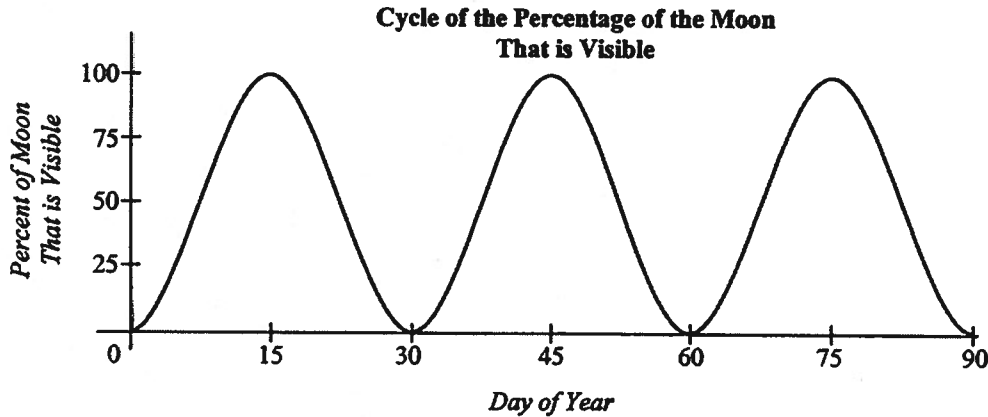
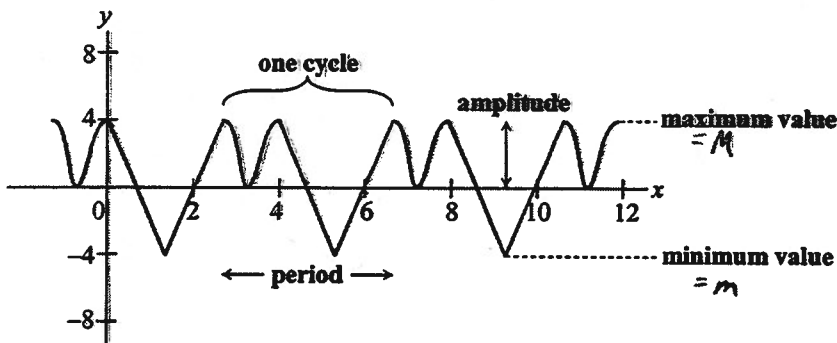


MCR 3UI – Introduction to Periodic Functions



The visibility of the moon versus the day of the year is an example of a periodic function.
 A periodic function is a function that has a pattern of y-values that repeat at regular intervals.
(eg. every 30 days, the moon has the same percentage visible)

PARTS OF A PERIODIC FUNCTION



cycle: one complete pattern

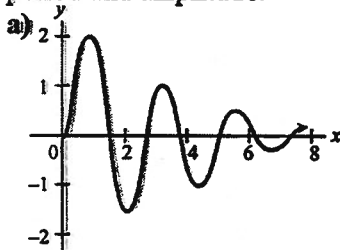
period: horizontal length of one cycle

amplitude: half the distance between max + min values

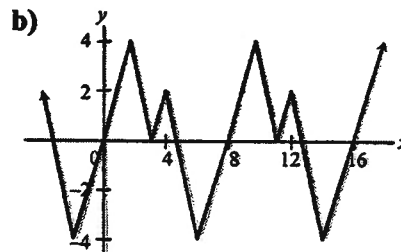
$$a = \frac{|M - m|}{2}$$

* absolute value is ALWAYS positive

Eg. ● Determine whether or not each function below is periodic. If it is, state the domain, range, period and amplitude:



No!
 (y-values don't repeat)



Yes, this is periodic!

i) $D = \{x \in \mathbb{R}\}$

ii) $R = \{y \in \mathbb{R} \mid -4 \leq y \leq 4\}$

iii) Period = $8 - 0 = 8$

iv) $a = \frac{|4 - (-4)|}{2}$

Eg 2 A periodic function, f , has a period of 10.
If $f(2) = -1$ and $f(7) = 5$, determine:

a) $f(22)$

Since $f(2) = -1$ & period = 10
then $f(2+10) = -1$
and $f(2+10+10) = -1$
and $f(2+k \cdot 10) = -1$
(for any integer k)

$$\therefore f(22) = f(2+2 \cdot 10) \\ = -1$$

b) $f(97)$

$\therefore f(7) = 5$
then $f(7+k \cdot 10) = 5$

$$\therefore f(97) = f(7+9 \cdot 10) \\ = 5$$

HW pg 359 #1, 2, 3ab, 4, 5, 8, 13, 14