MCR 3UR~ Chapter 6 PRACTICE Test
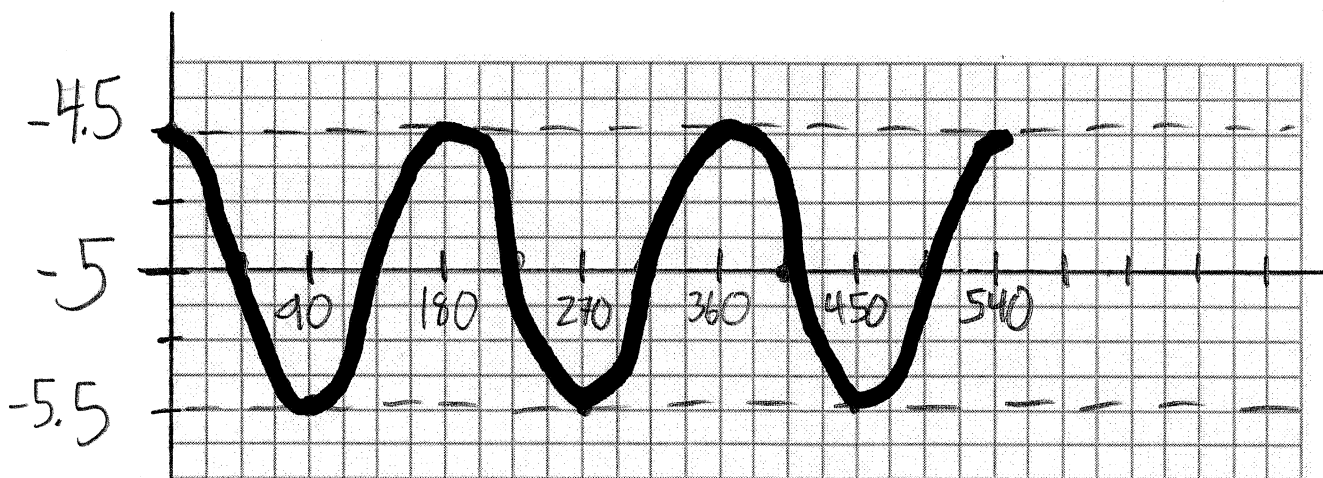
1. Sketch the following functions:
    a) $f(x) = -2\sin[4(x + 60)] + 3$

$-2\sin(4x) + 3$

$a = -2$
$k = 4$
$d = -60$
$c = 3$

period = 90   shifted left 60
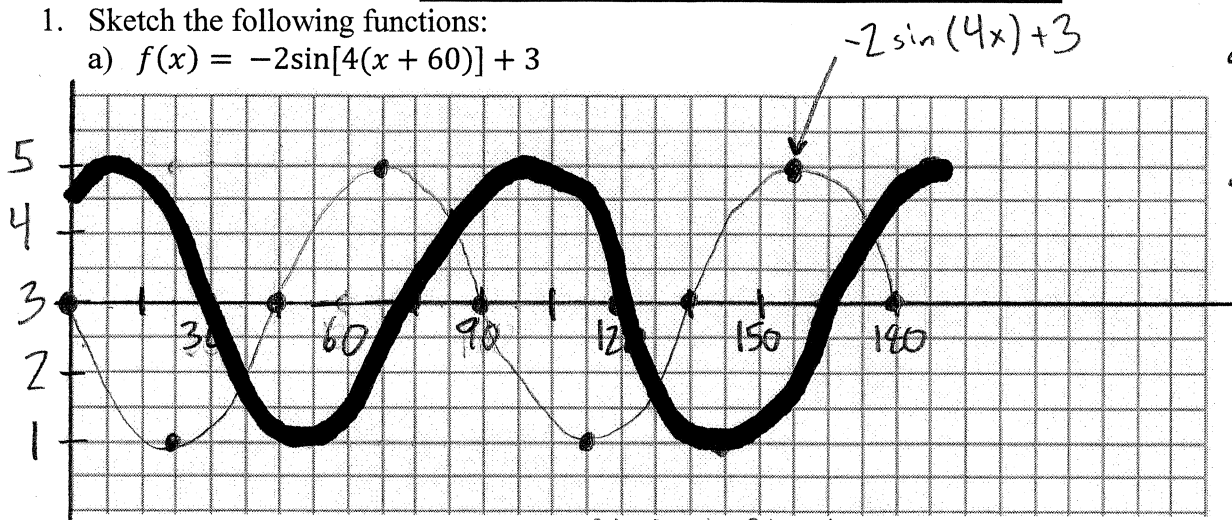
b) Three cycles of a sinusodial function that has a period of 180°, an amplitude of 0.5, and whose equation of the axis is y = -5. (Write the equation first)

− does not say where it starts

− does not specify sin or cos

$f(x) = 0.5\cos(2x) - 5$

✱ there are many possible equations

Name: _____   Date: _____

a is ⊖   *|a| = 3*

2. The function $f(x) = \cos x$ undergoes a reflection in the x-axis, a vertical stretch by a factor of 3, a horizontal compression by a factor of 4, a horizontal translation 2 units left and vertical translation 1 unit down.
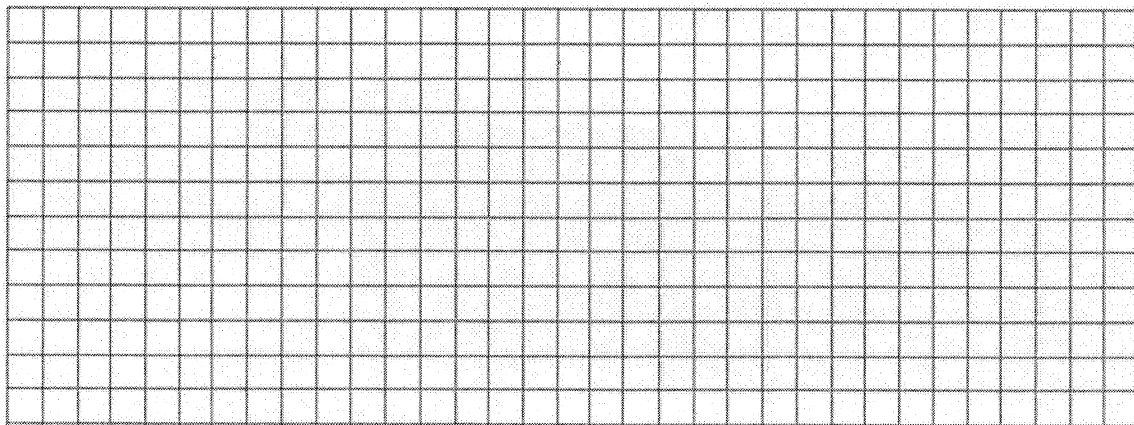
k = 4 ⇒ period = 90   *d = -2*   *c = -1*

   a) Write the resulting equation of the function.

$$f(x) = -3\cos(4(x+2)) - 1$$

   b) Sketch the resulting graph.

don't graph, horizontal translation is silly!

APPLICATION

$a = 22$

A clock is hanging on a wall. The length of the minute hand is 22 cm, and the lowest that the tip of the minute hand ever reaches above the ground is 304 cm. [3, 2]
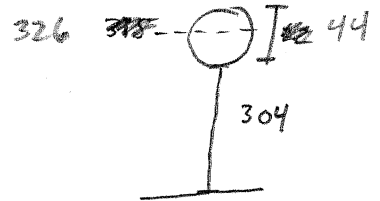
$axis = 304 + 22 = \cancel{315}\ 326$

a) What are the equation of the axis, amplitude, and period (in minutes) of the function that represents the tip of the minute hand's height above the ground?

equation of axis: $y = \cancel{315}\ 326$

amplitude: 22

period: 60 minutes

326 $\cancel{348}$ 44
304

b) Determine the equation of the sinusoidal function that represents the tip of the minute hand's height above the ground. Assume that at t=0 min, the time is 5 p.m. at 5pm minute hand is at the top
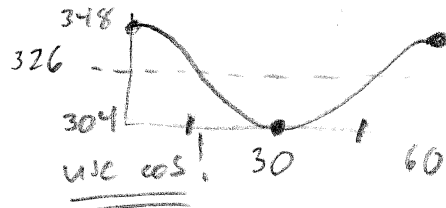
$a = 22$
$c = 326$
$k = 6 \ \left(\frac{360}{60}\right)$
$d = 0 \ (\text{use cos})$

$$h = 22\cos(6t) + 326$$

348
326
304
use cos! 30 60

TIPS

Kendra is riding a Ferris at a constant speed of 15 km/h. The boarding height for the wheel is 2 m, and the wheel has a diameter of 16 m. What is the equation of the function that describes Kendra's height in terms of time, assuming we start timing when Kendra is at the mid-point on the wheel. [4]

Speed = 15 km/h
convert to m/s

15000 m/h
250 m/min
(4.2 m/s)

circumference = $\pi(16)$
$= 50.3\ m$

$\dfrac{50.3\ m}{4.2\ m/s} = 12\ s\ per\ cycle$

∴ period = 12

$a = 8$
$k = 30 \ \left(\frac{360}{12}\right)$
$d = 0 \ (\text{using sin})$
$c = 10$

18
10
2
0 12

$$h = 8\sin(30t) + 10$$