

Exploring Angle Restrictions and Classifying Triangles

A decorative graphic consisting of several horizontal lines of varying lengths and colors (teal and white) extending from the right side of the title area across the top of the slide.

I. Evaluate an Expression

a. To evaluate an expression means to substitute a given value in for a variable and simplify

b. Evaluate the following:

iii. $3x$ if $x = 6$ **18**

iv. $-4x^2 - 7x + 2$ if $x = -6$ **-100**

II. Sine, Cosine and Tangent

- a. Sine, Cosine and Tangent are trigonometric functions that are related to triangles and angles
 - ii. We will discuss more about where they come from later! 😊
- b. We can evaluate a sine, cosine or tangent just like any other expression
- c. We have buttons on our calculator for sine, cosine and tangent
 - iii. Sine → SIN
 - iv. Cosine → COS
 - v. Tangent → TAN
- d. When evaluating sine, cosine or tangent, we must remember that the value we substitute into the expression represents an angle

e. Angles are measured in

vi. Degrees

vii. Radians

f. We have to check our mode to make sure the calculator knows what measure we are using!

viii. In this class, we will always use Degrees, but you should know that radians exist!

MODE → Make sure Degree is highlighted!

g. For some angles, tangent will be undefined.

h. This means there is an asymptote at this value.

Evaluate the following:

- $\sin (52^\circ)$ 0.788
- $\cos (122^\circ)$ -0.530
- $\tan (-76^\circ)$ -4.011
- $\cos (45^\circ)$ 0.707
- $\sin (30^\circ)$ 0.500
- $\tan (90^\circ)$ undefined
- $\tan (5 \text{ radians})$ -3.38

Solving Equations

- a. To solve an equation means to "undo" all the operations to get the variable by itself
- b. To "undo" an operation means to use the inverse operation
 - i. The inverse operation of addition is subtraction
 - ii. The inverse operation of multiplication is division
 - iii. The inverse operation of squaring is taking a square root
- c. Solve the following equations using inverse operations:
 - i. $3x + 5 = 14$ $x = 3$
 - ii. $2x^2 + 4 = 76$ $x = 6$ and $x = -6$

Solving Sine, Cosine and Tangent Equations

- a. We can solve equations involving sine, cosine and tangent just like any other equation!
- b. Inverse operations of sine, cosine and tangent
 - i. Sine \rightarrow $\boxed{\text{SIN}^{-1}}$
 - ii. Cosine \rightarrow $\boxed{\text{COS}^{-1}}$
 - iii. Tangent \rightarrow $\boxed{\text{TAN}^{-1}}$

d. Solve the following equations and express your answer in degrees:

1. $\sin(x) = 0.6$ 36.87°

2. $\cos(x) = 1.5$ no solution

3. $\tan(x) = -6.7$ -81.51°

4. $\cos(x) = -0.87$ 150.46°

5. $\sin(x) = 0.5$ 30°

Challenge

Solve and express your answer in degrees.

$$3\sin(x)+4=1.57$$

Answer:

$$X=-54.1$$

Complete page 4 in your packet.
We will go over in 5 minutes.

Evaluate each of the following using your calculator (round to the nearest thousandth).

- | | | | |
|----------------------|---------|---------------------------------|-----------|
| 1. $\sin(62^\circ)$ | 0.883 | 7. $\cos(-13^\circ)$ | 0.974 |
| 2. $\cos(132^\circ)$ | -0.669 | 8. $\tan(95^\circ)$ | -11.430 |
| 3. $\tan(-87^\circ)$ | -19.081 | 9. $\cos(778^\circ)$ | 0.530 |
| 4. $\cos(178^\circ)$ | -0.999 | 10. $\sin(225^\circ)$ | -0.707 |
| 5. $\sin(-60^\circ)$ | -0.866 | 11. $\tan(90^\circ)$ | undefined |
| 6. $\sin(78^\circ)$ | 0.978 | 12. $\sin(3.4 \text{ radians})$ | -0.256 |

Solve the following equations and express your answer in degrees to the nearest tenth:

1. $\sin(x) = 0.8$
 53.1°

2. $\cos(x) = -1.7$
undefined

3. $\tan(x) = -9.5$
 -84.0°

4. $\cos(x) = -0.78$
 141.3°

5. $\sin(x) = 0.366$
 21.5°

6. $\sin(x) = -0.768$
 -50.17°

7. $-1\cos(x) = -0.72$
 43.9°

8. $3\tan(x) = -12.8$
 -76.8°

9. $4\cos(x) - 6 = -5.2$
 78.5°

10. $3\sin(x) + 4 = 1.57$
 -54.1°

11. $\tan(x) = 3.27$
 72.9°

12. $2\sin(x) + 5\sin(x) - 6 = -2$
 34.8°

I. Classifying Triangles by their angles

a. Acute Triangle

- i. An acute triangle is a triangle that has **all three angles less than 90 degrees**



b. Obtuse Triangle

- i. An obtuse triangle is a triangle that has **one angle greater than 180 degrees**



c. Right Triangle

- i. A right triangle is a triangle that has **one right triangle**

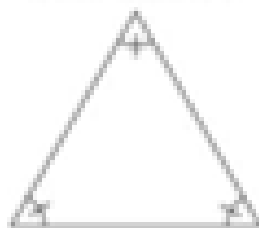


d. Oblique Triangle

- i. A oblique triangle is a **non-right triangle**
ii. These can be **acute** triangles or **obtuse** triangles.

e. Equiangular Triangle

i An equiangular triangle is a triangle that has **all three angles = 60 degrees**



Classifying Triangles by their sides

a. Scalene Triangle

i A scalene triangle is a triangle that **3 noncongruent sides**

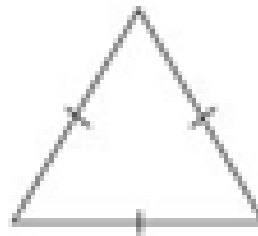
b. Isosceles Triangle



i. An isosceles triangle is a triangle that has **at least two congruent sides**

c. Equilateral Triangle

i. An equilateral triangle is a triangle that has **three congruent sides**



III. Right Triangles and Special Sides

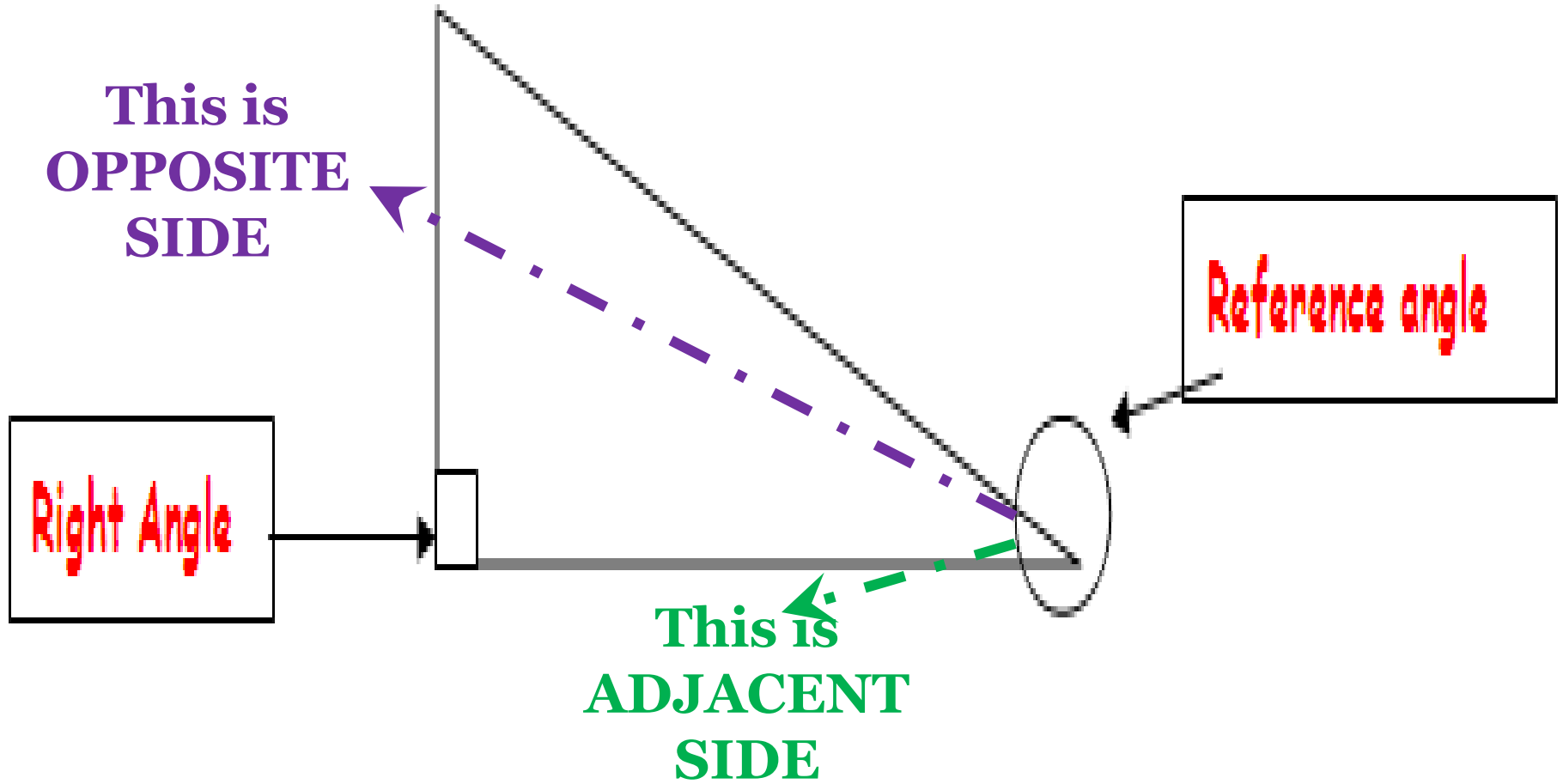
a. A right triangle has three special sides

b. These sides are dependent on the angles: a **right angle** and a **reference angle**

i. Hypotenuse - **diagonal from the right angle**

ii. Opposite Leg - **opposite (across from/not touching) the reference angle**

iii. Adjacent Leg - **adjacent (next to/touching) the reference angle**



Label the Triangles

Label the triangles using

H for *hypotenuse* side,

O for *opposite* side and

A for *adjacent* side

Complete the table below

Angle	$\sin(\text{angle})$	$\cos(\text{angle})$	$\tan(\text{angle})$
0			
30			
60			
90			
120			
150			
180			
210			
240			
270			
300			
330			
360			

Exploring Sine, Cosine and Tangent Angle Restrictions

1. What do you notice about the sine column?
Describe the pattern.
1. What do you notice about the cosine column?
Describe the pattern.
1. What do you notice about the tangent column?
Describe the pattern.