Alg. 2 - Tuesday 1-31-12

Graph of $y = \sin(x)$ Exercise

1. Label the important angles on the x-axis in radians.

2. Using the graph, estimate
   - A) $\sin\left(\frac{\pi}{3}\right)$
   - B) $\sin\left(\frac{2\pi}{3}\right)$
   - C) $\sin\left(\frac{4\pi}{3}\right)$
   - d) $\sin\left(\frac{5\pi}{3}\right)$

3. How do the values of the $\sin(x)$ compare in question #2? Why?

4. Compare the approximate value of the $\sin(x)$ from the graph with the trig. table for $20°, 40°, 60°, 90°$.

TRANSLATING FUNCTIONS

Up/Down ⇒ Change y ↕

(Ex) $y = f(x) = x$ ⇒ BASE FUNCTION (1st degree = linear)

$y = f(x) = x + 1$ ⇒ moves up 1 UNIT

$y = f(x) = x - 2$ ⇒ moves down 2 units

$y = f(x) = f(x) \pm b$ moves "base" function up or down b units

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(Ex) $y = f(x) = x^2$ base function (2ND degree = QUADRATIC)

$y = f(x) = x^2 + 1$ up 1 unit

$y = f(x) = x^2 - 2$ down 2 units

(Ex) $y = f(x) = \sin(x)$ base SINE function

$y = f(x) = \sin(x) + 1$ up 1 unit

$y = f(x) = \sin(x) - 2$ down 2 units

NOTE: Ch 14-1 GRAPHING Trig FUNCTIONS

Ch 14-2 TRANSLATING the GRAPHS OF THE Trig. FUNCTIONS

Left/right ⇒ Change $X \leftrightarrow$
(− to right, + to left)

(Ex) $y = f(x) = x^2$ Parabola

$y = f(x) = (x-2)^2 + 3$ ⇒ 2 units right, 3 units up

$y = f(x) = (x+1)^2 - 6$ ⇒ 1 unit left, 6 units down

$y = f(x) = \sin(x)$

$y = f(x) = \sin(x-2) + 3$ ⇒ 2 units right, 3 units up

↑ This horizontal shift is called a "phase shift" for periodic functions like the sine and cosine

(ref. pg 270 Ch. 14-2)

Changing the "shape" or "scaling" the function ⇒ multiply by something

(Ex) $y = f(x) = x$

$y = af(x) = ax$ or "mx" ⇒ slope!

(Ex) $y = f(x) = 2x + 1$ slope $= \frac{2}{1}$

$y = f(x) = x^2$

$y = f(x) = a(x-h)^2 + k$] Vertex form of parabola

a ↑ smile/frownie and steep or narrow

h ↑ left/right

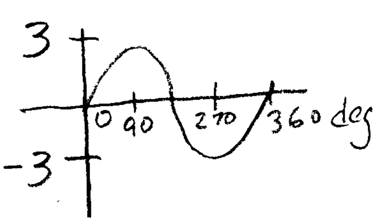
k ↑ up/down

(Ex) $y = f(x) = \sin(x)$

$y = f(x) = a\sin(x-h) + k$

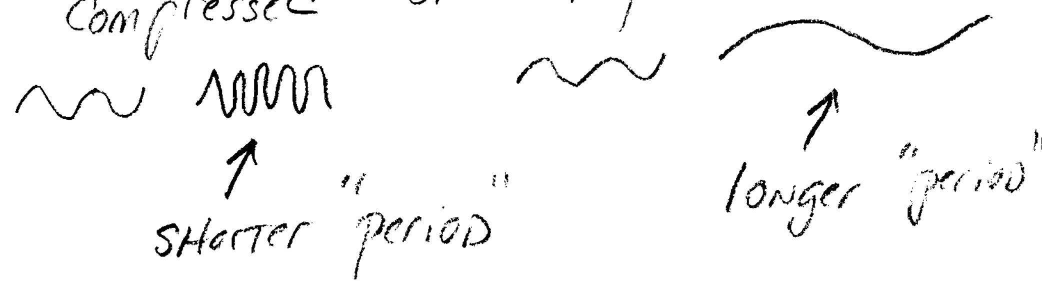
a ↑ Amplitude

(Ex) $y = f(x) = 3\sin(x)$



↑ Amplitude $= \pm|3|$ (Ref. pg 764 Ch 14-1)

Periodic functions have an additional property that can be changed (think accordion), it can be compressed or expanded.



(Ex) $y = a \sin b(x - h) + k$

↑ b affects the "base" period which for the sine is 360° or 2π radians

(Ex) $y = \sin 1(x)$ $\quad b = 1 \quad p = \frac{360}{b} = 360°$

(Ex) $y = \sin 2(x)$ $\quad p = \frac{360}{b} = 180°$

↑ compress

(Ex) $y = \sin \frac{1}{2}(x)$ $\quad p = \frac{360}{b} = 720°$

↑ expand

Finally! The most general form of the sine function with constants for ↕ up/down, left/right ↔ (phase shift) for scale (amplitude) and period. (compress/expand)

$$y = f(x) = \sin(x)$$

base function
period = 360°
Amplitude = ±1

$$y = f(x) = a \sin b(x-h) + k$$

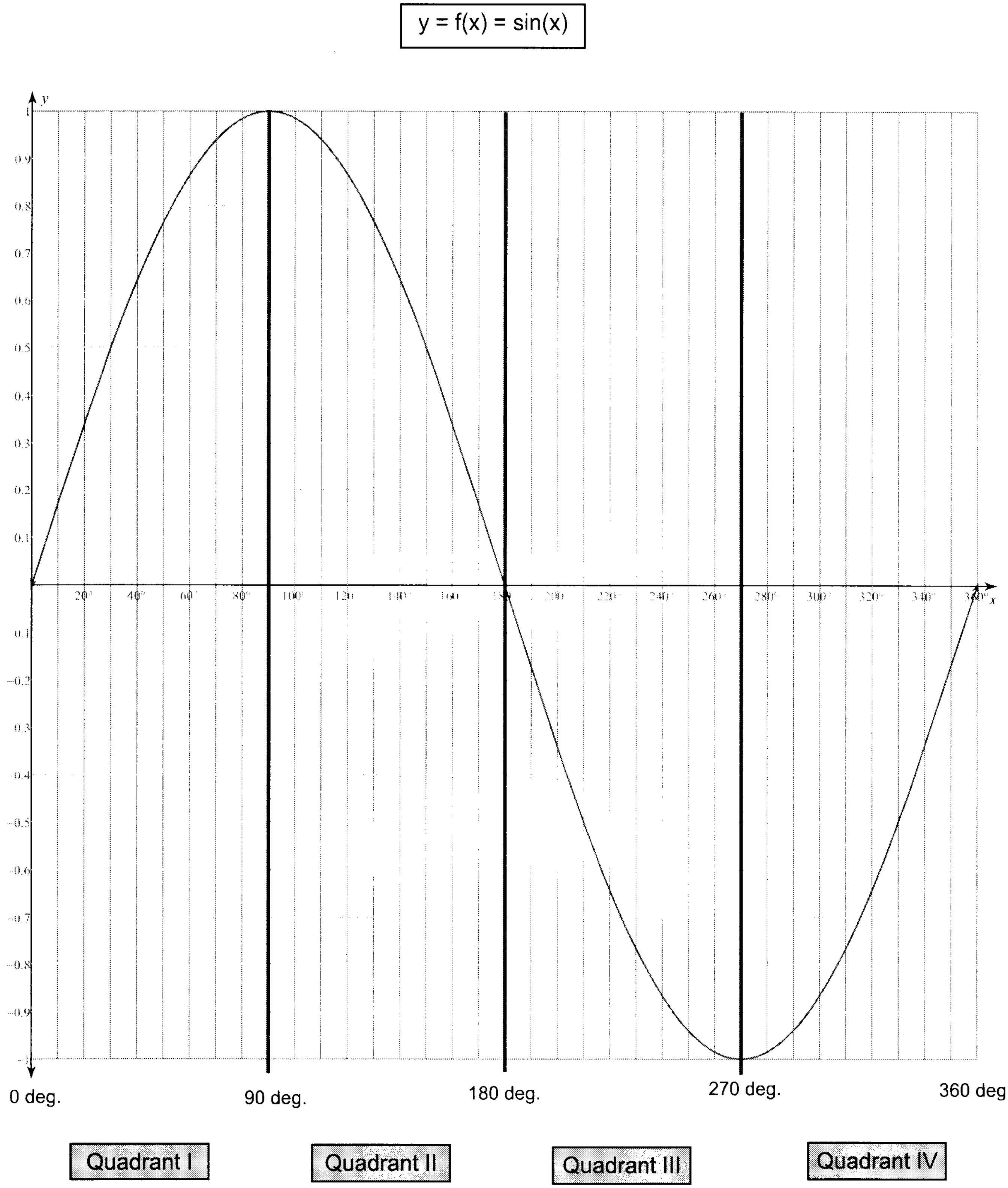
$|a|$ = amplitude

$\frac{360}{|b|}$ = period or $\frac{2\pi}{|b|}$ radians

h = left/right phase shift
+ to left, − to right

k = up/down

Homework: Practice Worksheet # 27-30, 35-38



y = f(x) = sin(x)
y
x
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1
20°
40°
60°
80°
100°
120°
140°
160°
180°
200°
220°
240°
260°
280°
300°
320°
340°
360°
0 deg.
90 deg.
180 deg.
270 deg.
360 deg.
Quadrant I
Quadrant II
Quadrant III
Quadrant IV