

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

Name: _____ Class: _____ Date: _____

Total: 9 marks

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]

4 Go further

- work through the **2.7 Derivatives of $\cos x$, $\sin x$, e^x , and $\ln x$** lesson on the **Learn** page;
- read the **Differentiation: Definition and Fundamental Properties** section of the AP Calculus AB handout on the **Know** page.

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) $-\sin x$.