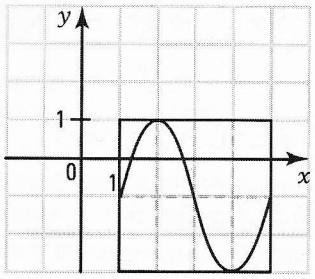
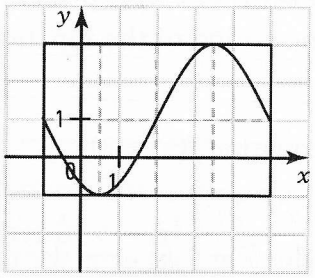
5. Draw one cycle of each of the following functions.

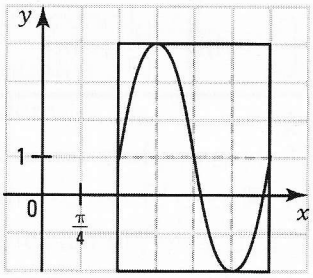
a) $y = 2 \sin \frac{\pi}{2}(x - 1) - 1$



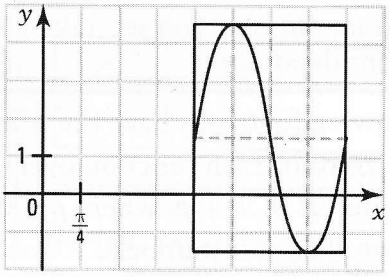
b) $y = -2 \sin \frac{\pi}{3}(x + 1) + 1$



c) $y = 3 \sin 2\left(x - \frac{\pi}{2}\right) + 1$

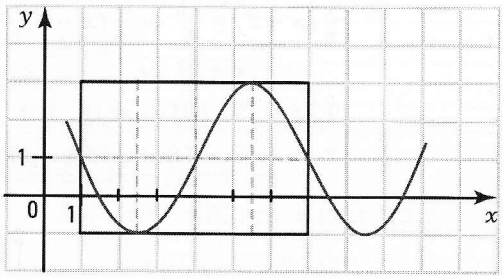


d) $y = -3 \sin -2(x - \pi) + \frac{3}{2}$



ACTIVITY 7 Finding the zeros of the function $y = a \sin b(x - h) + k$

A portion of the graph of the function $f(x) = -2 \sin \frac{\pi}{3}(x - 1) + 1$ is represented on the right.



a) What is the period p of the function? ***p = 6***

b) 1. How many zeros does the function f have?
An infinite number.

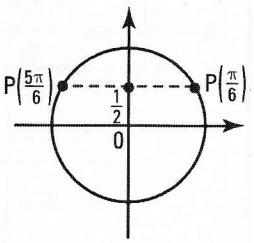
2. How many zeros does the function f have when $x \in [1, 7]$? ***Two zeros.***

c) Justify the steps for finding the zeros of f when $x \in [1, 7]$.

1. $-2 \sin \frac{\pi}{3}(x - 1) + 1 = 0$ ***We set f(x) = 0.***

2. $\sin \frac{\pi}{3}(x - 1) = \frac{1}{2}$ ***We isolate sin b(x - h).***

3. $\frac{\pi}{3}(x - 1) = \frac{\pi}{6}$ or $\frac{\pi}{3}(x - 1) = \frac{5\pi}{6}$ ***We solve the equation sin θ = 1/2 knowing that θ = π/3 (x - 1).***



4. $x = 1.5$ or $x = 3.5$ ***We deduce the solutions for x.***

d) From the zeros of f obtained over [1, 7], explain how to deduce the zeros of f located on the next cycle, i.e. when $x \in [7, 13]$.

You need to add the period to each zero. The zeros over [7, 13] are 7.5 and 9.5.

e) Verify that the set of zeros of f is $\{\ldots; -4.5; -2.5; 1.5; 3.5; 7.5; 9.5; \ldots\}$ or $\{1.5 + 6n\} \cup \{3.5 + 6n\}, n \in \mathbb{Z}$.