Midterm Study Guide

Mid-Second Semester Examination

Academic Year 2024-2025

BACCALAUREATE SCHOOLS

مدارس البكالوريا

Subject: Math

Grade 10

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Content: enVision Algebra

Topics Covered

Chapter	Lesson	Pages
Trigonometric Functions	1- Trigonometric Functions and Acute Angles	357-364
	2- Angles and the Unit Circle	365-375
	3- Trigonometric Functions and Real Numbers	376-382

Please study the material listed in the table above with a focus on the points below.

Please use your textbook, notes, and worksheets to study.

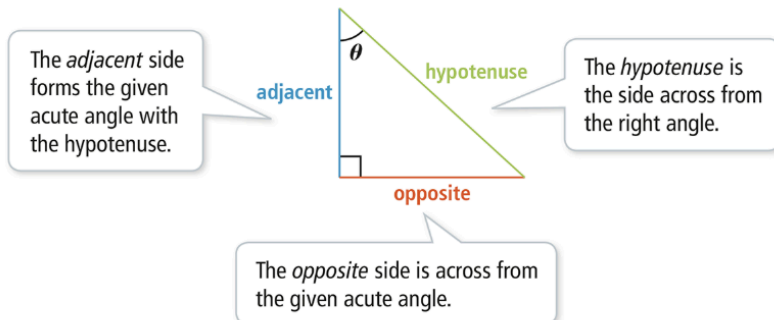**Key Topics and Concepts**

Lesson 1: Trigonometric Functions and Acute Angles

- Math Literacy and Vocabulary

- Identify the trigonometric ratios

- Write trigonometric ratios

- Use one trigonometric ratio to find another

- Find a missing side length

- Evaluate trigonometric ratios in special triangles

- Explain trigonometric identities

Trigonometric Ratios

The three sides of a right triangle are referred to as the hypotenuse and two legs.

The Greek letter θ, read "theta", is often used to represent an acute angle in a right triangle. Angle θ is an abbreviation for "angle with measure θ".

The *adjacent* side forms the given acute angle with the hypotenuse.

The *hypotenuse* is the side across from the right angle.

The *opposite* side is across from the given acute angle.

These are the six basic trigonometric functions of the angle θ.

Sine
$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

Cosine
$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

Tangent
$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$

The **reciprocal trigonometric functions** of the angle θ are formed by exchanging the terms in each ratio.

Cosecant
$$\csc \theta = \frac{\text{hypotenuse}}{\text{opposite}}$$

Secant
$$\sec \theta = \frac{\text{hypotenuse}}{\text{adjacent}}$$

Cotangent
$$\cot \theta = \frac{\text{adjacent}}{\text{opposite}}$$

	$0°$	$30°$	$45°$	$60°$	$90°$
$\sin(\theta)$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos(\theta)$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan(\theta)$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	undefined

<u>Lesson 2: Angles and the Unit Circle</u>

- Math Literacy and Vocabulary

- Find the measure of an angle in standard position

- Find reference angles

- Find the coordinates of a point on the unit circle

- Understand radian measure on the unit circle

- Convert between degrees and radians

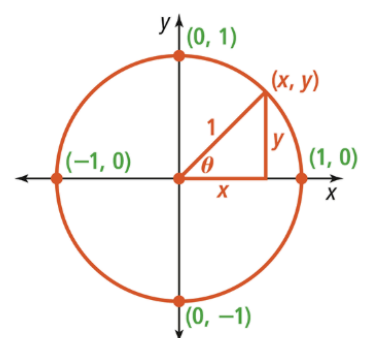- Use radians to find arc length

The Unit Circle

The unit circle is a circle that has its center at the origin and has a radius of 1.

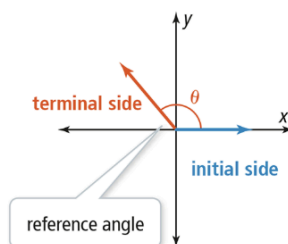In any right triangle formed with the radius as the hypotenuse, the length of the hypotenuse is 1.

Based on right triangle trigonometry

$$\sin \theta = \frac{y}{1}, \text{ or } y \qquad \cos \theta = \frac{x}{1}, \text{ or } x$$
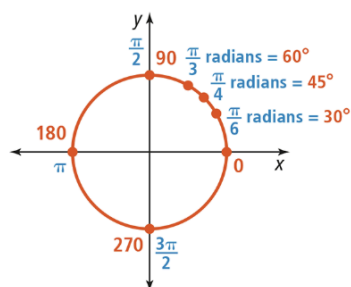
Angles and the Unit Circle

STANDARD POSITION

An angle is in standard position when its initial side is the positive x-axis and its vertex is at the origin.

The reference angle is the acute angle formed by the terminal side and the x-axis.

DEGREES AND RADIANS

$\frac{\pi}{3}$ radians = 60°

$\frac{\pi}{4}$ radians = 45°

$\frac{\pi}{6}$ radians = 30°

$\text{radians} = \frac{\pi}{180} \cdot \text{degrees}$

$\text{degrees} = \frac{180}{\pi} \cdot \text{radians}$

Lesson 3: Trigonometric Functions and Real Numbers

- Math Literacy and Vocabulary

- Use reference triangles to evaluate sine and cosine

- Use the pythagorean identity $\sin^2\theta + \cos^2\theta = 1$

- Use the unit circle to evaluate tangents

- Evaluate the reciprocal functions
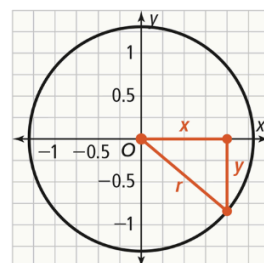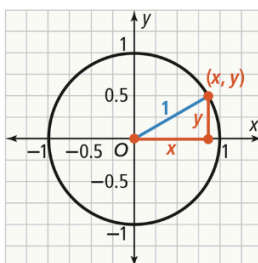
- Use any circle centered at the origin

Trigonometric Functions and the Unit Circle

A reference triangle is formed using the terminal side of an angle and a perpendicular segment from the terminal point to the x-axis. This can help you find the coordinates of the terminal point on the unit circle.

Trigonometric Functions on the Unit Circle	Trigonometric Functions on Any Circle
GRAPHS	
WORDS For an angle with measure θ in standard position with terminal point (x, y) on the unit circle:	For an angle with measure θ in standard position with terminal point (x, y) on any circle:
$\sin\theta = y \qquad \csc\theta = \frac{1}{y}$ $\cos\theta = x \qquad \sec\theta = \frac{1}{x}$ $\tan\theta = \frac{y}{x} \qquad \cot\theta = \frac{x}{y}$	$\sin\theta = \frac{y}{r} \qquad \csc\theta = r \cdot \frac{1}{y}$ $\cos\theta = \frac{x}{r} \qquad \sec\theta = r \cdot \frac{1}{x}$ $\tan\theta = \frac{y}{x} \qquad \cot\theta = \frac{x}{y}$