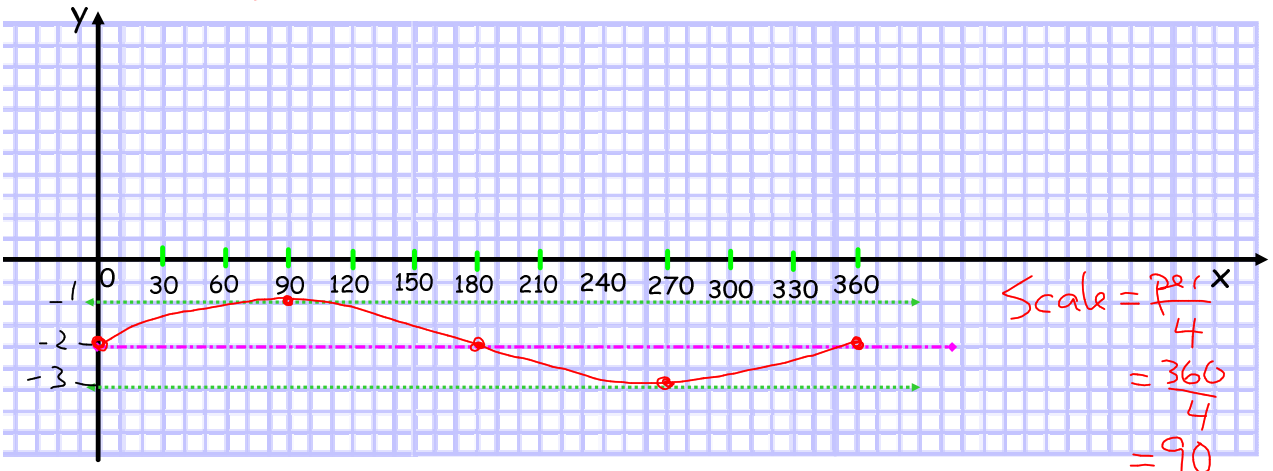
5.4 Translations of Sine Functions

Ex 1: Vertical Translations

a) Graph **y=sinx-2** as a transformation of the function y=sinx, for one full cycle.

Max: 1 -> -1 ← Shift down 2 units

Min: -1 -> -3



Scale = $\frac{\text{per}}{4}$ = $\frac{360}{4}$ = 90

Pattern? . . .

b) What are the domain and the range of the new function? (for one complete cycle)

D={ $0 \leq x \leq 360°, x \in \mathbb{R}$ }

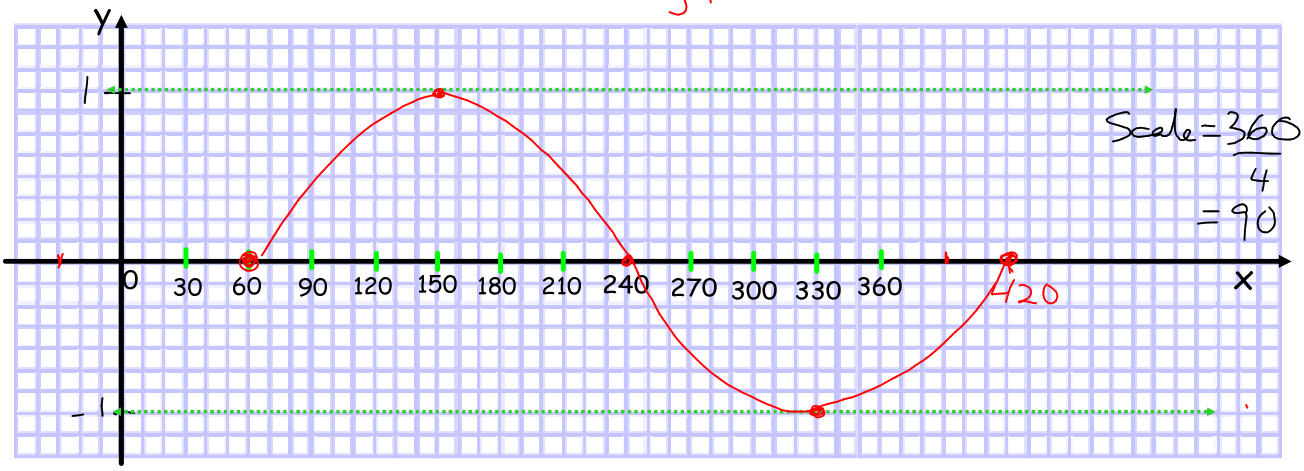
R={ $-3 \leq y \leq -1, y \in \mathbb{R}$ }

c)State the:

- equation of the axis $y = -2$
- amplitude 1
- period 360°

Ex 2: Horizontal translations:

a) Graph **f(x)=sin(x-60)** as a transformation of the function f(x)=sinx, ← 60 units right for one full cycle.



b) What are the domain and the range of the new function?

D={$60 \leq x \leq 420, x \in \mathbb{R}$}

R={$-1 \leq y \leq 1, y \in \mathbb{R}$ }

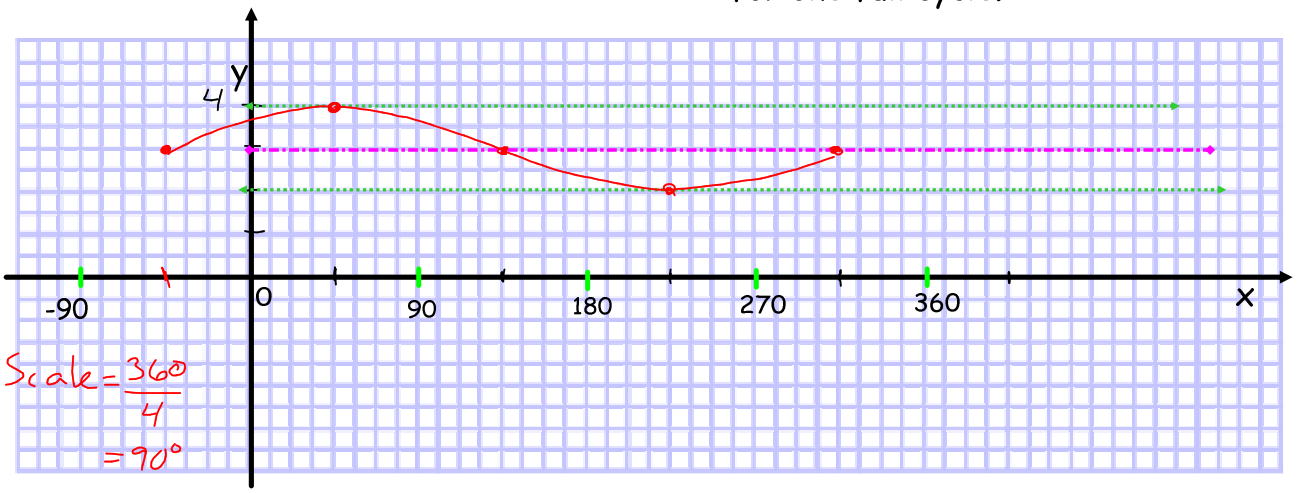
c)State the:

- equation of the axis $y = 0$
- amplitude 1
- period 360°

Ex 3: Combination of horizontal and vertical translations

a) Graph the function $f(x)=\sin(x+45^\circ)+3$ transform the function f(x)=sinx, for one full cycle.

Left 45° Up 3



b) What are the domain and the range of the new function?

D={ $-45^\circ \le x \le 315^\circ, x \in \mathbb{R}$ }

R={ $2 \le y \le 4, y \in \mathbb{R}$ }

c)State the equation of the axis, amplitude, and the period of the new function

eqn of axis $y = 3$

amplitude = 1

period = 360°

Ex 4: Creating an equation from the description of transformations:

a) The graph of y=sinx has been translated:
-to the right 30°
-up 5 units.
Write the new equation: $y = \sin(x-30°)+5$

b) The graph of y=sinx has been translated:
-to the right 73°
-down 3 units.
Write the new equation: $y = \sin(x-73°)-3$

c) The graph of y=sinx has been translated:
-to the left 20°
-up 3 units.
Write the new equation: $y = \sin(x+20°)+3$

d) The graph of y=sinx has been translated:
-to the left 0°
-down 6 units.
Write the new equation: $y = \sin x - 6$

e) The graph of y=sinx has been translated:
-to the right 90°
-down 12 units.
Write the new equation: $y = \sin(x-90°)-12$

f) The graph of y=sinx has been translated:
-to the left 2°
-up 0.5 units.
Write the new equation: $y = \sin(x+2°)+0.5$

Hmwk:
p365
1, 3, 4 cd, 5cd, 8, 10, 12,14, 16