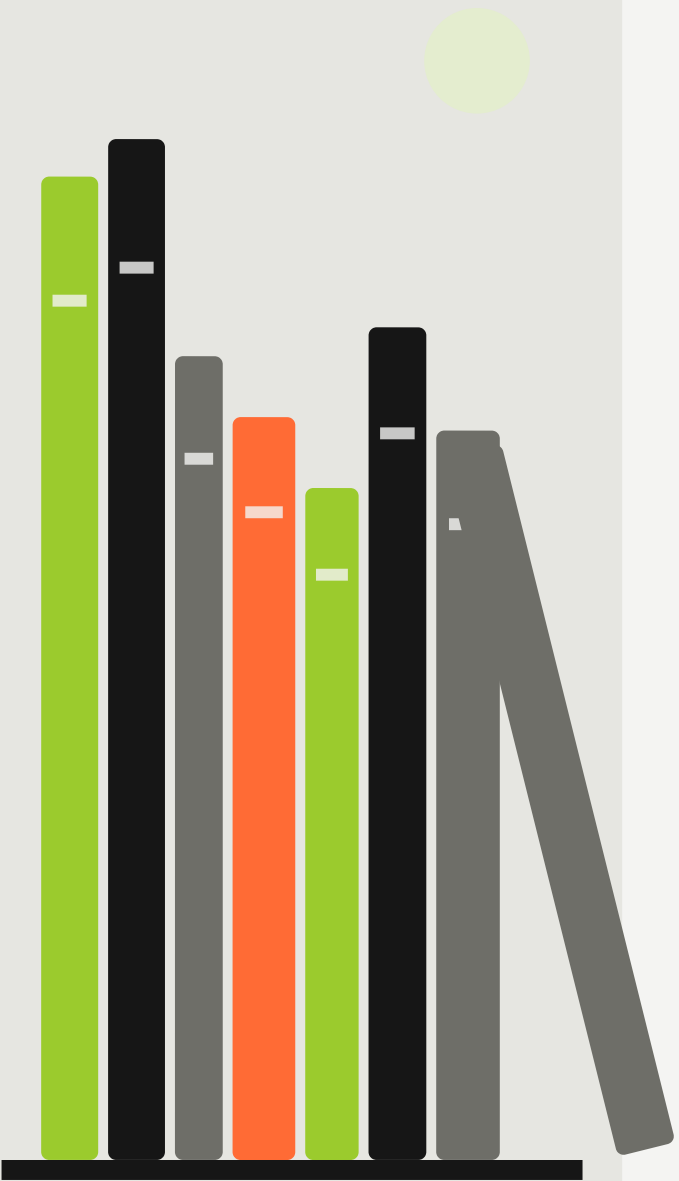




MATHEMATICS • CLASS 10

# Trigonometry Basics

Sine, cosine and tangent in right triangles

TEACHER  
Teacher Name

CLASS  
10

PERIOD  
40 minutes

# Lesson plan

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**01** Warm-up

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**02** Learn

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**03** Explore

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**04** Practise

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01

# WARM-UP



# Learning objectives

- Name the sides of a right triangle
- Define sin, cos and tan
- Recall standard angle values
- Solve height and distance problems

YOU ALREADY KNOW

**Pythagoras  
theorem and  
similar triangles.**

KEY IDEA

How can you find the  
height of a tree  
without climbing it?

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Think about it

02

LEARN



# Ratios in a right triangle

**Trigonometric ratios compare the sides of a right triangle.**

For an angle  $\theta$ :  $\sin \theta = \text{opposite/hypotenuse}$ ,  $\cos \theta = \text{adjacent/hypotenuse}$ ,  $\tan \theta = \text{opposite/adjacent}$ .

The ratios are the same for every triangle with that angle.



Diagram / picture

# Key terms

1

## Hypotenuse

The longest side, opposite the right angle.

2

## Opposite

The side facing angle  $\theta$ .

3

## Adjacent

The side next to  $\theta$ .

# Solving a height problem

**1 Draw**

Sketch the triangle

**2 Label**

Mark  $\theta$  and the known side

**3 Choose**

sin, cos or tan

**4 Solve**

Rearrange and calculate

# Standard values

| Angle | sin          | cos          | tan          |
|-------|--------------|--------------|--------------|
| 30°   | $1/2$        | $\sqrt{3}/2$ | $1/\sqrt{3}$ |
| 45°   | $1/\sqrt{2}$ | $1/\sqrt{2}$ | 1            |
| 60°   | $\sqrt{3}/2$ | $1/2$        | $\sqrt{3}$   |

*Learn these with the hand trick.*

03

EXPLORE



# Did you know?

## 2,000+

years of trigonometry

## SOH-CAH-TOA

the classic memory aid

## GPS

uses trigonometry

# Real-life examples

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Image 1

## Architecture

Roofs and ramps



Image 2

## Navigation

Ships and aircraft



Image 3

## Surveying

Heights of buildings

# sin vs cos

## sin $\theta$

- Opposite / hypotenuse
- Rises from  $0^\circ$  to  $90^\circ$
- $\sin 90^\circ = 1$

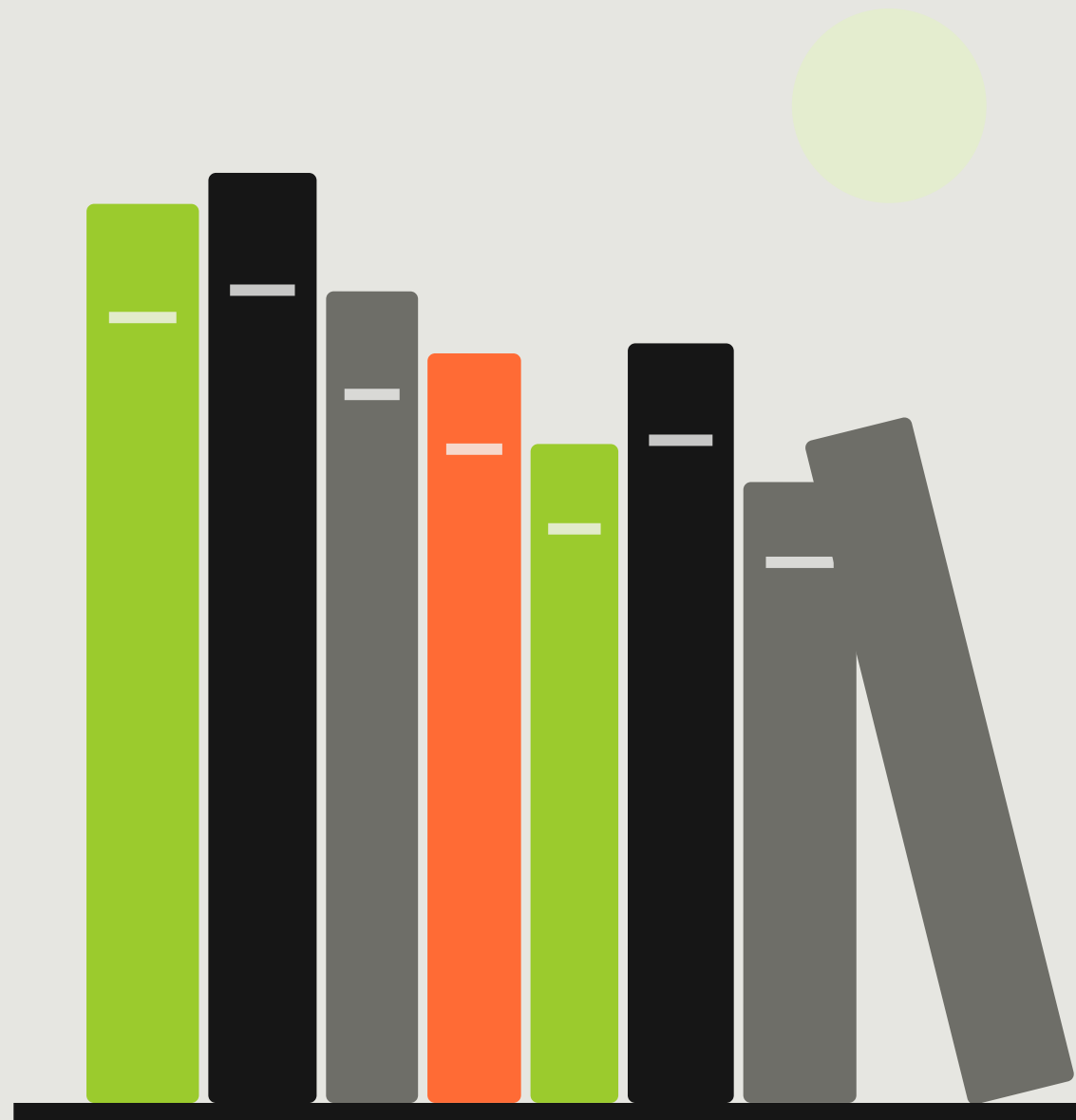
vs

## cos $\theta$

- Adjacent / hypotenuse
- Falls from  $0^\circ$  to  $90^\circ$
- $\cos 0^\circ = 1$

04

PRACTISE



# Check your understanding

- Write  $\sin \theta$  in terms of sides
- Find  $\tan 45^\circ$
- If  $\sin \theta = 1/2$ , find  $\theta$
- A ladder makes  $60^\circ$  with the ground; find the height it reaches

# Activity time

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1

## Clinometer

Make one from a protractor and a straw.

2

## Measure the school

Find the flagpole height.

3

## Value bingo

Bingo with standard values.

# Homework

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- Exercise 8.1, questions 1–5
- Prove  $\sin^2\theta + \cos^2\theta = 1$
- Estimate the height of a building near home

# Great work today!

Next lesson: Trigonometric identities

Teacher Name

Class 10

