^2$
Rhombus: $A = \frac{1}{2}d_1d_2$		
Volume	Right Triangles	
Prism or cylinder: $V = Bh$	$\sin(\angle B) = \frac{\text{opposite side}}{\text{hypotenuse}}$ $\cos(\angle B) = \frac{\text{adjacent side}}{\text{hypotenuse}}$ $\tan(\angle B) = \frac{\text{opposite side}}{\text{adjacent side}}$	
Pyramid or cone: $V = \frac{1}{3}Bh$		
Sphere: $V = \frac{4}{3}\pi r^3$		
		Pythagorean Theorem: $a^2 + b^2 = c^2$