

2.7 Derivatives of $\cos x$, $\sin x$, e^x , and $\ln x$

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS derivatives 导数

Objective

Build the skills to answer exam questions on **the derivatives of** $\cos x$, $\sin x$, e^x , and $\ln x$.

You must be able to:

- state and use these four standard **derivatives** 导数

1 Worked examples

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

■ Key derivatives

$$\frac{d}{dx}[\sin x] = \cos x, \quad \frac{d}{dx}[\cos x] = -\sin x,$$

$$\frac{d}{dx}[e^x] = e^x, \quad \frac{d}{dx}[\ln x] = \frac{1}{x}.$$

2 Practice

2.1 State $\frac{d}{dx}[\sin x]$. [1]

2.2 State $\frac{d}{dx}[e^x]$. [1]

2.3 State $\frac{d}{dx}[\cos x]$ and $\frac{d}{dx}[\ln x]$. [2]

3 Exam-style questions

3.1 $\frac{d}{dx}[\cos x]$ equals [1]

- **A** $\sin x$
 - **B** $-\sin x$
 - **C** $\cos x$
 - **D** $-\cos x$
-

3.2 $\frac{d}{dx}[\ln x]$ equals [1]

- **A** x
 - **B** $\frac{1}{x}$
 - **C** $\ln x$
 - **D** e^x
-

3.3 Differentiate each.

(a) $\sin x$. [1]

(b) e^x . [1]

(c) $\cos x$.

[1]

Solutions

2.1 $\cos x$.

2.2 e^x .

2.3 $\frac{d}{dx}[\cos x] = -\sin x$; $\frac{d}{dx}[\ln x] = \frac{1}{x}$.

3.1 B.

3.2 B.

3.3 (a) $\cos x$. (b) e^x . (c) $-\sin x$.