

Finding the rule of $y = a \sin b(x-h) + k$ Consider the function, f , represented below.

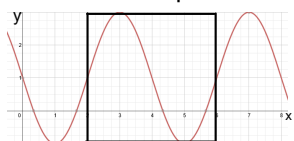
Period: 4

Amplitude: 2

Determine the rule of the function.

- 1) Choose a starting point of a cycle (h, k) . Draw a rectangle around the first cycle.
- 2) Determine p , a , b .
- 3) State Rule(s)

Solution: Example 1



1) $(h, k) = (2, 1)$

Is the cycle increasing or decreasing from $(2, 1)$? $f \uparrow \therefore ab > 0$

2) $p = 4$

$b = \frac{\pi}{2}$

$a = 2$

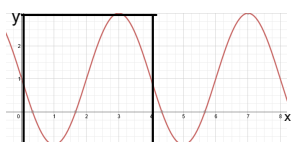
$$\begin{array}{l} p = 4 \\ p = \frac{2\pi}{b} \\ 4 = \frac{2\pi}{b} \\ b = \frac{\pi}{2} \end{array}$$

Rule:

1) $y = 2 \sin \frac{\pi}{2}(x-2) + 1$

2) $y = -2 \sin -\frac{\pi}{2}(x-2) + 1$

Solution: Example 2



- 1)
- $(h, k) = (0, 1)$
- , draw a rectangle around the first cycle.

Is the cycle increasing or decreasing from $(0, 1)$? $f \downarrow \therefore ab < 0$

2) $p = 4$

$b = \frac{\pi}{2}$

$a = 2$

Rule:

1) $y = -2 \sin \frac{\pi}{2}(x) + 1$

2) $y = 2 \sin -\frac{\pi}{2}(x) + 1$

Do all the rules represent the same function?


Yes.

$$e) f(x) = -3 \sin \frac{\pi}{4} x + 6$$

$$-3 \sin \frac{\pi}{4} x + 6 = 0$$

$$\sin \frac{\pi}{4} x = 2$$

$$S = \{\emptyset\}$$

$$P = 24$$
$$9 \quad , \quad 17$$


$$(12) \quad x = -7 \quad x = -3$$

$$-7, -3, [5, 9, 17, 21, 29]$$

$$S = \{5, 9, 17, 21, 29\}$$