

Exercise walk-through

Sinusoidal Function Transformations ■ 3.6

eXercise

You must be able to

- describe how a , b , h , and k transform $y = \sin x$

Method — Transformations of a sinusoid

Starting from $y = \sin x$, in $y = a \sin(b(x - h)) + k$:

- a scales vertically (sets the amplitude);
- b scales horizontally (period = $\frac{2\pi}{b}$);
- h shifts horizontally;
- k shifts vertically (sets the midline).

Method — Example

$y = 2 \sin(x) - 3$: amplitude 2, midline $y = -3$.

Practice 2.1 ■ 1 mark

State the effect of a in $y = a \sin x$.

Solution 2.1

Worked steps

it scales the graph vertically, setting the amplitude to $|a|$ **B1**.

Practice 2.2 ■ 1 mark

State the effect of k in $y = \sin x + k$.

Solution 2.2

Worked steps

it shifts the graph vertically, moving the midline to $y = k$ **B1**.

Practice 2.3 ■ 2 marks

For $y = 2 \sin(x) - 3$, state the amplitude and midline.

Solution 2.3

Worked steps

amplitude 2; midline $y = -3$ **B1** **B1**.

Exam-style 3.1 ■ 1 mark

In $y = a \sin(bx)$, increasing b

- A** raises the midline
- B** shortens the period
- C** raises the amplitude
- D** shifts the graph right

Solution 3.1

- A raises the midline
- B shortens the period
- C raises the amplitude
- D shifts the graph right



Worked steps

B.

Exam-style 3.2 ■ 1 mark

The $+k$ in $y = \sin x + k$

- A** changes the period
- B** shifts the midline
- C** changes the amplitude
- D** reflects the graph

Solution 3.2

A changes the period

B shifts the midline



C changes the amplitude

D reflects the graph

Worked steps

B.

Exam-style 3.3 ■ 1 mark

$$y = 4 \sin(x) + 2.$$

- (a) State the amplitude.
- (b) State the midline.
- (c) State the maximum value.

Solution 3.3

Worked steps

(a) 4 **B1**. (b) $y = 2$ **B1**. (c) $2 + 4 = 6$ **B1**.