

3.5 Sinusoidal Functions

Name: _____ Class: _____ Date: _____

Total: 9 marks

Objective

Build the skills to answer exam questions on **sinusoidal functions**.

You must be able to:

- read the amplitude, period, phase shift, and midline from $y = a \sin(b(x - h)) + k$

1 Worked examples

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

■ The general sinusoid

$$y = a \sin(b(x - h)) + k.$$

- $|a|$ = **amplitude** 振幅;
- period = $\frac{2\pi}{b}$;
- h = horizontal (**phase**) shift 相移;
- k = **midline** 中线 (vertical shift).

■ Example

$y = 3 \sin(2x) + 1$: amplitude 3, period $\frac{2\pi}{2} = \pi$, midline $y = 1$.

2 Practice

2.1 In $y = a \sin(bx)$, state the amplitude. [1]

2.2 State the period of $y = \sin(2x)$. [2]

2.3 In $y = \sin x + 3$, state the midline. [1]

3 Exam-style questions

3.1 In $y = a \sin(b(x - h)) + k$, the amplitude is [1]

- **A** b
 - **B** $|a|$
 - **C** k
 - **D** h
-

3.2 The period of $y = a \sin(bx)$ is [1]

- **A** 2π
 - **B** $\frac{2\pi}{b}$
 - **C** $\frac{b}{2\pi}$
 - **D** πb
-

3.3 $y = 3 \sin(2x) + 1$.

(a) State the amplitude. [1]

(b) State the period. [1]

(c) State the midline. [1]

4 Go further

- work through the **3.5 Sinusoidal Functions** 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 $|a|$.

2.2 period $= \frac{2\pi}{2} = \pi$.

2.3 $y = 3$.

3.1 B.

3.2 B.

3.3 (a) 3. (b) π . (c) $y = 1$.