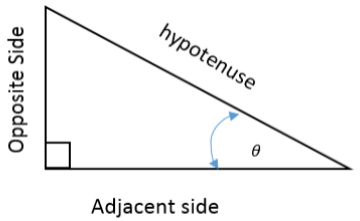
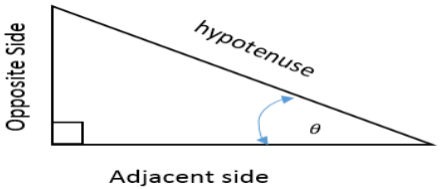
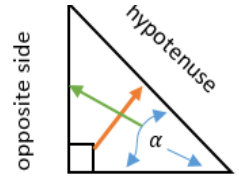
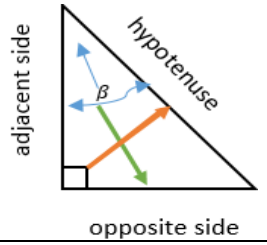
SUBJECT and GRADE	GRADE 10 MATHEMATICS	
TERM 2	*Week 5*	
TOPIC	2-Dimensional Trigonometry	
AIMS OF LESSON	To: • Use trigonometric ratios and apply them in right-angled triangles to calculate sides and angles of triangles. • Work with more than one triangle to calculate lengths and sides in the triangles. • Represent a real – life problem as a right-angled triangle or triangles. •	
RESOURCES	***Paper based resources***	***Digital resources***
	• *Consult your Trigonometry section in the textbook.*	SOHCAHTOA Mnemonic: https://youtube.com/watch?v=PIWJo5uK3Fo Angles of Elevation and Depression:https://youtu.be/YNe5epxUFTU Scientific Calculator
INTRODUCTION	• *Trigonometry was developed in ancient civilisations to solve practical problems such as building construction and navigation. These lessons will show that trigonometry can be used to solve other practical problems..*	
	• *NB!* ***Pythagorus' Theorem*** *is only used if the lengths of two sides are given:* $(hypotenuse)^2 = (adjacent\ side)^2 + (opposite\ \ side)^2$ *or* $r^2 = x^2 + y^2$	EG. 
	• ***Naming the sides in a Right-Angled Triangle***  	For any Right-angled Δ, we identify the sides in the following order: 1. The longest side is called the **hypotenuse**. The angle (∠) across the hypotenuse is indicated by *a block*□ . This block represents a right angle i.e 90° 2. The side across from the angle you are working with is the **opposite side**, 3. and the remaining side is called the **adjacent side**



1. Identify the hypotenuse, the side opposite the right ∠.
2. Where is the ∠ I must use?

I require α so the side across α is the opposite side.

3. The remaining side is the adjacent side.



1. Identify the hypotenuse, the side opposite the right ∠.
2. Where is the ∠ I must use?

I require β so the side across β is the opposite side.

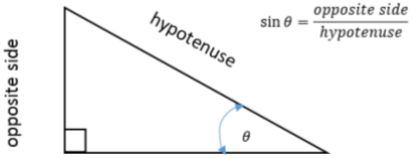
3. The remaining side is the adjacent side.

The Names of the 3 Ratios

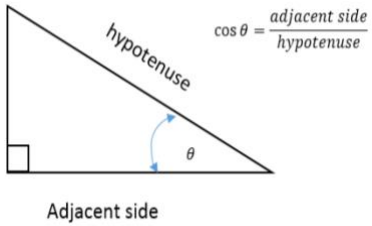
Sine, cosine and tangent

Definitions

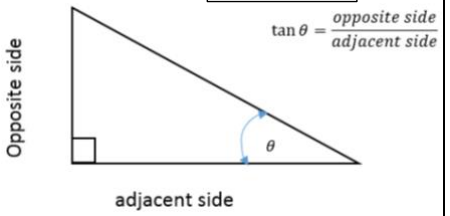
sine θ



cosine θ



tangent θ



How can we remember the definitions?

SOH CAH TOA

CONCEPTS AND SKILLS

For a right – angled triangle, when an angle is given and a side you can use the ratios to determine the other two sides

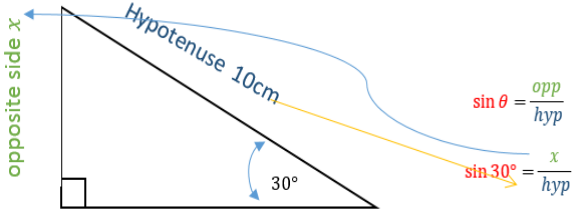
1.Identify which side is required.

2.Pick the correct formula

3.Rearrange the formula to find the required side.

Then substitute to find the required side.

Example 1: Determine the length of the side x, in the sketch below.



Solution:

$$\sin\theta = \frac{opp}{hyp}$$

$$\sin 30° = \frac{x}{10}$$

$$\frac{10}{1} \times \sin 30° = \frac{x}{10} \times \frac{10}{1}$$

$$10 \times \sin 30° = 1x$$

$$1x = 10 \times \sin 30°$$

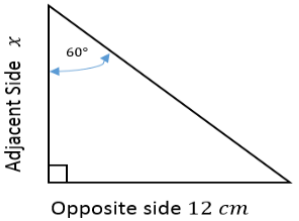
$$1x = 10 \times \frac{1}{2}$$

$$1x = 5\ cm$$

1. Identify x, is the side opposite the given angle 30°.
2. Pick the correct ratio. The opposite must be calculated and the length of the hypotenuse is given. The trig ratio involving opposite side and hypotenuse is the sine ratio. Substitute the values/variables that we know
3. Rearrange the formula to find x , the required side.

CAN YOU?

1. Determine the length of the side x, in the sketch below.



Answer: $x = 5\ cm$

LET'S LOOK AT PROBLEMS WHERE THE ANGLE HAS TO BE FOUND

Example 2: Determine the size of θ: $\mathbf{\sin\theta = \frac{7}{12}}$

Solution:

$\theta = 35{,}69°$

On the calculator press INV/SHIFT button then sin then $\frac{7}{12}$ $\therefore \theta = 35{,}69°$

Just take note if you use the decimal ($\frac{7}{12} = 0{,}583$), since you are rounding off early

$\boldsymbol{\theta}$ = 35,66° this is incorrect if answer is correct to two decimal places.

CAN YOU?

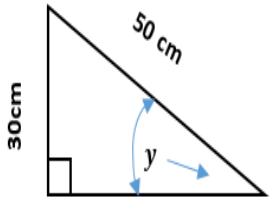
2.

Determine the size of β: $\mathbf{\tan\beta = \frac{14}{15}}$

Answer: β= 43,03°

HEIGHTS and DISTANCES

Example 3: Determine the size of the angle y.

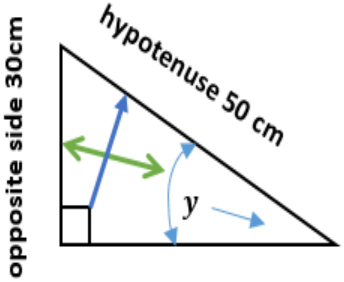


Solution:

$$\sin y = \frac{30}{50}$$

$$y = \sin^{-1}\left(\frac{30}{50}\right)$$

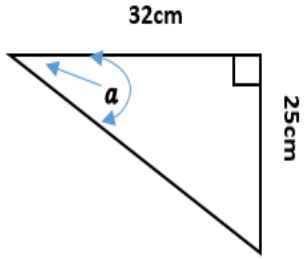
$$y = 36{,}87°$$



The hypotenuse and opposite side can be identified so the sine ratio is required.

CAN YOU?

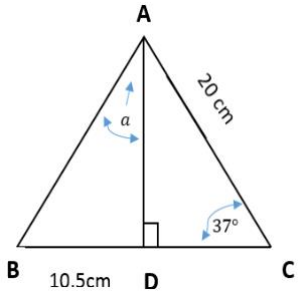
3.Determine the size of the angle a.



Answer:

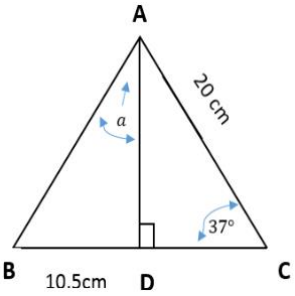
$a = 37{,}99°$

Example 4: Determine AD



CAN YOU?

Determine: DC



	2.1 To find AD –Use triangle ADC. The hypotenuse(AC) is given and opposite side(AD) must be determined, ∴the sine ratio is required. $\sin C = \frac{opp}{hyp} = \frac{AD}{AC}$ $\sin(37°) = \frac{AD}{20}$ $\frac{20}{1} \times \sin(37°) = \frac{AD}{20} \times \frac{20}{1}$ $20 \times \sin(37°) = AD$ $AD = 20 \times \sin(37°)$ $AD = 15{,}97\ cm$ $\therefore DC = 15{,}97cm$
ACTIVITIES/ ASSESSMENT	*Do Additional exercises from your textbook.*
	Syavula: *Page:229 Exercise: 7 – 3* *Page 232 Exercise: 7 - 4*
CONSOLIDATION	**KEY CONCEPTS :** • Definitions of the ratios • How to find a side when an angle and another side is given. • How to find an angle when two sides are given.