

3.3 Sine and Cosine Function Values

Name: _____ Class: _____ Date: _____

Total: 9 marks

Objective

Build the skills to answer exam questions on **sine and cosine function values**.

You must be able to:

- use the **unit circle** 单位圆: the point at angle θ is $(\cos \theta, \sin \theta)$
- convert between degrees and **radians** 弧度

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ The unit circle

On the unit circle, the point at angle θ is $(\cos \theta, \sin \theta)$.

Radians: $\pi = 180^\circ$.

Key values: $\cos 0 = 1$, $\sin 0 = 0$; $\cos \frac{\pi}{2} = 0$, $\sin \frac{\pi}{2} = 1$.

■ Using the unit circle

Find $\cos \frac{\pi}{3}$ and $\sin \frac{\pi}{3}$. The angle $\frac{\pi}{3} = 60^\circ$ gives the point $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$, so $\cos \frac{\pi}{3} = \frac{1}{2}$ and $\sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$. The x -coordinate is the cosine; the y -coordinate is the sine.

2 Practice

2.1 State the coordinates of the unit-circle point at angle θ . [1]

2.2 Convert 180° to radians. [1]

2.3 State $\sin \frac{\pi}{2}$ and $\cos \frac{\pi}{2}$. [2]

3 Exam-style questions

3.1 On the unit circle, the point at angle θ is [1]

- **A** $(\sin \theta, \cos \theta)$
 - **B** $(\cos \theta, \sin \theta)$
 - **C** $(\tan \theta, 1)$
 - **D** $(1, \theta)$
-

3.2 π radians equals [1]

- **A** 90°
 - **B** 180°
 - **C** 270°
 - **D** 360°
-

3.3 Evaluate each.

(a) $\cos 0$. [1]

(b) $\sin 0$. [1]

(c) $\sin \frac{\pi}{2}$. [1]

4 Go further

- work through the **3.3 Sine and Cosine Function Values** lesson on the **Learn** page;
- read the **Trigonometric and Polar Functions** section of the AP Precalculus hand-out on the **Know** page.

Solutions

2.1 $(\cos \theta, \sin \theta)$.

2.2 π radians.

2.3 $\sin \frac{\pi}{2} = 1$; $\cos \frac{\pi}{2} = 0$.

3.1 B.

3.2 B.

3.3 (a) 1. (b) 0. (c) 1.