Geometry B

**Inverse Trigonometry**

**Unit Summary:**

The word inverse simply means the opposite. Inverse trigonometry is used to find unknown angles within a right triangle when two side lengths are given.

In this unit, you will apply the relationships in special triangles—such as a 30-60-90 triangle or a 45-45-90 triangle—along with the Pythagorean Theorem to solve problems. You will identify and solve problems using Pythagorean Triples. Lastly, you will use the inverse of the three trigonometry functions sine, cosine, and tangent to find angles of elevation and depression.

Be aware: Consider the function . The notation for its inverse function is , but this does not mean that the function is being raised to the negative power.

**Lesson 2 – Pythagorean Triples**

**Key Words:**

* **integer** – any of the natural numbers, the negatives of these numbers, or zero
* **Pythagorean Theorem** – the theorem which states that the square of the length of the hypotenuse of a right triangle is equal to the sum of the squared lengths of the other two sides
* **Pythagorean triple** – three positive integers , , and , where

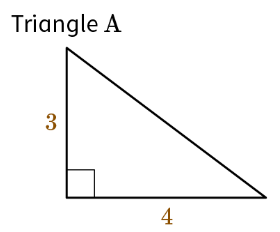
**Objective 1:** In this section, you will identify Pythagorean triples.

*Mathematical Practice Standard: Make sense of problems and persevere in solving them.*

**Big Ideas**:

* Pythagorean triples are examples of special right triangles, which have unique properties or features that can be used to simplify calculations. Pythagorean triples are right triangles where all three sides of the triangle have lengths that are positive integers.
  + Examples of Pythagorean Triples

|  |  |  |  |
| --- | --- | --- | --- |
| (3, 4, 5) | (5, 12, 13) | (8, 15, 17) | (7, 24, 25) |
| (20, 21, 29) | (12, 35, 37) | (9, 40, 41) | (28, 45, 53) |
| (11, 60, 61) | (16, 63, 65) | (33, 56, 65) | (48, 55, 73) |
| (13, 84, 85) | (36, 77, 85) | (39, 80, 89) | (65, 72, 97) |

* Use the Pythagorean Theorem to determine whether a right triangle is a Pythagorean triple.
  + Pythagorean Theorem:
  + Ex: 

|  |  |
| --- | --- |
| Fill in the Pythagorean Theorem equation with the information provided for the right triangle |  |
| Calculate |  |
| Take the square root of both sides |  |
| Answer (length of hypotenuse) |  |
| Determine if the triangle is a Pythagorean triple once the measurements of all 3 sides are known. | The length of the hypotenuse is 5. Triangle A is a Pythagorean triple because  , and 3, 4, and 5 are all positive integers. |

**Objective 2:** In this section, you will learn about Pythagorean triples and how to use them to solve problems.

*Mathematical Practice Standard: Look for and make use of structure.*

**Big Ideas:**

* If you multiply all the values in a Pythagorean triple by the same whole number, you will get another Pythagorean triple. Therefore, for any Pythagorean Triple a, b, and c, you can create another Pythagorean triple ka, kb, and kc, where k is any positive integer.
  + Ex: starting with the triple (3, 4, 5) each number can be multiplied by 2 to form the triple (6, 8, 10). Or multiplying each number by 3 would give the Pythagorean triple (9, 12, 15).

**Practice Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| P 1 | Given that (10,24,) is a Pythagorean triple and 24, what is the value of ? |  |
| P 2 | What value of that is less than 51 will make (, 45, 51) a Pythagorean triple? |  |
| P 3 | Use the image to answer the question.    Given is a right triangle with side lengths and . The Pythagorean triple (9,12,15) represents the side lengths of the given triangle. Find the value of |  |
| P 4 | A 13-foot ladder is leaning against a 12-foot-tall vertical wall. Use a Pythagorean triple to find out how far the bottom of the ladder is from the wall.  The bottom of the ladder is \_\_\_ feet away from the wall. | 5 |
| P 5 | The size of a TV is the diagonal length of the TV. Use a Pythagorean triple to find the length of a 20-inch TV, given that its width is 12 inches.  \_\_ inches | 16 |

**Quick Check Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| Q 1 | Given that (5,12,13) is a Pythagorean triple, identify another example of a Pythagorean triple from the following:   * (10,12,13) * (15,25,39) * (50,120,130) * (25,60,39) | (50,120,130) |
| Q 2 | Which value of will make (, 63, 65) a Pythagorean triple? |  |
| Q 3 | Christian’s kite was stuck on top of a tree. To get it down, he used a 10-foot ladder and placed the bottom 6 feet away from the tree. Which of the following correctly uses a Pythagorean triple to find how high the ladder reaches the tree?   * 8 feet * 11.7 feet * 6 feet * 4 feet | 8 feet |
| Q 4 | Use the image to answer the question.    Given is a right triangle with side lengths andThe Pythagorean triple (9,12,15) represents the side lengths of the given right triangle. Which of the following is the correct value of ?   * 15 |  |
| Q 5 | Elena’s office is 25 miles southeast of her home. Which of the following correctly uses a Pythagorean triple to find out how many miles Elena needs to drive south and then east to get from home to work?   * 7 miles south and 24 miles east * 5 miles south and 14.5 miles east * 7 miles south and 18 miles east * 5 miles south and 20 miles east | 7 miles south and 24 miles east |

**Lesson 3 – Generating Triples Discussion Day 1**

**Lesson 4 – Generating Triples Discussion Day 2**

**Lesson 5 – Inverse Sine**

**Key Words:**

* **angle of elevation** – the angle formed by the line of sight and the horizontal plane for an object above the horizontal
* **inverse function** – a function that is derived from a given function by interchanging the two variables
* **inverse sine function** – the inverse of the sine function

**Objective 1:** In this section, you will learn how to use the inverse of the sine ratio to solve applied problems.

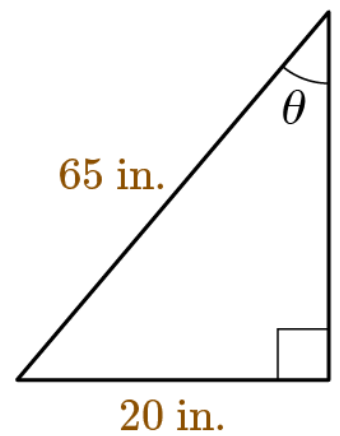
*Mathematical Practice Standard: Make sense of problems and persevere in solving them.*

**Big Ideas**:

* Inverse operations are mathematical operations that “undo” each other.
  + Ex: subtraction is the inverse operation of addition; multiplication is the inverse operation of division
* Inverse functions undo each other and are derived from each other by interchanging the two variables in the functions.
  + Here are the steps for identifying an inverse function:

(function)

|  |  |
| --- | --- |
| Step 1: let (in the function) |  |
| Step 2: Interchange the variables and |  |
| Step 3: Solve the function for |  |
| Step 4: Replace using inverse notation; that is, let | (inverse function) |

* Remember: the sine function of an angle is defined as "the ratio of the lengths of the opposite side and the hypotenuse in a given right triangle."
* The inverse of the sine function is .
* When should you use the inverse sine function?
  + If you are given the proper ratio of the lengths of sides in a right triangle, then the inverse sine function can be used to identify the missing angles.
  + Ex: 

**Practice Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| P 1 |  |  |
| P 2 |  |  |
| P 3 |  |  |
| P 4 |  |  |
| P 5 |  |  |

**Quick Check Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| Q 1 |  |  |
| Q 2 |  |  |
| Q 3 |  |  |
| Q 4 |  |  |
| Q 5 |  |  |

**Lesson 6 – Inverse Cosine**

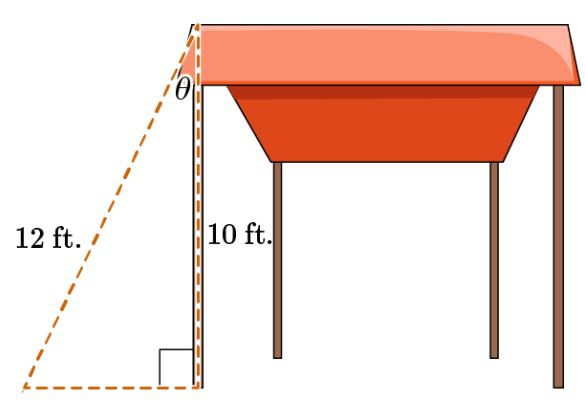
**Key Words:**

* **cosine** – the ratio between the leg adjacent to the angle and the hypotenuse in a right triangle
* **hypotenuse** – the side of a right triangle that is opposite the right angle
* **inverse** – an operation that undoes the effect of another operation

**Objective 1:**

*Mathematical Practice Standard:*

**Big Ideas**:

* Remember: the cosine function of an angle is defined as " the ratio between the leg adjacent to the angle and the hypotenuse in a right triangle." This function can be used to find the missing side of a triangle using the known angle and one known side.
* The inverse of the cosine function is .
* When should you use the inverse cosine function?
  + If you are given the proper ratio of the lengths of sides in a right triangle, then the inverse sine function can be used to identify the missing angles.
  + Ex: 

**Practice Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| P 1 |  |  |
| P 2 |  |  |
| P 3 |  |  |
| P 4 |  |  |
| P 5 |  |  |

**Quick Check Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| Q 1 |  |  |
| Q 2 |  | Yes, the angle formed is approximately |
| Q 3 |  |  |
| Q 4 |  |  |
| Q 5 |  |  |

**Lesson 7 – Inverse Tangent**

**Key Words:**

* **inverse** – an operation that undoes the effect of another operation
* **tangent** – the ratio in a right triangle between the leg opposite to the angle and the leg adjacent to the angle

**Objective 1:** In this section, you will use the inverse of the tangent ratio to solve problems.

*Mathematical Practice Standard: Make sense of problems and persevere in solving them.*

**Big Ideas**:

* + The tangent ratio is written as .
  + The inverse tangent ratio is written as .
  + The inverse tangent finds the measure of a given angle, .
  + Sometimes, more information is given in a problem than you might need. Take your time to make sense of the problem using the following hints.
    - * Hint 1: Identify important information and which numbers will be necessary for creating an inverse tangent ratio.
        + Examples of important information: missing angle, adjacent side, opposite side, or hypotenuse
      * Hint 2: Draw a right triangle that represents the problem.
        + Label the missing angle, label the triangle with the important information
    - Then solve for the unknown angle using the inverse tangent ratio.
      * The opposite and adjacent sides of a right triangle are needed to use the inverse tangent ratio.
    - Check your solution using the tangent ratio.

**Practice Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| P 1 | Use the inverse of the tangent ratio to find the indicated missing angle. Round your answer to the nearest whole degree. |  |
| P 2 | Damar is buying a new windsail for his sailboat. The triangular sail is attached between a vertical pole that creates a 90° angle to the boat and a horizontal pole that is attached at the bottom of the vertical pole. If the vertical pole is 22 feet tall and the horizontal pole is 8 feet, what is the angle of the sail that is formed at the top of the vertical pole? Round your answer to the nearest whole degree. | The angle is approximately . |
| P 3 | Use the inverse of the tangent ratio to find the approximate angle measure at vertex *A*. Round your answer to the nearest whole degree. | The angle at vertex *A* is approximately . |
| P 4 | Kiera is sketching a logo design for a client. The client wants the logo to be her initials inside of a right triangle. The right triangle has a base length of four inches and a height of two inches, with the right angle on the left and between the two measurements. What is the approximate angle measure of the angle formed at the top of the triangle logo? Round your answer to the nearest whole degree. |  |
| P 5 | Use the inverse of the tangent ratio to find the approximate measure of angle *B.* Round your answer to the nearest whole degree. | The approximate measure of angle *B* is . |

**Quick Check Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| Q 1 | Use the inverse of tangent to solve for the approximate angle measure of vertex , rounded to the nearest whole degree. |  |
| Q 2 | Dedrea is making a bike ramp on the sidewalk in front of their house. They place a wood plank on top of blocks to form the ramp. The blocks are one foot in height, and the distance from the base of the blocks to where the wood plank touches the sidewalk is five feet. What is the approximate angle formed between the sidewalk and the base of the ramp? |  |
| Q 3 | Right triangle is drawn on paper. The right angle is located at vertex with side length as the hypotenuse. The side length measurements are , , and . What is the approximate angle measure at vertex ? |  |
| Q 4 | Use the inverse of tangent to find the approximate measure of angle , rounded to the nearest whole degree. |  |
| Q 5 | You are making a banner for your cousin's birthday party. You start by cutting out triangle pieces of cardstock paper; to not waste paper, you choose to cut the paper diagonally. Each piece of cardstock paper measures five inches in height with a base of three and a half inches. After cutting, what is the approximate angle formed at the base of the triangle? |  |

**Lesson 8 – Solving Right Triangles**

**Key Words:**

* **angle of depression** – the angle formed by the line of sight and the horizontal plane for an object below the horizontal
* **angle of elevation** – the angle formed by the line of sight and the horizontal plane for an object above the horizontal
* **Pythagorean Theorem** – the theorem which states that the square of the length of the hypotenuse of a right triangle is equal to the sum of the squared lengths of the other two sides
* **trigonometric ratios** – the value of the ratios of the sides of a right triangle known as sine, cosine, and tangent

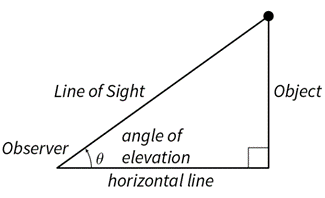
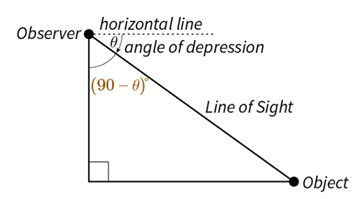
**Objective 1:** In this section, you will use trigonometric ratios to solve right triangles in applied situations.

*Mathematical Practice Standard: Look for and make use of structure.*

**Big Ideas**:

* Recall the three trigonometric ratios are sine, cosine, and tangent.

|  |  |
| --- | --- |
|  |  |

* Angles of elevation and depression help measure objects that are far away or that are large. This is also called the “line of sight” and forms the hypotenuse of the right triangle formed from above or below an object.
  + Angle of elevation is the angle created between you and an object above you. If you look up at an object, the angle your line of sight makes with the horizontal line is called the angle of elevation.
    - Example: Observer is standing on the ground looking up at a tree, building, plane, etc.
    - 
  + Angle of depression is the angle created between you and an object below you. If you look down at an object, the angle your line of sight makes with a horizontal line is called the angle of depression.
    - Example: Observer is standing on a cliff, in an airplane, etc. looking down at an object.
    - Angles of depression occur outside of the triangle because this is the angle an observer is looking down from. Because the horizontal and vertical line form a right triangle, the angle inside the triangle is 90 degrees minus the angle of depression.
    - 

|  |  |
| --- | --- |
| Steps to solve Real-World Situations using Trigonometric Ratios | Example Problem |
| Step 1: Draw a picture of the scenario using a right triangle. | Abu is a lighthouse keep and he spots a ship in the distance. If the lighthouse is 65 feet tall, and he looks down at the ship at an angle of depression of 37 degrees, how far away is the ship from the shore? Round your answer to the nearest thousandth. |
| Step 2: Label the sides of your triangle opposite, hypotenuse, and adjacent.    *Recall: The hypotenuse is always opposite of the right angle.*    *Recall: Adjacent and Opposite should be in reference to the angle or angle you are solving for*. |  |
| Step 3: Choose the correct trigonometric ratio based on the sides and angles you are given.    *Side unknown: use regular trigonometric ratios*  *Angle unknown: use inverse trigonometric ratios* | Because you know the angle, the opposite side (*x*), and the adjacent side, you will use the tangent ratio:      Therefore, |
| Step 4: Solve. |  |

* Some problems will be more advanced and there are other steps or things to consider.

|  |  |
| --- | --- |
| Sometimes, the angle is unknown. Remember to use the inverse trigonometric ratio for these types of problems. |  |
| Surveying equipment – some problems involve equipment that is raised off of the ground. The height of this equipment needs to be considered in your drawing and calculations. In this example, the surveying equipment is 5 feet off of the ground. |  |
| Some problems involve using more than one right triangle to solve, therefore more steps are involved. For this example, you must complete two trigonometric calculations to solve for *x* and *y*. | Stage one: find the hypotenuse of the larger right triangle.    Stage two: find the hypotenuse of the smaller right triangle. |

**Objective 2:** In this section, you will use the Pythagorean Theorem to solve right triangles in applied problems.

*Mathematical Practice Standard: Look for and make use of structure.*

**Big Ideas**:

* Given an angle of elevation or depression and a known side of a right triangle, you can find the other missing sides and angles using a combination of trigonometric ratios and the Pythagorean Theorem.
* Recall:

|  |  |
| --- | --- |
| Pythagorean Theorem | Trigonometric Ratios |
| Where and represent the lengths of the legs of the right triangle a represents the length of the hypotenuse. | For this lesson, refers to the angle of elevation or depression. |
|  |  |

**Practice Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| P 1 |  | 4.5 feet |
| P 2 |  | 2 |
| P 3 |  | 1 |
| P 4 |  | 5.66 inches |
| P 5 |  | 933 feet |

**Quick Check Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| Q 1 |  | 55 feet |
| Q 2 |  | 71 feet |
| Q 3 |  | 25 feet |
| Q 4 |  |  |
| Q 5 |  | 5.85 feet |

**Lesson 9 – The Law of Sines**

**Key Words:**

* **altitude** – a line segment drawn from a vertex of a triangle perpendicular to the opposite side
* **Law of Sines** – the ratio of the side length of a triangle to the sine of the opposite angle of the side is the same for all three sides
* **oblique triangle** – a triangle with no right angle
* **right triangle** – a triangle in which one angle is a right angle (90-degree angle)
* **trigonometric ratios** – the value of the ratios of the sides of a right triangle known as sine, cosine, and tangent

**Objective 1:** In this section, you will use the Law of Sines to find unknown measurements in right triangles.

*Mathematical Practice Standard: Attend to Precision*

**Big Ideas**:

* + The Law of Sines states that the ratio of the side length of a triangle to the sine of the opposite angle of the side length is the same for all three sides.
  + The Law of Sines allows you to find missing angles and sides in triangles if you know two angles and one side, or, if you know two sides and one angle.

|  |  |
| --- | --- |
|  | How to derive the Law of Sines:  From this image, we know that:  If we use inverse operations to solve each of the above scenarios for , we conclude that:  Thus, the Law of Sines is:  The nature of ratios allows the Law of Sines to be inverted and still yield the same answer. So, another equivalent to the Law of Sines is:  In this equivalency, A is the angle opposite side a, B is the angle opposite side b, and C is the angle opposite side c. |

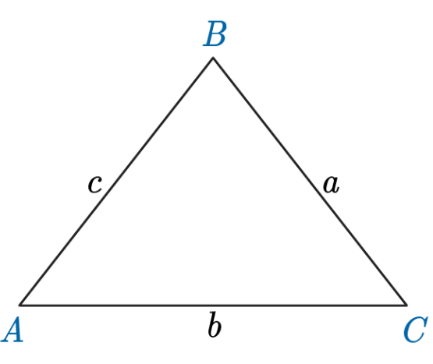
* Steps for solving right triangles using the Law of Sines:

|  |  |
| --- | --- |
| Right Triangle: Missing Side | Right Triangle: Missing Angle |
| *Recall: Angles inside of a triangle add up to 180 degrees.* |  |
| The angle corresponds to the side length of 12. To use the Law of Sines, you need two angles and one side length. You have a missing side length, *x*, and need its corresponding angle. You can calculate the missing angle by using the triangle sum theorem. | To use the Law of Sines, you need two side lengths and one angle. There is no need for an extra step here, everything you need is provided in the problem. |
| Now you have two angles and one side length to use the Law of Sines and solve for the missing length *x*. | Now you have two sides and one angle to use the Law of Sines and solve for the missing angle . |
| Set up the ratio for using the above values. | Set up the ratio for using the above values. |
| Solve for x using inverse operations: | Solve for using inverse operations:  *Recall: Use the inverse ratio when the angle is unknown.* |

**Objective 2:** In this section, you will use the Law of Sines to find unknown measurements in non-right triangles.

*Mathematical Practice Standard: Look for and make use of structure.*

**Big Ideas:**

* + The Law of Sines can be used to solve for missing angles and sides in more than just right triangles. Oblique triangles are triangles with no right angle, and the Law of Sines holds true for these types of triangles.
    - 
    - Recall the Law of Sines:
  + Steps for solving oblique triangles using the Law of Sines:

|  |  |
| --- | --- |
| Oblique Triangle: Missing Angle | Oblique Triangle: Missing Side |
|  |  |
| Confirm that your triangle meets one of the following criteria to use Law of Sines:   1. Two side lengths and one angle 2. Two angles and one side length | |
| This triangle meets the criteria for number one. | This triangle meets the criteria for number two. |
| Set up the ratio for using the above values. | Set up the ratio for using the above values. |
| Solve for using inverse operations and inverse sine. | Solve for using inverse operations. |

**Practice Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| P 1 |  | 9 cm |
| P 2 |  | 315 km |
| P 3 |  | 73 degrees |
| P 4 |  | 10.8 |
| P 5 |  | 45 degrees |

**Quick Check Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| Q 1 | * 3,835 mm * 405 mm * 366 mm * 385 mm | 405 mm |
| Q 2 | * 15 m * 62 m * 53 m * 25 m | 53 m |
| Q 3 |  |  |
| Q 4 | * 0.2 inches * 9.7 inches * 6.5 inches * 15.5 inches | 9.7 inches |
| Q 5 | * 86 degrees * 27 degrees * 1 degrees * 7 degrees | 1 degrees |

**Lesson 10 – Law of Cosines**

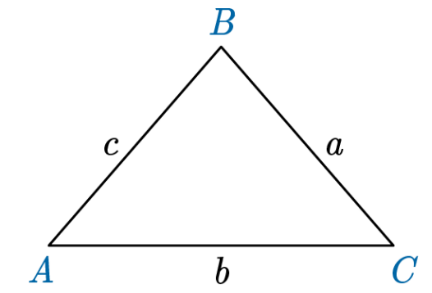
**Key Words:**

* **Law of Cosines** – the law stating that the square of a side of a plane triangle equals the sum of the squares of the remaining sides minus twice the product of those sides and the cosine of the angle between them
* **oblique triangle** – a triangle with no right angle
* **right triangle** – a triangle in which one angle is a right angle (90-degree angle)
* **trigonometric ratios** – the value of the ratios of the sides of a right triangle known as sine, cosine, and tangent

**Objective 1:** In this section, you will use the Law of Cosines to find unknown measurements in right triangles.

*Mathematical Practice Standard: Attend to precision.*

**Big Ideas**:

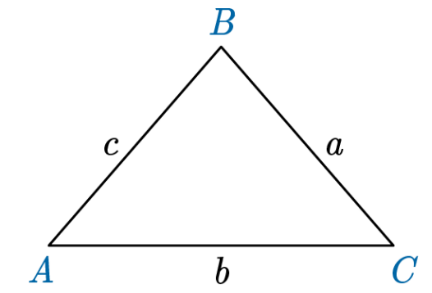
* + Like the Law of Sines, The Law of Cosines helps find missing sides and angles of both oblique and right triangles. The law that you choose depends on the information known about a triangle.
  + The Law of Cosines:
    - 
  + For the Law of Cosines, you need to know two sides and the angle between them to find the third side that is opposite the known angle.
  + Using the Law of Cosines on right triangles:

|  |  |
| --- | --- |
| Right Triangle: Missing Side | Right Triangle: Missing Angle |
|  |  |
| Notice that the given angle is located between the side length of 9 and 22, and the side length x is opposite the angle 63 degrees. | Notice that the angle x is located between the side length of 8 and 17. The side length 15 is opposite of angle x. |
| Substitute these values into the Law of Cosines:  To get, | Substitute these values into the Law of Cosines:  To get, |
| Solve the equation using order of operations, inverse operations.  Square b and c. Multiply 2bc.  Add 81 and 484.  Calculate cosine term.  Simplify.  Square both sides.  Simplify. | Solve the equation using order of operations, inverse operations, and inverse cosine.  *Recall: Use inverse trig ratios when you are finding the missing angle.*  Square a, b, and c. Multiply 2bc.  Add 64 and 289.  Subtract 353 from both sides.  Simplify.  Divide both sides by –272.  Simplify.  Take the inverse cosine of both sides.  Simplify.  Calculate. |

**Objective 2:** In this section, you will use the Law of Cosines to find unknown measurements in non-right triangles.

*Mathematical Practice Standard: Look for and make use of structure.*

**Big Ideas:**

* Recall that the Law of Cosines can be applied to oblique triangles.
  + The Law of Cosines:
  + 
* Recall: For the Law of Cosines, you need to know two sides and the angle between them to find the third side that is opposite the known angle.
* To find an angle in an oblique triangle, you must know all three sides of the triangle.
* Use the Law of Cosines on oblique triangles:

|  |  |
| --- | --- |
| Oblique Triangle: Missing Side | Oblique Triangle: Missing Angle |
|  |  |
| Notice that the angle is between two side lengths, 15 and 22. | Notice that the side lengths adjacent to the missing angle are 32 and 18. The side opposite of the missing angle is 21. |
| Substitute these values into the Law of Cosines:  To get, | Substitute these values into the Law of Cosines: |
| Solve for using the order of operations and inverse operations:  Square b and c. Multiple 2bc.  Add 225 and 484.  Simplify the term with Cosine.  Simplify.  Square both sides.  Simplify. | Solve for *A* using order of operations, inverse operations, and inverse cosine:  Square a, b, and c. Multiply 2bc.  Add 1,024 and 324.  Subtract 1,348 from both sides.  Simplify.  Divide both sides by –1,152.  Simplify.  Take the inverse cosine of both sides.  Simplify.  Calculate. |

**Practice Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| P 1 |  | 4 |
| P 2 |  | 23 |
| P 3 |  | 33 |
| P 4 |  | 8 |
| P 5 |  | 10.3 |

**Quick Check Questions and Answers**

|  |  |  |
| --- | --- | --- |
|  | Question | Answer |
| Q 1 | Use the Law of Cosines, , to find the value of angle in a right triangle where   * 12.7 degrees * 14.5 degrees * 13.1 degrees * 17.3 degrees | 12.7 degrees |
| Q 2 | Use the Law of Cosines, , to find the value of angle in a right triangle where   * 84.55 degrees * 77.32 degrees * 78.01 degrees * 90.01 degrees | 77.32 degrees |
| Q 3 | Use the Law of Cosines, , to find the value of angle in a right triangle where   * 89.9 degrees * 25.1 degrees * 73.6 degrees * 16.3 degrees | 16.3 degrees |
| Q 4 | * 15 degrees * 63 degrees * 119 degrees * 50 degrees | 119 degrees |
| Q 5 | * 28 degrees * 24 degrees * 133 degrees * 19 degrees | 19 degrees |

**Lesson 11 – Inverse Trigonometry Apply –** Sample work drop box available if teacher would like to collect student work; no Practice or Quick Check

**Lesson 12 – Inverse Trigonometry Review –** Practice Questions and Answers

**Lesson 13 - Inverse Trigonometry Unit Test**