

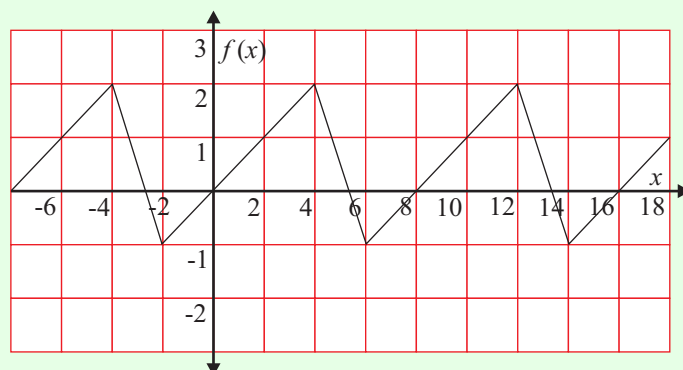
## DIFFERENTIATION & FUNCTIONS (Q 6, 7 & 8, PAPER 1)

### LESSON NO. 10: PERIODIC FUNCTIONS

2006

- 6 (a)  $f : x \rightarrow f(x)$  is a periodic function defined for  $x \in \mathbb{R}$ .

The period is as indicated in the diagram.



- (i) Write down the period and the range of the function.
- (ii) Find  $f(44)$ .

**SOLUTION**

6 (a) (i)

Period = 8

Range =  $[-1, 2]$

6 (a) (ii)

$$f(44) = f(4) = 2$$

Every periodic function has two important features:

**1. PERIOD:**

The length of the wave along the  $x$ -axis before it repeats itself.

**2. RANGE:**

This is the interval between the lowest  $y$  value and the highest  $y$  value.

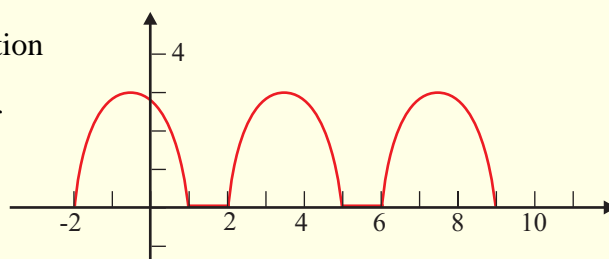
The value of the function at any value of  $x$  can be worked out from the first wave by dividing the value of  $x$  by the period and finding the remainder.

$$f(x) = f(\text{Remainder})$$

2003

- 8 (a) Part of the graph of a periodic function is shown.

Write down the period and range of the function.



**SOLUTION**

Every periodic function has two important features:

**1. PERIOD:**

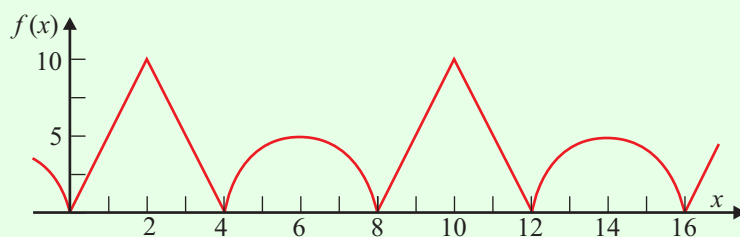
The length of the wave along the  $x$ -axis before it repeats itself.

**2. RANGE:**

This is the interval between the lowest  $y$  value and the highest  $y$  value.

Period = 4

Range =  $[0, 3]$

**2000****6 (b)**

The graph shows portion of a periodic function  $f : x \rightarrow f(x)$  which is defined for  $x \in \mathbf{R}$ .

- (i) Write down the period and the range of  $f(x)$ .
- (ii) Complete the following table:

$x$	2	8	14	20	26
$f(x)$					

**SOLUTION****6 (b) (i)**

Period = 8

Range =  $[0, 10]$ **6 (b) (ii)**

The first 3 values can be worked out from the graph as shown.

$$f(2) = 10$$

$$f(8) = 0$$

$$f(14) = 5$$

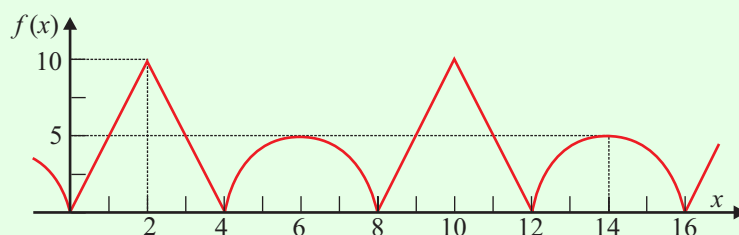
Every periodic function has two important features:

**1. PERIOD:**

The length of the wave along the  $x$ -axis before it repeats itself.

**2. RANGE:**

This is the interval between the lowest  $y$  value and the highest  $y$  value.



The value of the function at any value of  $x$  can be worked out from the first wave by dividing the value of  $x$  by the period and finding the remainder.

$$f(x) = f(\text{Remainder})$$

The last 2 values are worked out using the information as explained in the box above. Divide the value of the function by the period and take the remainder.

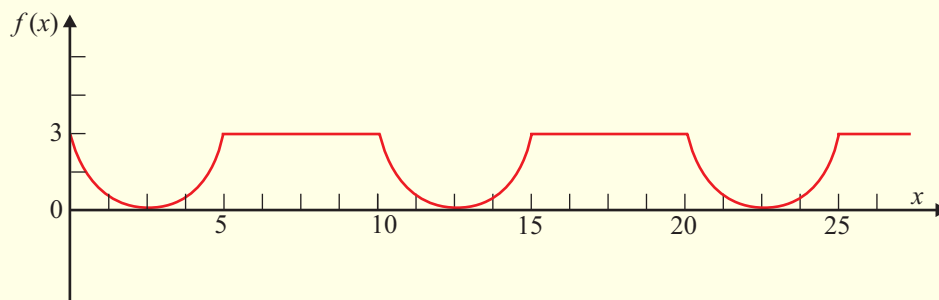
$$f(20) = f(4) = 0$$

$$f(26) = f(2) = 10$$

$x$	2	8	14	20	26
$f(x)$	10	0	5	0	10

**1997**

**6 (a)**



The graph shows portion of a periodic function  $f : x \rightarrow f(x)$ .

Write down the period and range of the function.

What is the value of  $f(77.5)$ ?

**SOLUTION**

**6 (a)**

Every periodic function has two important features:

**1. PERIOD:**

The length of the wave along the  $x$ -axis before it repeats itself.

**2. RANGE:**

This is the interval between the lowest  $y$  value and the highest  $y$  value.

Period = 10

Range =  $[0, 3]$

The value of the function at any value of  $x$  can be worked out from the first wave by dividing the value of  $x$  by the period and finding the remainder.

$$f(x) = f(\text{Remainder})$$

$$f(77.5) = f(7.5) = 3$$