

3 Trig ratios and the unit circle – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
periodic	周期性	_____
period	周期	_____
unit circle	单位圆	_____
radians	弧度	_____

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

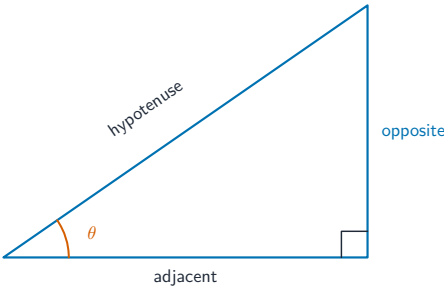
1 Periodic patterns

A pattern is **periodic** 周期性 if it repeats at regular steps. The **period** 周期 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 :

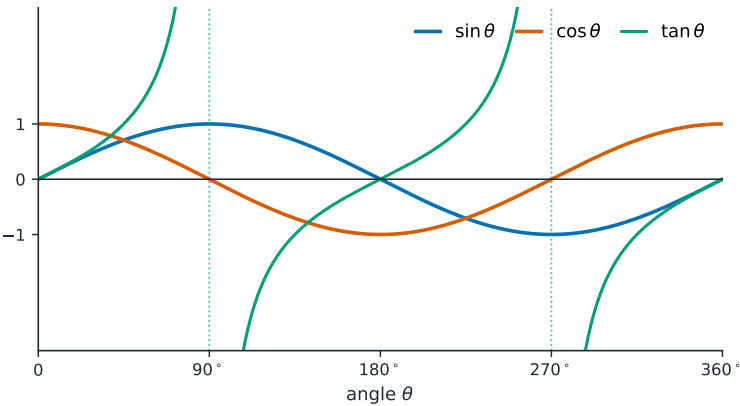
$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}, \quad \cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}, \quad \tan \theta = \frac{\text{opposite}}{\text{adjacent}}.$$



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



4 Special angles

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

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.

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]
