Are there any Homework Questions you would like to see on the board?

pp. 348-350 # 1 – 3, 7   AND
pp. 357-358 # 1 – 4, 6 – 8

Today's Learning Goal(s):

By the end of the class, I will be able to:

a) determine how the values of c and d affect the functions
$f(x) = \sin x + d$ and $f(x) = \sin(x - c)$
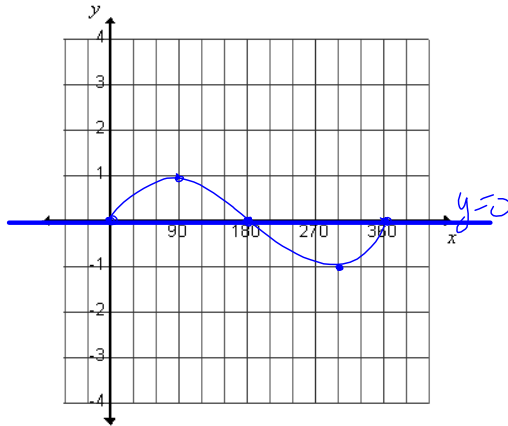
MCF 3MI   6.5 Transformations of the Sine Function

Vertical Translations: $f(x) = \sin x + d$, and Horizontal Translations: $f(x) = \sin(x - c)$

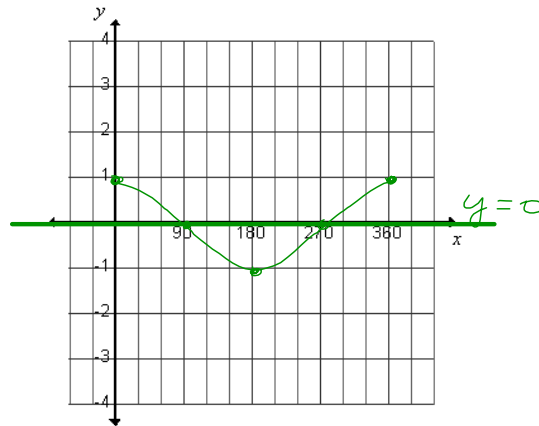Warm up: Sketch using the **5 key points**.

Date: NOV, 22/19

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

b) $g(x) = \cos x$

y=0

y=0

Equation of the axis $y = 0$

Amplitude 1

Period: $360°$

Domain: $\{x \in \mathbb{R}\}$

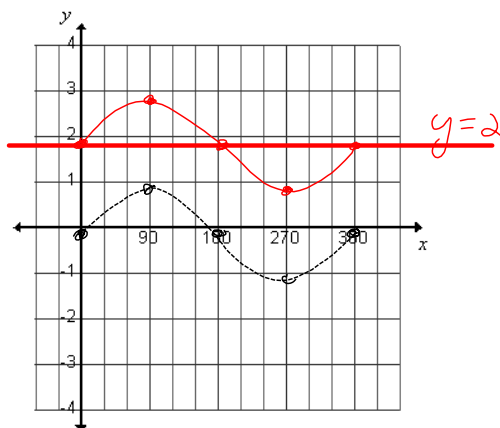Range: $\{y \in \mathbb{R} \mid -1 \le y \le 1\}$

Equation of the axis $y = 0$

Amplitude 1

Period: $360°$

Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid -1 \le y \le 1\}$

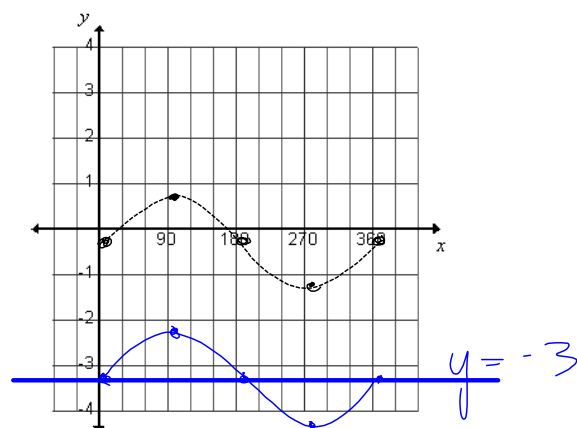Ex. 1: Vertical Translations: $f(x) = \sin x + d$

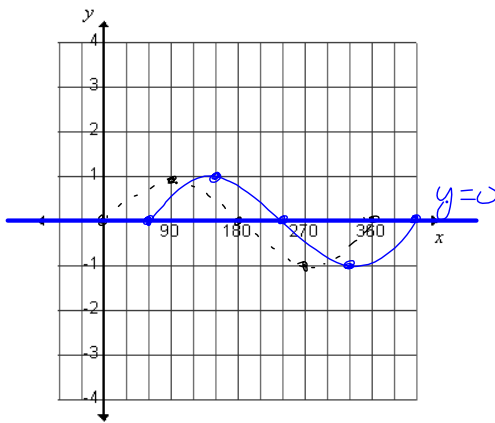a) Sketch $f(x) = \sin x + 2$ v.t.

b) $f(x) = \sin x - 3$

y=2

y = -3

Equation of the axis $y = 2$

Amplitude 1

Period: $360°$

Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid 1 \le y \le 3\}$

Equation of the axis $y = 3$

Amplitude 1

Period: $360°$

Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid -4 \le y \le -2\}$

Ex. 2: Horizontal Translations: $f(x) = \sin(x - c)$ ← h.t.

a) Sketch $f(x) = \sin(x - 60°)$

b) $f(x) = \sin(x + 30°)$

$y = 0$

$y = 0$

Equation of the axis $y = 0$

Amplitude 1

Period: $360°$

Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid -1 \leq y \leq 1\}$

Equation of the axis $y = 0$
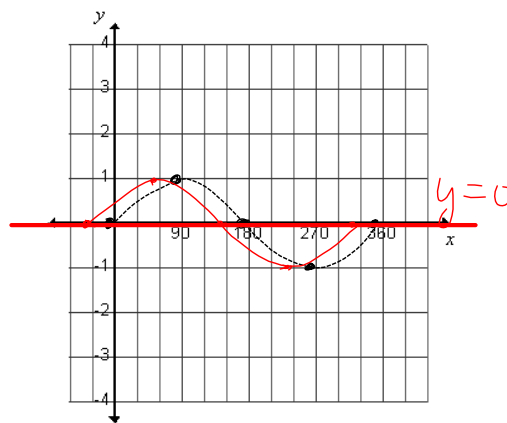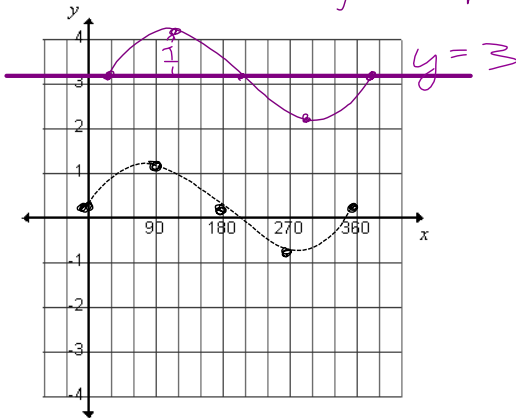
Amplitude 1

Period: $360°$

Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid -1 \leq y \leq 1\}$

Ex. 3: $f(x) = \sin(x - c) + d$

a) Sketch $f(x) = \sin(x - 30°) + 3$
→ right → up 3

$y = 3$

b) $f(x) = \sin(x + 45°) - 1$

$y = -1$

Equation of the axis $y = 3$
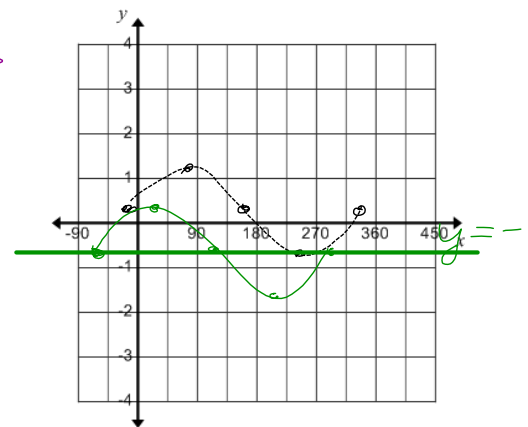
Amplitude 1

Period: $360°$

Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid 2 \leq y \leq 4\}$

Equation of the axis $y = -1$

Amplitude 1

Period: $360°$

Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid -2 \leq y \leq 0\}$

When applying **translations**, which analysis items are invariant?

Amplitude   **Period**   **Domain**

Ex. 4 a) The graph of $f(x) = \sin x$ has been translated to the right 45° and up 2 units.
Write the new equation.

$$f(x) = \sin(x - 45°) + 2$$

$f(x) = \sin(x - 45°) + 2$

b) The graph of $g(x) = \cos x$ has been translated down 3 units and to the left 30 °.
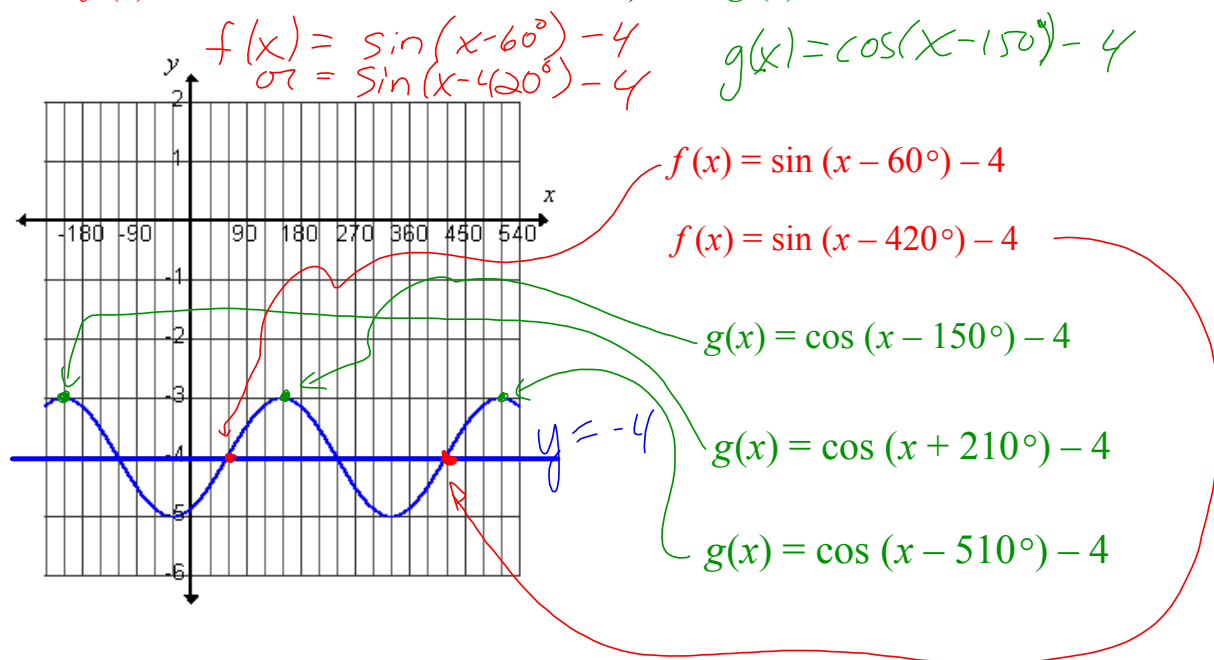Write the new equation.

$$g(x) = \cos(x + 30°) - 3$$

c) The graph of $f(x) = \sin x$ undergoes a horizontal translation of 15° and ← to the right
a vertical translation of – 6. Write the new equation.

$$f(x) = \sin(x - 15°) - 6$$

Ex. 5 Determine two possible equations for the sketch below.

a) Use $f(x) = \sin x$ as the base curve.   b) Use $g(x) = \cos x$ as the base curve.

$$f(x) = \sin(x - 60°) - 4$$
$$or = \sin(x - 420°) - 4$$

$$g(x) = \cos(x - 150°) - 4$$

$f(x) = \sin(x - 60°) - 4$

$f(x) = \sin(x - 420°) - 4$

$g(x) = \cos(x - 150°) - 4$

$y = -4$

$g(x) = \cos(x + 210°) - 4$

$g(x) = \cos(x - 510°) - 4$

Review the learning goals. Were we successful today?
(Inform of graphs on website.)
Homework: p. 365 # 1, 3, 4def, 6 – 8, 9cef, 15

Review the learning goals. Were we successful today?

a) determine how the values of c and d affect the functions $f(x) = \sin x + d$ and $f(x) = \sin(x - c)$

(Inform of graphs on website.)

Today's Homework:

pp. 365-367 # 1, 3, 4def, 6 – 8, 9cef, 15