3 Trig ratios and the unit circle – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	**Write it 3 times** (English)		
periodic			
period			
unit circle			
radians			

Recall

You have used trigonometry with right triangles:

- **SOH CAH TOA**: sine, cosine, and tangent of an angle.
- You have seen the smooth wave shape of a sine graph.
- Angles can be measured in degrees.

This sheet lines up the trig ideas the course builds on. Each idea has a worked example.

New ideas

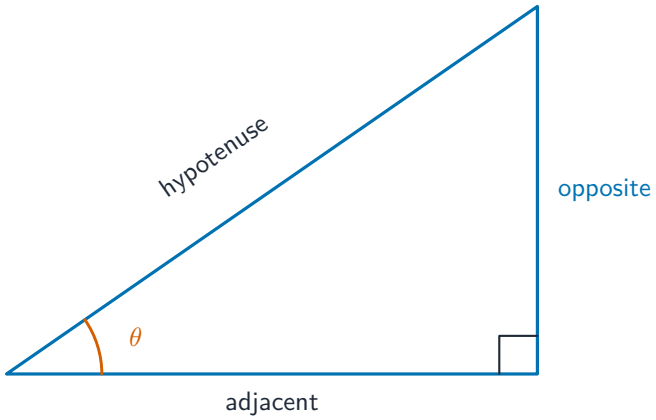
1 Periodic patterns

A pattern is **periodic** if it repeats at regular steps. The **period** is how far you go before it repeats – like the tides, or day and night.

2 Right-triangle trig

For a right triangle, with an angle θ:

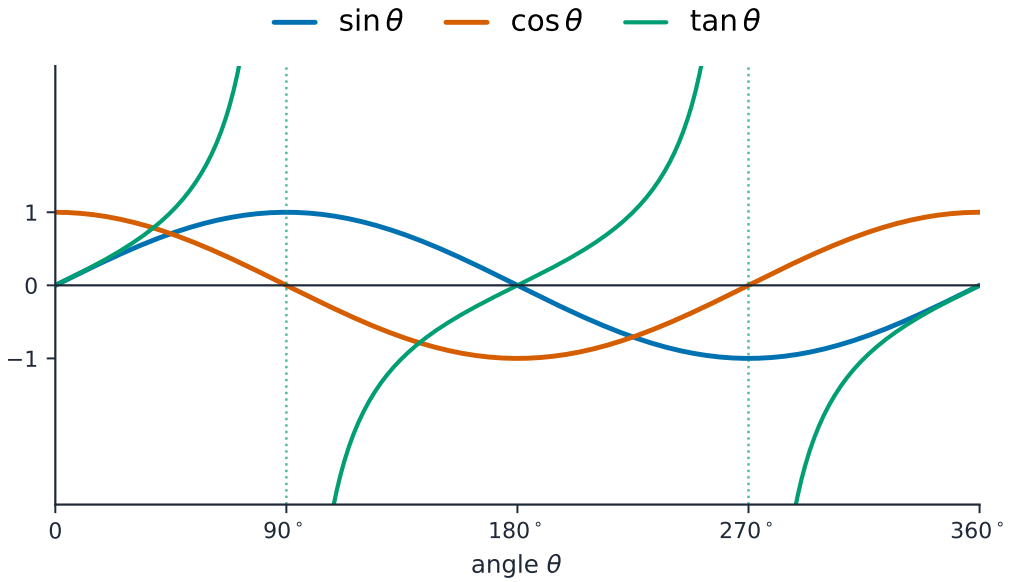
$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}, \quad \cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}, \quad \tan\theta = \frac{\text{opposite}}{\text{adjacent}}.$$



Worked example. In a right triangle with opposite $= 3$ and hypotenuse $= 5$: $\sin\theta = \frac{3}{5} = 0.6$.

3 The unit circle

On the **unit circle** (radius 1), the point at angle θ has coordinates $(\cos\theta, \sin\theta)$. Angles can be measured in **radians** (a full turn is 2π).



4 Special angles

The values at $0°, 30°, 45°, 60°, 90°$ come up again and again – for example $\sin 30° = 0.5$ and $\cos 60° = 0.5$.

Watch out: $\sin\theta$ and $\cos\theta$ are always between -1 and 1 – they are ratios of a side to the hypotenuse (the longest side), so they can never exceed 1.

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Practice

Try these in order. The methods are all above.

2.1 State what it means for a pattern to be periodic. [1]

2.2 Write the SOH CAH TOA ratios for sine, cosine, and tangent. [3]

2.3 A right triangle has opposite $= 4$ and hypotenuse $= 5$. Find $\sin\theta$. [2]

2.4 The same triangle has adjacent $= 3$. Find $\cos\theta$ and $\tan\theta$. [2]

2.5 State the largest and smallest possible values of $\sin\theta$. [1]