

Exercise walk-through

Sine and Cosine Function Values ■ 3.3

eXercise

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

Method — The unit circle

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

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

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

Method — 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.

Practice 2.1 ■ 1 mark

State the coordinates of the unit-circle point at angle θ .

Solution 2.1

Method: The unit circle

Worked steps

$(\cos \theta, \sin \theta)$ **B1**.

Practice 2.2 ■ 1 mark

Convert 180° to radians.

Solution 2.2

Method: The unit circle

Worked steps

π radians **B1**.

Practice 2.3 ■ 2 marks

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

Solution 2.3

Worked steps

$$\sin \frac{\pi}{2} = 1; \cos \frac{\pi}{2} = 0 \quad \text{B1} \quad \text{B1}.$$

Exam-style 3.1 ■ 1 mark

On the unit circle, the point at angle θ is

A $(\sin \theta, \cos \theta)$

B $(\cos \theta, \sin \theta)$

C $(\tan \theta, 1)$

D $(1, \theta)$

Solution 3.1

Method: The unit circle

A $(\sin \theta, \cos \theta)$

B $(\cos \theta, \sin \theta)$



C $(\tan \theta, 1)$

D $(1, \theta)$

Worked steps

B.

Exam-style 3.2 ■ 1 mark

π radians equals

A 90°

B 180°

C 270°

D 360°

Solution 3.2

A 90°

B 180°



C 270°

D 360°

Worked steps

B.

Exam-style 3.3 ■ 1 mark

Evaluate each.

(a) $\cos 0$.

(b) $\sin 0$.

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

Solution 3.3

Worked steps

(a) 1 **B1**. (b) 0 **B1**. (c) 1 **B1**.