

Exercise walk-through

Sinusoidal Function Context and Data Modeling ■ 3.7

eXercise

You must be able to

- build a sinusoidal model from a maximum, minimum, and **period** 周期

Method — Building a sinusoid from data

- amplitude = $\frac{\max - \min}{2}$;
- midline = $\frac{\max + \min}{2}$;
- $b = \frac{2\pi}{\text{period}}$.

Method — Example

A tide with max 6 m, min 2 m, period 12 h: amplitude 2, midline 4, $b = \frac{2\pi}{12} = \frac{\pi}{6}$, giving $y = 2 \sin\left(\frac{\pi}{6}t\right) + 4$.

Practice 2.1 ■ 1 mark

State the formula for b given the period.

Solution 2.1

Worked steps

$$b = \frac{2\pi}{\text{period}} \quad \text{B1}.$$

Practice 2.2 ■ 2 marks

A quantity has max 10 and min 4. Find the amplitude and midline.

Solution 2.2

Worked steps

$$\text{amplitude} = \frac{10 - 4}{2} = 3; \text{midline} = \frac{10 + 4}{2} = 7 \quad \text{M1} \quad \text{A1}.$$

Practice 2.3 ■ 1 mark

State b for a period of 24.

Solution 2.3

Worked steps

$$b = \frac{2\pi}{24} = \frac{\pi}{12} \text{ (B1)}.$$

Exam-style 3.1 ■ 1 mark

Given period P , the value b equals

A $P/2\pi$

B $2\pi/P$

C πP

D $2\pi P$

Solution 3.1

A $P/2\pi$

B $2\pi/P$



C πP

D $2\pi P$

Worked steps

B.

Exam-style 3.2 ■ 1 mark

The midline of a sinusoidal model equals

A $\frac{\max - \min}{2}$

B $\frac{\max + \min}{2}$

C $\max$

D $\min$

Solution 3.2

A $\frac{\max - \min}{2}$

B $\frac{\max + \min}{2}$



C max

D min

Worked steps

B.

Exam-style 3.3 ■ 1 mark

A Ferris wheel has maximum height 50 m, minimum 2 m, and period 60 s.

- (a) Find the amplitude.
- (b) Find the midline.
- (c) Find the value of b .

Solution 3.3

Worked steps

$$(a) \frac{50 - 2}{2} = 24 \text{ m } \text{B1}. \quad (b) \frac{50 + 2}{2} = 26 \text{ m } \text{B1}. \quad (c) b = \frac{2\pi}{60} = \frac{\pi}{30} \text{ B1}.$$