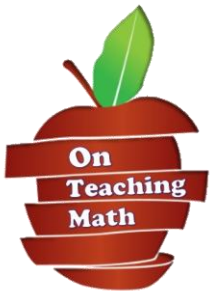


Trigonometry

Lesson & Notes

Special Right Triangles



Lesson, Guided Notes & Practice

- 1 Visually attractive lesson aligned with interactive guided notes.
- 2 Supports all students.
- 3 Answer key included.
- 4 Start your Trigonometry unit off on the right foot!

This Works

Trigonometry – Introduction to Trigonometry

Name: _____

Day 1: Special Right Triangles

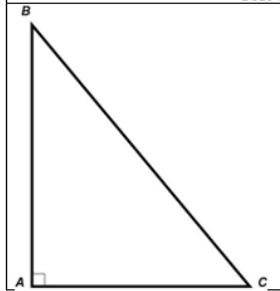
Lesson Objective: Students will identify and apply the relationships between sides and angles in special right triangles (45-45-90 and 30-60-90).

1. Students will identify the relationships between legs and hypotenuse in a 45-45-90 triangle.
2. Students will figure out and apply the side ratio relationships in a 30-60-90 triangle.
3. Students will find missing sides and angles in special right triangles using their unique properties.

Key Vocabulary

Term	Definition
Right Triangle	A triangle with one 90-degree angle
Legs	The two perpendicular sides that form the right angle
Hypotenuse	Hypotenuse: The longest side of a right triangle, opposite to the 90-degree angle
Isosceles Right Triangle	A right triangle where the two legs are equal in length (also called 45-45-90 triangle)
30-60-90 Triangle	A right triangle with angles of 30°, 60°, and 90°
Adjacent to an angle	The leg that forms an angle (in a triangle) is adjacent to that angle
Opposite of an angle	The leg that does NOT form an angle (in a triangle) is called opposite of the angle

Test Your Knowledge



1. Which side is opposite of the angle with vertex C?
2. Which side is adjacent to the angle with vertex B?
3. What is the name of the side opposite of the angle with vertex A?

1

Students engagement is maximized.

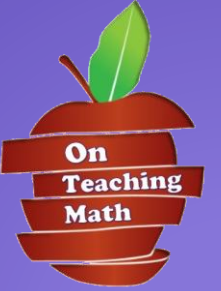
2

PowerPoint is aligned with the guided notes.

3

Student understanding is built and tested throughout the lesson.

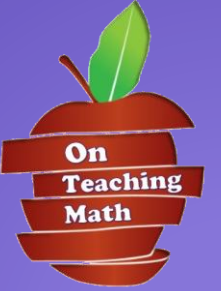
What's Included



Trigonometry – Special Right Triangles

- PowerPoint – 21 slides
- 3 Pages of Guided Notes
- 10 Homework Questions
- Answer Key

Guided Notes



Trigonometry – Introduction to Trigonometry
Day 1: Special Right Triangles

Name: _____

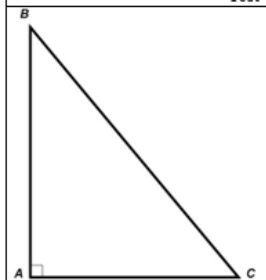
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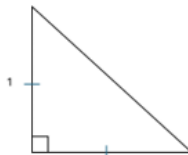
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Test Your Knowledge



- Which side is opposite of the angle with vertex C?
- Which side is adjacent to the angle with vertex B?
- What is the name of the side opposite of the angle with vertex A?

In Trigonometry we must KNOW and Remember Two Triangles



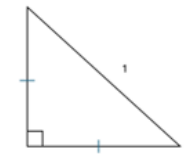
I know this is an isosceles right triangle because of these two facts:

-
-

The angles in this triangle are 45° because:

I know the Pythagorean Theorem applies to this triangle because:

Use the Pythagorean Theorem to find the length of the hypotenuse.
 $a^2 + b^2 = c^2$



Use the Pythagorean Theorem to find the length of the hypotenuse.
 $a^2 + b^2 = c^2$

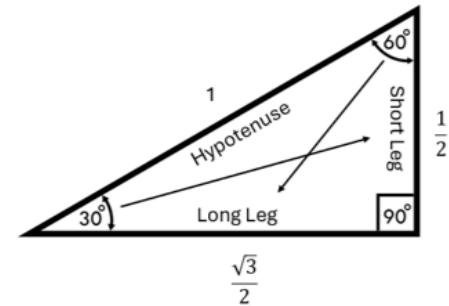
KEY FACT TO REMEMBER: In a 45-45-90 triangle, if the legs are any number, we'll call it x , then the hypotenuse is $x\sqrt{2}$.

Similarly, if the hypotenuse is some number, called y , then the sides are $\frac{y\sqrt{2}}{2}$.

You Try: Given the triangle is an isosceles right triangle:

Find the hypotenuse given that one leg is 3. Find the legs given that the hypotenuse is $4\sqrt{2}$.

The Other Special Right Triangle 30-60-90



Key Facts

- The short side is opposite of the smallest angle.
- The short side is half of the length of the hypotenuse.
- The long side (leg) is opposite of the 60° angle.
- The long leg's length is the short leg $\times \sqrt{3}$.

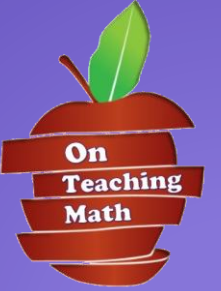
You Try: If the short leg of a 30-60-90 triangle is 5, what is the hypotenuse?

If the hypotenuse is 12, what are the lengths of the other legs?

Wrap – Up: Grade Your Current Understanding for Each Goal from Today:

Identify the relationships between legs, and the hypotenuse in a 45-45-90 triangle.	Figure out and apply the side ratio relationships in a 30-60-90 triangle.	Find missing sides and angles in special right triangles using their unique properties.

Practice Problems



Algebra 2 – Introduction to Trigonometry
Homework 1: Special Right Triangles

Name: _____

- In a 45-45-90 triangle, if one leg is 6 units, the hypotenuse is:
a) $6\sqrt{2}$ units
b) 12 units
c) 8.5 units
d) $3\sqrt{2}$ units
- The angles in a 30-60-90 triangle are in what ratio?
a) 1:2:3
b) 2:3:4
c) 1:2:4
d) 1:2:3
- In a 30-60-90 triangle, which side is opposite to the 30° angle?
a) The hypotenuse
b) The shortest leg
c) The longer leg
d) Both legs are equal
- If the hypotenuse of an isosceles right triangle is 8 units, each leg is:
a) 4 units
b) $4\sqrt{2}$ units
c) $8\sqrt{2}$ units
d) 16 units

Free Response Questions (4 points each):

- In a 30-60-90 triangle, if the shortest side is 5 units, find:
a) The longer leg
b) The hypotenuse

- An isosceles right triangle has a leg of 12 units. Find:

- The other leg
- The hypotenuse

- In a 30-60-90 triangle, the hypotenuse is 16 units. Find:

- The shortest side
- The longer leg

- A square has a diagonal of 10 units. Find:

- The length of each side
- The area of the square

- A regular hexagon has a side length of 4 units. Find:

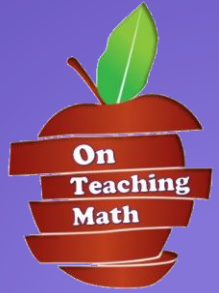
- The length of a radius (from center to vertex)
- The length of an apothem (perpendicular distance from center to side)

- Two mirrors meet at a 45° angle. A light ray hits one mirror 8 units from the corner. How far from the corner will the ray hit the second mirror after being reflected from the first mirror?

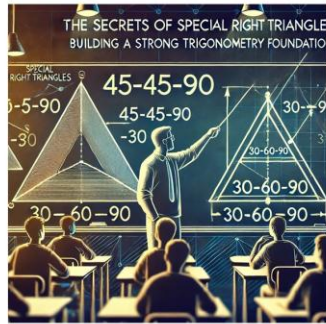
Answer Key

- a) $6\sqrt{2}$ units
Explanation: In a 45-45-90 triangle, if leg = x , then hypotenuse = $x\sqrt{2}$
When leg = 6, hypotenuse = $6\sqrt{2}$
- a) 1:2:3
Explanation: $30^\circ:60^\circ:90^\circ = 1:2:3$
- b) The shortest leg
Explanation: In a 30-60-90 triangle, the shortest leg is always opposite to the 30° angle
- b) $4\sqrt{2}$ units
Explanation: In a 45-45-90 triangle, if hypotenuse = h , then legs = $h/\sqrt{2}$
When $h = 8$, legs = $8/\sqrt{2} = 4\sqrt{2}$
- a) $5\sqrt{3}$ units
b) 10 units
Explanation: In 30-60-90 triangle, if shortest side = x :
Longer leg = $x\sqrt{3} = 5\sqrt{3}$
Hypotenuse = $2x = 10$
- a) 12 units
b) $12\sqrt{2}$ units
Explanation: Isosceles right triangle has equal legs
Hypotenuse = leg $\times \sqrt{2} = 12\sqrt{2}$
- a) 8 units
b) $8\sqrt{3}$ units
Explanation: If hypotenuse = 16:
Shortest side = hypotenuse/2 = 8
Longer leg = $8\sqrt{3}$
- a) $5\sqrt{2}$ units
b) 50 square units
Explanation: Diagonal forms 45-45-90 triangle
Side = diagonal/ $\sqrt{2} = 10/\sqrt{2} = 5\sqrt{2}$
Area = side² = 50
- a) 4 units
b) $2\sqrt{3}$ units
Explanation: Regular hexagon creates 30-60-90 triangles
Radius = side length = 4
Apothem = radius $\times \cos(30^\circ) = 4 \times (\sqrt{3}/2) = 2\sqrt{3}$
- 8 units
Explanation: Forms isosceles right triangle
Distance will be equal on both mirrors due to 45° angle

Sample of Lesson

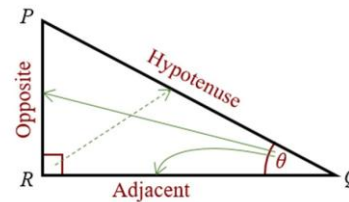


The Secrets of Special Right Triangles: Building a Strong Trigonometry Foundation

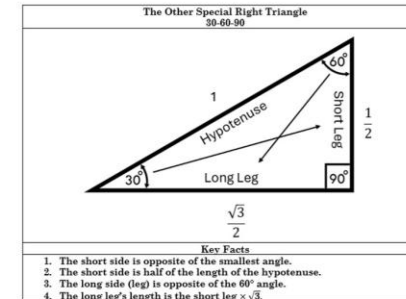


(C) On Teaching Math 2025

Adjacent to an angle	The leg that forms an angle (in a triangle) is adjacent to that angle
Opposite of an angle	The leg that does NOT form an angle (in a triangle) is called opposite of the angle



(C) On Teaching Math 2025



- Key Facts**
- The short side is opposite of the smallest angle.
 - The short side is half of the length of the hypotenuse.
 - The long side (leg) is opposite of the 60° angle.
 - The long leg's length is the short leg $\times \sqrt{3}$.

(C) On Teaching Math 2025

For a 30-60-90 Triangle:

If the hypotenuse is 10, the short side is 5. What would be the long side?

$$5\sqrt{3}$$

If the short leg was 11, what are the other two sides?

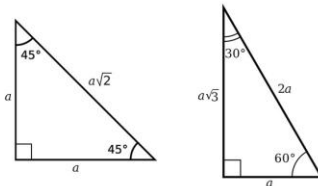
Hypotenuse: 22
Long Leg: $11\sqrt{3}$

If the long leg is $\sqrt{3}$, what are the other sides?

Hypotenuse: 2
Short Leg: 1

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Test Your Knowledge

- Which side is opposite of the angle with vertex C?
Side AB (or BA)
- Which side is adjacent to the angle with vertex B?
Side AB (or BA)
- What is the name of the side opposite of the angle with vertex A?
Hypotenuse

(C) On Teaching Math 2025

Test Your Knowledge

- Which side is opposite of the angle with vertex C?
- Which side is adjacent to the angle with vertex B?
- What is the name of the side opposite of the angle with vertex A?

(C) On Teaching Math 2025

03:00