

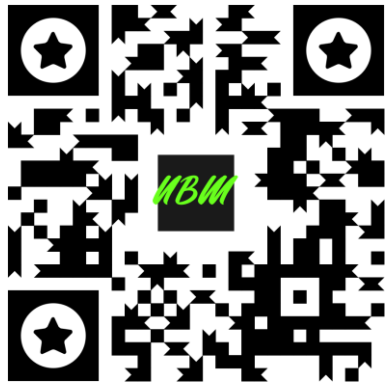
MATHEMATICS

**TOPIC: TRIGONOMETRY
GRADE 10**

CAPS ALIGNED

TRIGONOMETRY – TRIGONOMETRIC EQUATIONS

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TRIGONOMETRY – Grade 10

1. Trigonometry

1. Define the trigonometric ratios $\sin \theta$, $\cos \theta$ and $\tan \theta$ using the right – angled triangle
2. Extend the definitions of $\sin \theta$, $\cos \theta$ and $\tan \theta$ for $0^\circ \leq \theta \leq 360^\circ$
3. Define the reciprocal of the trigonometric ratios $\operatorname{cosec} \theta$, $\sec \theta$ and $\cot \theta$, using the right-angled triangles (these three reciprocals should be examined in Grade 10 only)
4. Derive values of the trigonometric ratios for the special cases (without using a calculator) $\theta \in \{0^\circ, 30^\circ, 45^\circ, 60^\circ, 90^\circ\}$
5. Solve two-dimensional problems involving right-angled triangles (See Term 3)
6. Solve simple trigonometric equations for angles between 0° and 90°
7. Use a diagram to determine the numerical values of ratios for angles from 0° to 360°

2. Trigonometry (2D)

1. Solve two-dimensional problems involving right- angled triangles
2. Problems in two dimensions

3. Examination Guideline

1. The reciprocal ratios $\operatorname{cosec} \theta$, $\sec \theta$ and $\cot \theta$ will be explicitly tested in all aspects: definitions, function values and equations.
2. While the focus of trigonometric graphs is on the relationships, the characteristics of the graphs will also be examined.

Trigonometry (Trigonometric Equations) - GRADE 10

Notes: Toolbox

①

Isolate the trig. function

$$\sin(\text{angle}) = \text{Numerical Value}$$

$$\cos(\text{angle}) = \text{Numerical Value}$$

$$\tan(\text{angle}) = \text{Numerical Value}$$

② Calculator in degree mode

Examples: Isolate the trig. ratio

$$\textcircled{1} \frac{\sin \theta}{2} = \frac{1}{2}$$

$$\sin \theta = 1$$

$$\textcircled{2} 3(\cos(\theta + 10^\circ)) - 1 = 1$$

$$\} \cos(\theta + 10^\circ) = 2$$

$$\cos(\theta + 10^\circ) = \frac{2}{3}$$

Trigonometry (Trigonometric Equations) - GRADE 10

Exercises - A

Exercise A

5.2 In each of the following equations, solve for x where $0^\circ \leq x \leq 90^\circ$. Give your answers correct to TWO decimal places.

5.2.1 $\tan x = 2,22$

5.2.2 $\sec(x + 10^\circ) = 5,759$

5.2.3 $\frac{\sin x}{0,2} - 2 = 1,24$

Solution

5.2.1 $\tan x = 2,22$

$$\tan^{-1}(\tan x) = \tan^{-1}(2,22)$$

$$x = 65,175^\circ$$

5.2.2 $\sec(x + 10^\circ) = 5,759$

$$\frac{1}{\cos(x + 10^\circ)} = 5,759$$

$$1 = 5,759 \times \cos(x + 10^\circ)$$

$$\frac{1}{5,759} = \cos(x + 10^\circ)$$

$$\therefore \cos(x + 10^\circ) = \frac{1}{5,759}$$

$$x + 10^\circ = \cos^{-1}\left(\frac{1}{5,759}\right)$$

$$x = \cos^{-1}\left(\frac{1}{5,759}\right) - 10^\circ$$

$$\therefore x = 70,00^\circ$$

5.2.3 $\frac{\sin x}{0,2} - 2 = 1,24$

$$\frac{\sin x}{0,2} = 3,24$$

$$\sin x = \frac{81}{125}$$

$$x = \sin^{-1}\left(\frac{81}{125}\right)$$

$$x = 40,39^\circ$$

Trigonometry (Trigonometric Equations) - GRADE 10

Exercises - B

Exercise B

5.2 Calculate θ if $2\sin(\theta+15^\circ)=1,462$ and $0^\circ \leq \theta \leq 90^\circ$.

Solution

$$2\sin(\theta+15^\circ)=1,462$$

$$\sin(\theta+15^\circ)=\frac{1,462}{2}$$

$$\Rightarrow \theta + 15^\circ = \sin^{-1}\left(\frac{1,462}{2}\right)$$

$$\theta = \sin^{-1}\left(\frac{1,462}{2}\right) - 15^\circ$$

$$\therefore \theta = 31,97^\circ$$

Trigonometry (Trigonometric Equations) - GRADE 10

Exercises - C

Exercise C

- 4.3 Solve for θ correct to TWO decimal places, if $\frac{4}{3}\sin\theta = \cos 37^\circ$ and $0^\circ \leq \theta \leq 90^\circ$.

Solution

$$\frac{4}{3}\sin\theta = \cos 37^\circ$$

$$\sin\theta = \frac{3 \times \cos 37^\circ}{4}$$

$$\sin\theta = \frac{3 \times \cos 37^\circ}{4}$$

$$\sin\theta = 0,5989766325$$

$$\theta = \sin^{-1}(0,5989766325)$$

$$\therefore \theta = 36,80^\circ$$

Trigonometry (Trigonometric Equations) - GRADE 10

Exercises - D

Exercise D

4.2 Solve for x , correct to ONE decimal place, where $0^\circ \leq x \leq 90^\circ$:

4.2.1 $\tan x = 2,01$

4.2.2 $5 \cos x + 2 = 4$

4.2.3 $\frac{\operatorname{cosec} x}{2} = 3$

Solution

4.2.1 $\tan x = 2,01$

$$\therefore x = \tan^{-1}(2,01)$$

$$\therefore x = 63,5^\circ$$

$$4.2.2 \quad 5 \cos x + 2 = 4$$

$$5 \cos x = 2$$

$$\cos x = \frac{2}{5}$$

$$x = \cos^{-1}\left(\frac{2}{5}\right)$$

$$\therefore x = 66,4^\circ$$

$$4.2.3 \quad \frac{\operatorname{cosec} x}{2} = 3$$

$$\operatorname{cosec} x = 6$$

$$\sin x = \frac{1}{6}$$

$$x = \sin^{-1}\left(\frac{1}{6}\right) \quad \therefore x = 9,6^\circ$$

END

$$e^{i\pi} + 1 = 0$$

Euler's Identity

SOURCES

- 1. FET CAPS DOCUMENT**
- 2. GRADE 10 EXAMINATION GUIDELINES**
- 3. GRADE 10 DBE/NOVEMBER 2015 -2018**