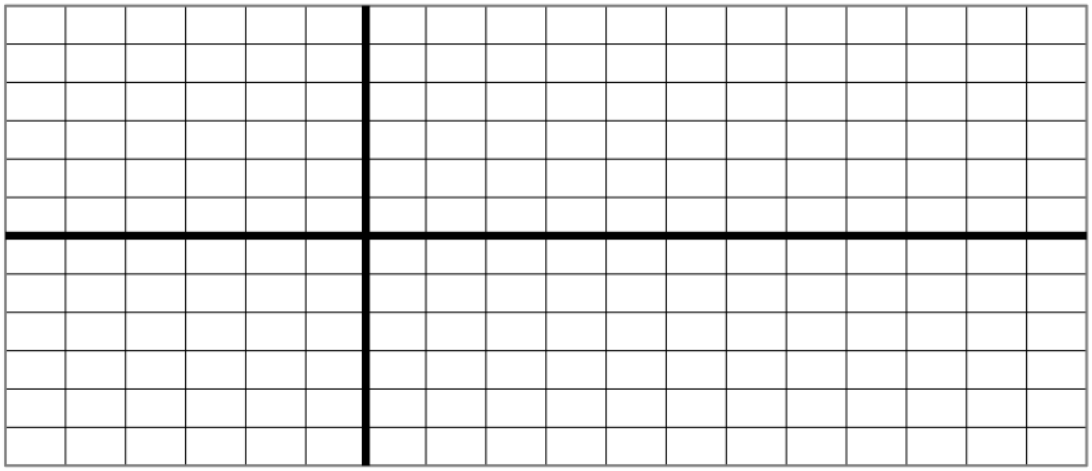
/15K	/10T	/6C	/14A	/1Bonus	Total /45

Name: _____ Date: _____

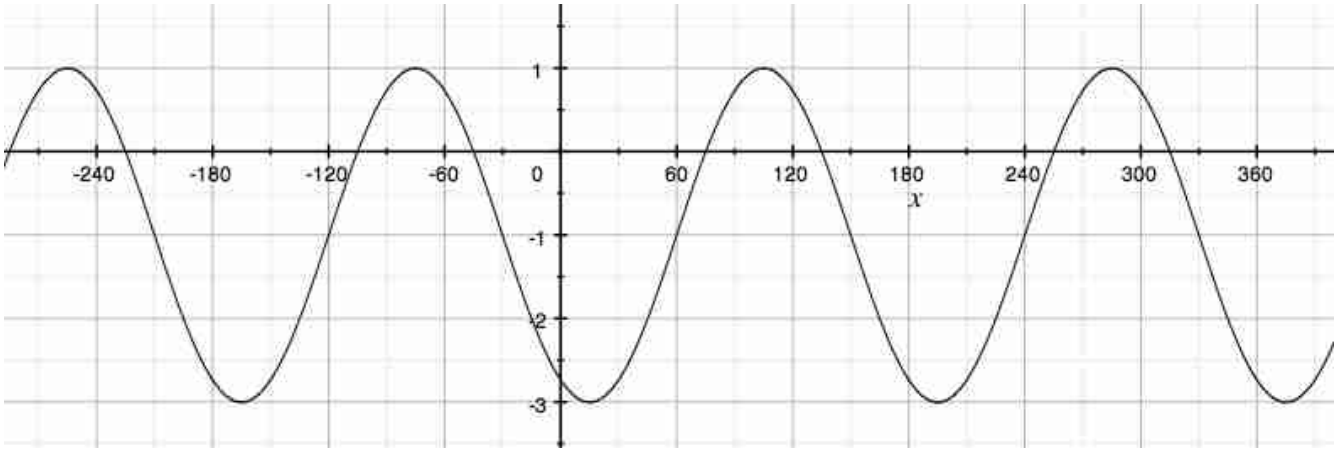
MCR3U Unit 5 Test: Trigonometric functions

Show all related work – support your answers by showing your process!

/3 K 1. Sketch one cycle of the graph of $y = -3\sin[\frac{4}{5}(x - 90^\circ)]$. Include an appropriate scale on each axis.



/3 K 2. Write an equation to represent the sinusoidal function in the following graph.



/2
C

3. What is the phase shift (and direction) of the cosine curve $y=2\cos(0.5\,x-100^o)$?

/2
K

4. Determine the period of the function $y=60\sin\left[\frac{10}{7}(x-360^o)\right]+120$?

/3
T

5. A sinusoidal function has an amplitude of 8 units, a period of 45°, and a minimum at (0, –14). Represent the function with an equation using a sine or cosine function.

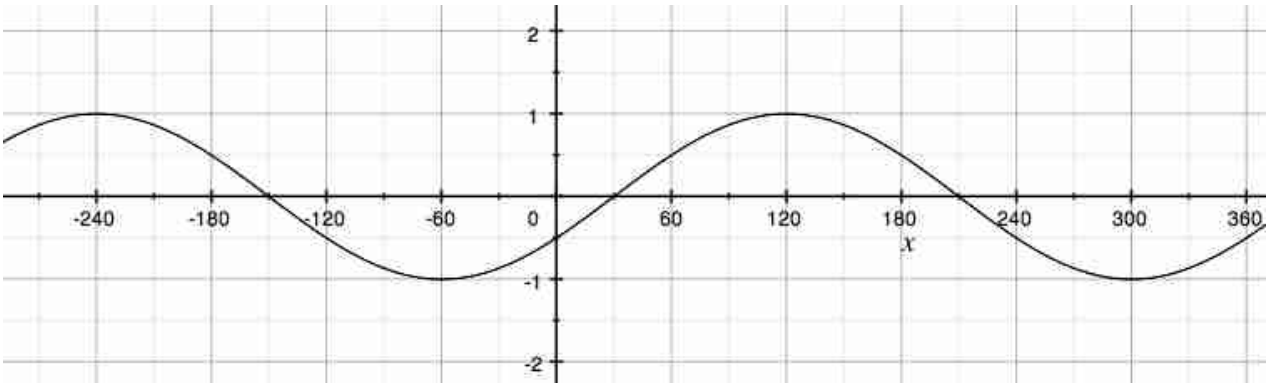
/3
T

6. Give the **co-ordinates** of a maximum of the graph of $f(x)=\sin\left[2(x-30^o)\right]+4$. Use this information to determine an equivalent equation using a cosine function.

/2
C

7. Is this the curve $y = -\cos(x - 60^\circ)$?

If it is, provide evidence to support it.
If it isn't, explain why it isn't.

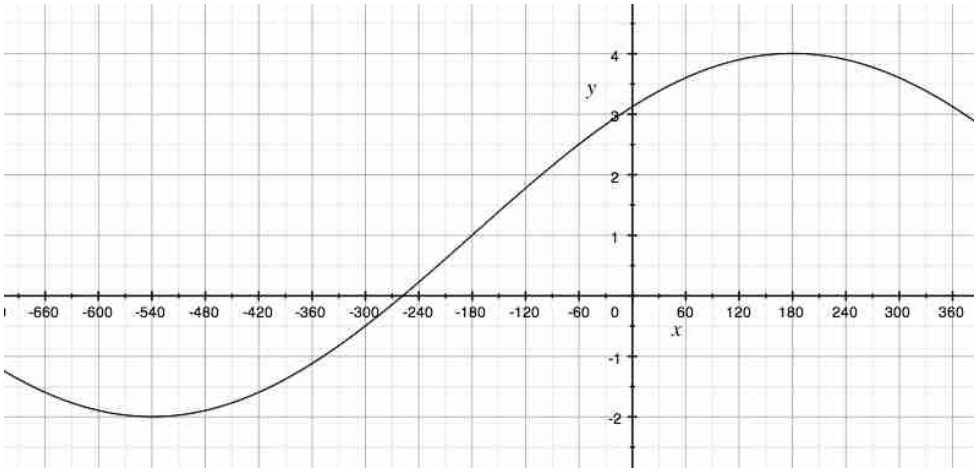


/4
K

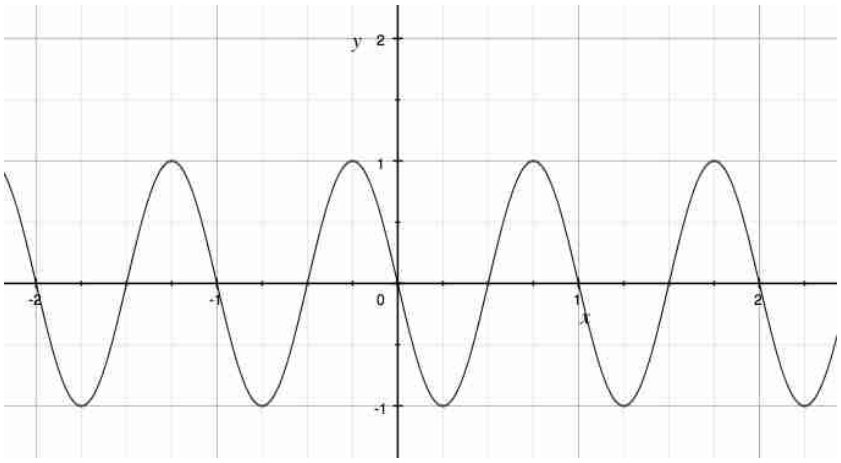
8. Determine equations to model each of the following sinusoidal functions.

a)

/4
A



b)



9. The following table lists average monthly high temperatures (°C) in St. John's NF for one year.

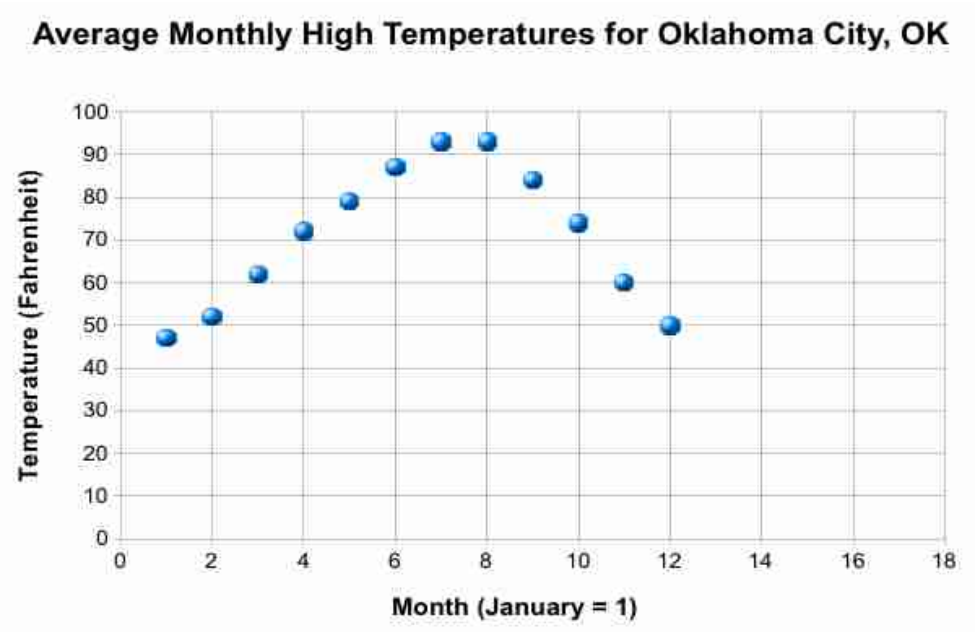
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
47	52	62	72	79	87	93	93	84	74	60	50

/3 K

a) Determine a **sine or cosine** equation to model this data.

/2 C

b) Graph your equation below.



/2 A

c) Determine an equivalent **sine or cosine** function that models this data.

- If you used **sine** in part (a), use **cosine** here
- If you used **cosine** in part (a), use **sine** here

/5
A

10. The depth of water h , in metres, in a given location on a given day at t hours after midnight can be modelled using the sinusoidal function $h(t)=1.8\cos[30(t-2)]+5.7$.

a) What are the maximum and minimum depths, of the water ?

b) Determine a time at which low tide occurs.

c) What is the depth of the water at 8 PM?

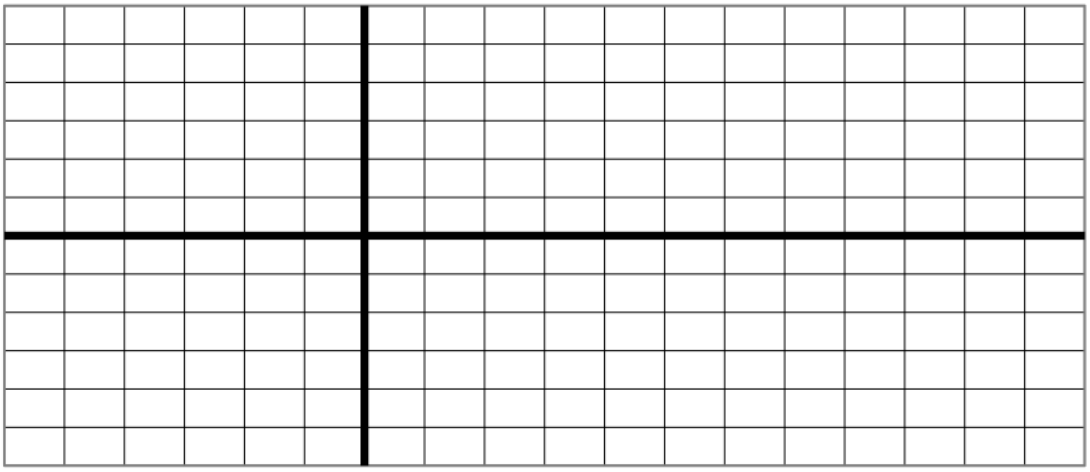
/4
T

11. Find the equation of a sinusoidal function that fits the following specifications:

- A maximum at $(45^\circ, 7)$
- The **next** maximum at $(60^\circ, 7)$
- The minimum of the function is -13

/3
A

12. Sketch the function $h(x)=4\cos[6(x-30^\circ)]$. Include an appropriate scale on both axes.



BONUS

/1

Describe the difference between **period** and **k**. Do not just give the formulas that relate the two.

$$Period=\frac{360^\circ}{k} \qquad k=\frac{360^\circ}{Period}$$

$$Amplitude=\frac{max-min}{2} \qquad Vertical\ Shift=\frac{max+min}{2}$$

$$Maximum=Vertical\ Shift+Amplitude \qquad Minimum=Vertical\ Shift-Amplitude$$

$$y=a\sin[k(x-d)]+c \qquad y=a\cos[k(x-d)]+c$$