AP PRECALCULUS • EXERCISE SHEET

3.1 Periodic Phenomena

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

Objective

Build the skills to answer exam questions on **periodic phenomena**.

You must be able to:

- identify the **period** 周期, **amplitude** 振幅, and **midline** 中线 of a periodic function

1 Worked examples

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

■ Periodic functions

A **periodic** function repeats every **period** P (the length of one cycle). Its:

- **amplitude** $= \dfrac{\max - \min}{2}$;
- **midline** $= \dfrac{\max + \min}{2}$ (the horizontal centre).

■ Example

Max 8, min 2: amplitude $= 3$, midline $= 5$.

2 Practice

2.1 Define the period of a periodic function. [1]

2.2 State how the amplitude relates to the max and min. [1]

2.3 A wave has max 8 and min 2. Find the amplitude and midline. [2]

3 Exam-style questions

3.1 The period of a periodic function is [1]

- **A** its height
- **B** the length of one cycle
- **C** its maximum
- **D** its slope

3.2 The amplitude equals [1]

- **A** $\max - \min$
- **B** $\dfrac{\max - \min}{2}$
- **C** $\dfrac{\max + \min}{2}$
- **D** $\max$

3.3 A tide has maximum height 6 m and minimum 0 m, repeating every 12 h.

(a) Find the amplitude. [1]

(b) Find the midline. [1]

(c) State the period. [1]

4 Go further

- work through the **3.1 Periodic Phenomena** 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 the length of one complete cycle.

2.2 amplitude $= \dfrac{\max - \min}{2}$.

2.3 amplitude $= \dfrac{8-2}{2} = 3$; midline $= \dfrac{8+2}{2} = 5$.

3.1 **B**.

3.2 **B**.

3.3 (a) $\dfrac{6-0}{2} = 3$ m. (b) $\dfrac{6+0}{2} = 3$ m. (c) 12 h.