

chapter

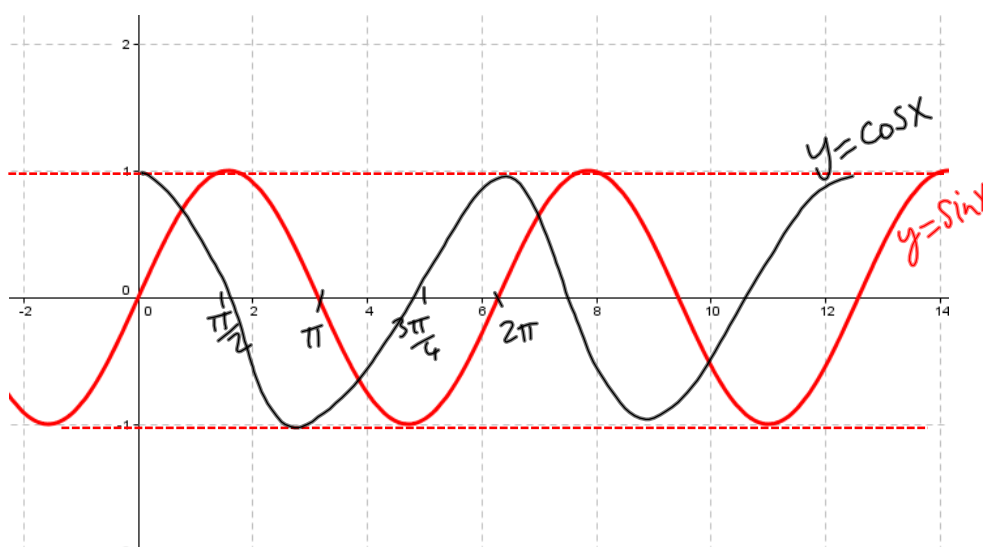
2

Trigonometry 1

Section 2.7 Graphs of trigonometric functions

PROJECT MATHS - STRAND 2
Text & Tests 4
 LEAVING CERTIFICATE
 HIGHER LEVEL

60

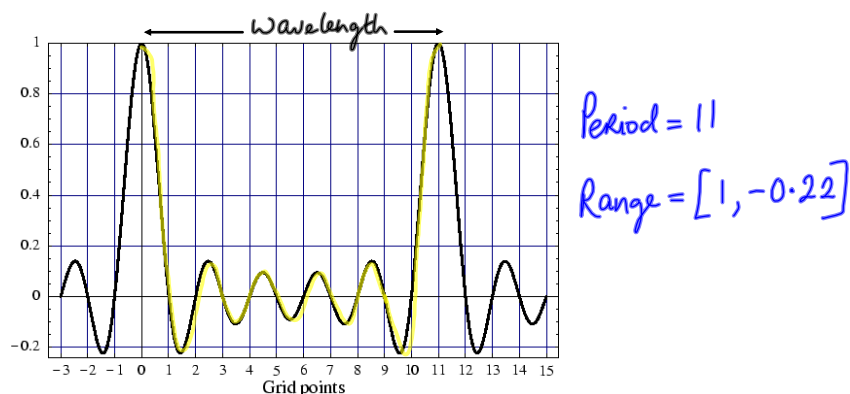


$$y = \sin x, \text{ Period} = 2\pi, \text{ Range} = [-1, 1]$$

$$y = \cos x, \text{ Period} = 2\pi, \text{ Range} = [-1, 1]$$

$$\text{note: } * \cos x = \sin(x - 90^\circ)$$

Periodic Functions have a shape that keeps repeating

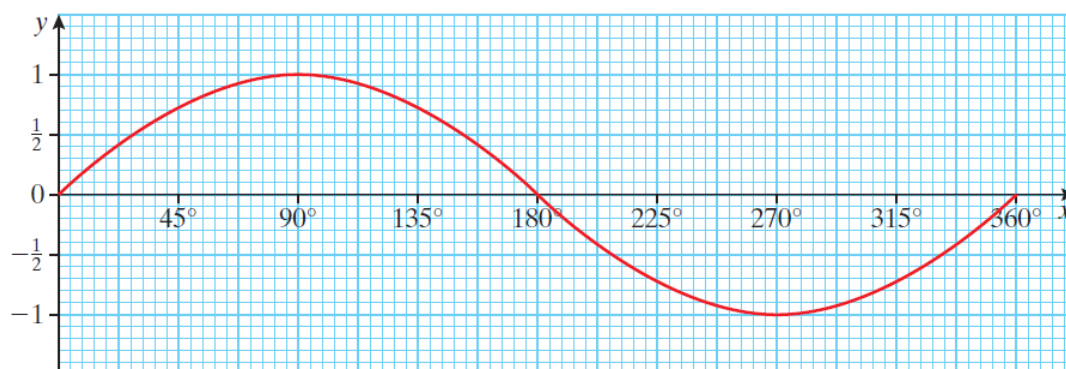


The Period of a function is the length of the repeating wave along the x-axis.

The Range of the function is the Maximum and minimum y values of the wave.

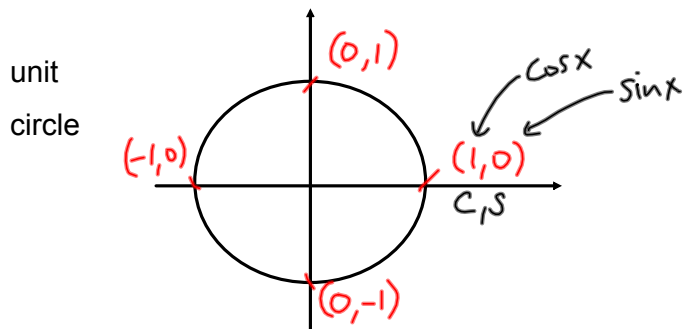
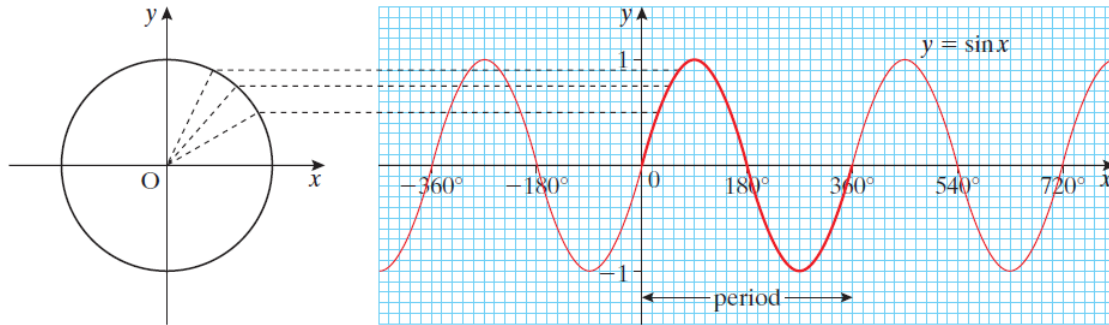
Graph of $y = \sin x$

$x =$	0°	45°	90°	135°	180°	225°	270°	315°	360°
$y = \sin x$	0	0.7	1	0.7	0	-0.7	-1	-0.7	0

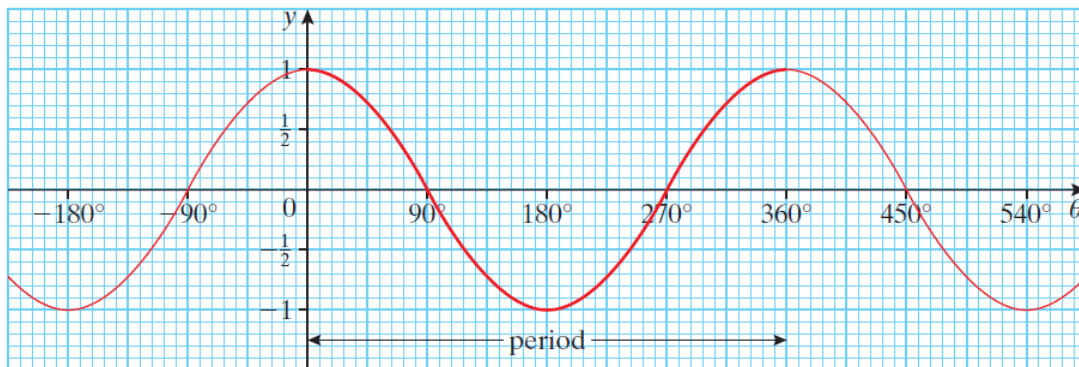


Graph of $y = \sin x$

The graph of $y = \sin x$ for $-360^\circ \leq x \leq 720^\circ$ is shown below.

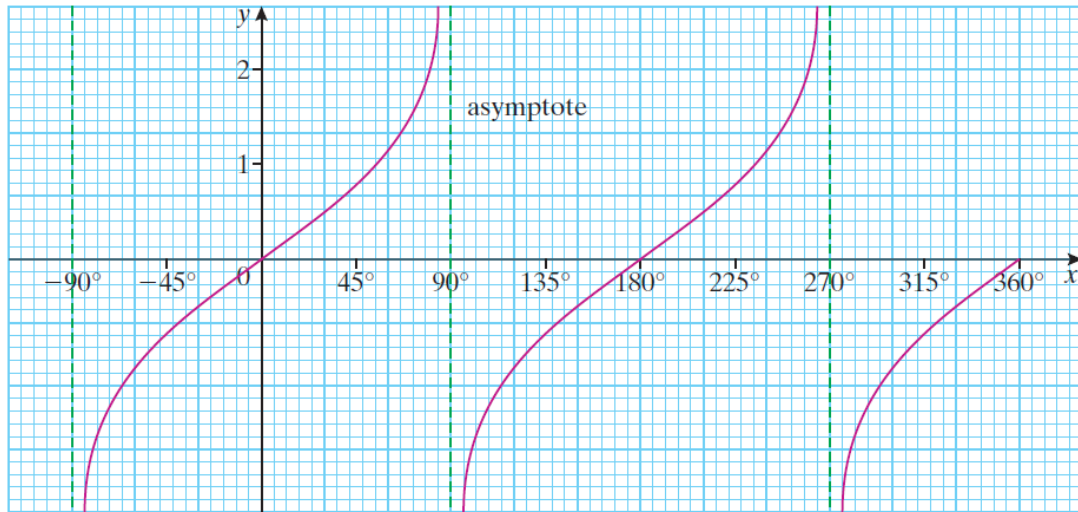
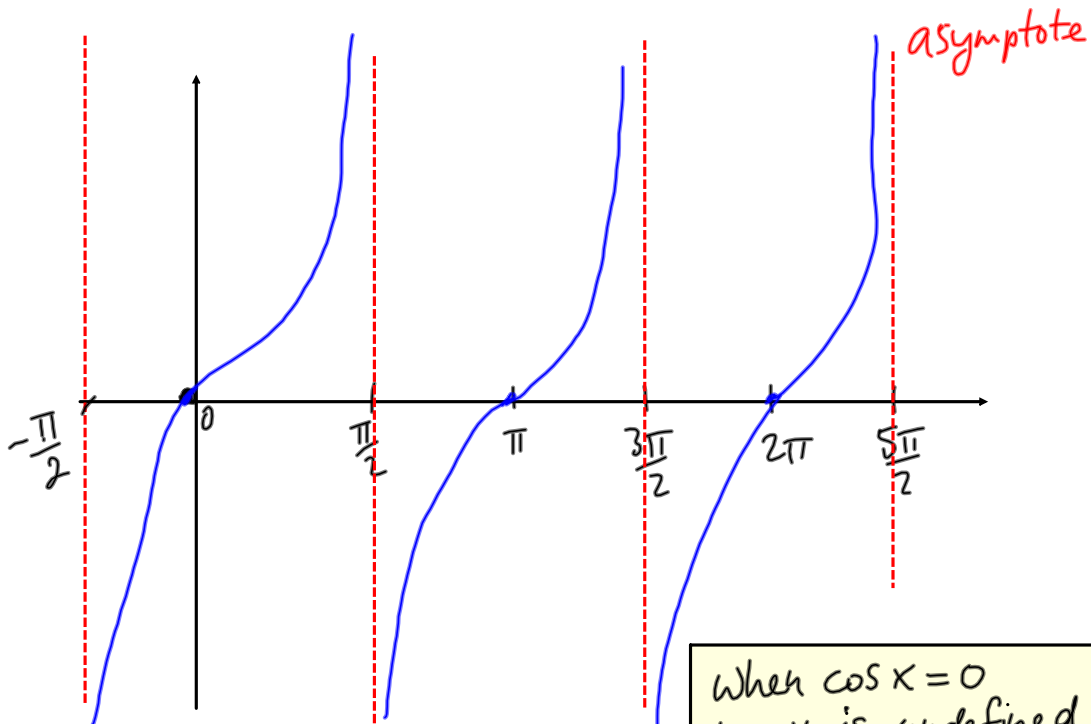


Graph of $y = \cos x$



Graph of $y = \tan x$

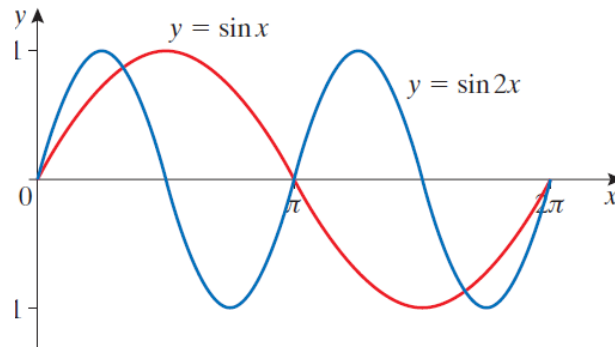
$x =$	0°	45°	90°	135°	180°	225°	270°	315°	360°
$y = \tan$	0	1	undefined	-1	0	1	undefined	-1	0

Graph of $y = \tan x$ 

When $\cos x = 0$
 $\tan x$ is undefined
 Since $\tan x = \frac{\sin x}{\cos x}$

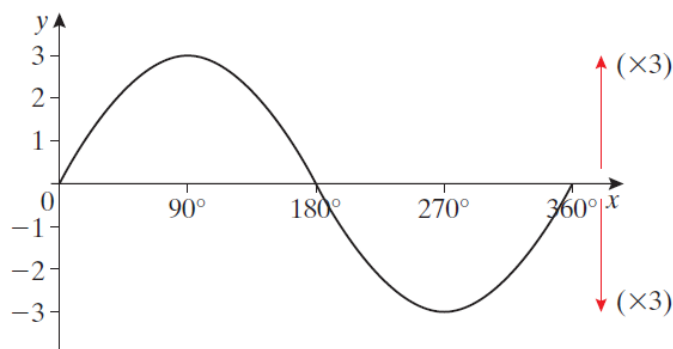
Graphs of $a \sin nx$ and $a \cos nx, n \in \mathbf{N}$

$y = \sin x$ has period 2π
 $y = \sin 2x$ has period $\frac{2\pi}{2} = \pi$
 $y = \sin 3x$ has period $\frac{2\pi}{3}$
 $y = \sin nx$ has period $\frac{2\pi}{n}$



Graph of $y = a \sin x$

Consider the graph of $y = 3 \sin x$.



The effect of the **3** is to stretch vertically the graph of $y = \sin x$ by a factor of 3.
 It has no effect on the x -direction of the graph.
 The graph of $y = 3 \sin x$ is shown on the right.
 The range is $(-3, 3)$.

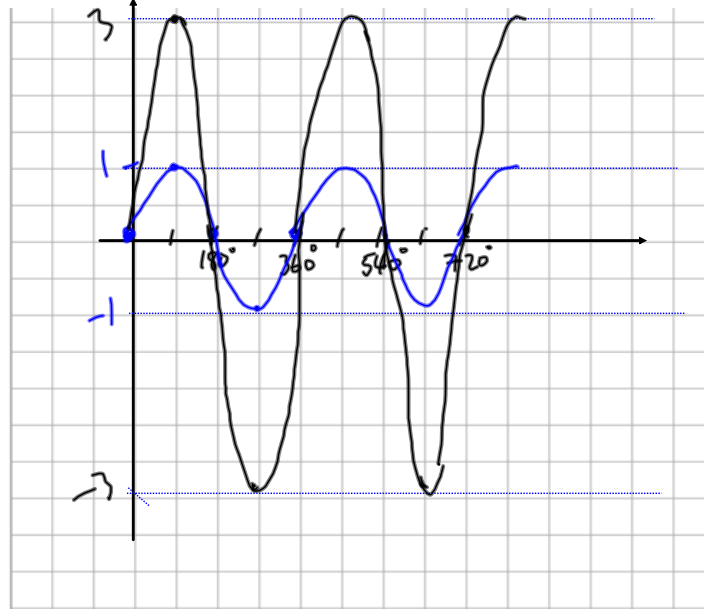
Exercise 2.7

1. Draw the graph of the function $y = \sin x$ in the domain $0 \leq x \leq 720^\circ$.

What is (i) the period 360°
 (ii) the range of the function? $[1, -1]$

Using the same pair of axes, draw the graph of $y = 3 \sin x$ in the same domain.

What is (iii) the period 360°
 (iv) the range of this function? $[3, -3]$



4. Write down the period and range of each of these functions:

(i) $y = 3 \cos x$

(ii) $y = 2 \sin 2x$

(iii) $y = 4 \sin 3x$

(i) $y = 3 \cos x$

Period = 360°

Range = $[3, -3]$

(ii) $y = 2 \sin 2x$

Period = $\frac{360^\circ}{2} = 180^\circ$

Range = $[2, -2]$

(iii) $y = 4 \sin 3x$

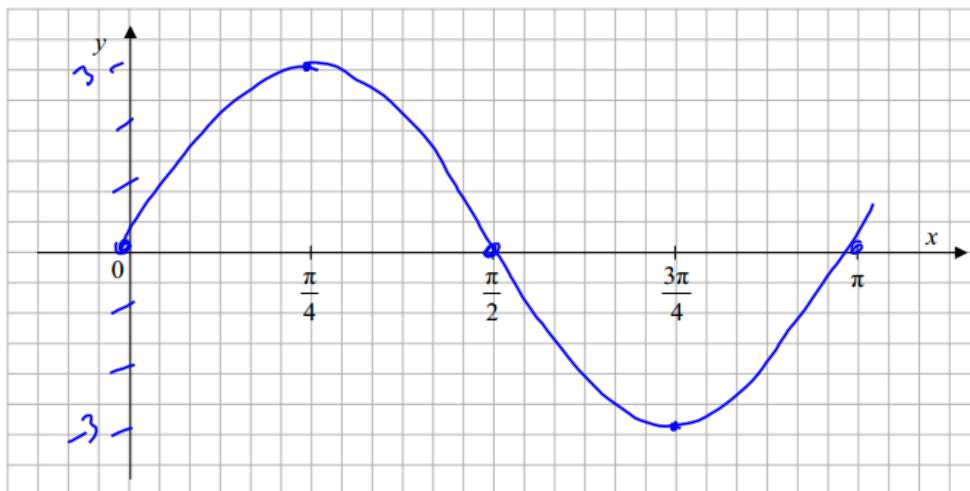
Period = $\frac{360^\circ}{3} = 120^\circ$

Range = $[4, -4]$

Question 5

Leaving Cert 2011

(25 marks)

The function $f : x \mapsto 3 \sin(2x)$ is defined for $x \in \mathbb{R}$.

- (c) Write down the range and the period of f .

Range = $[3, -3]$

Period = $\frac{360^\circ}{2} = 180^\circ$