

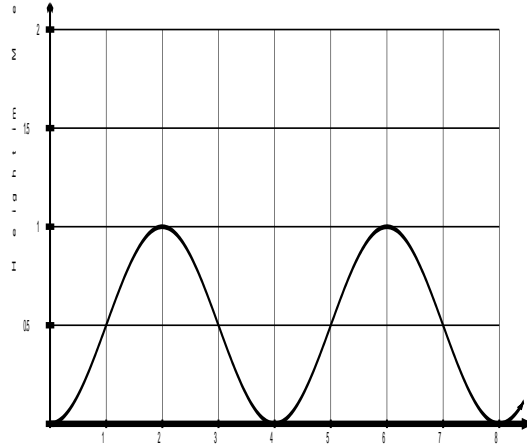
Mathematics 2204

Final Review

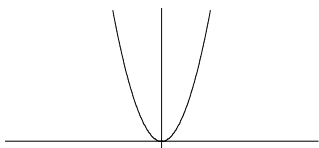
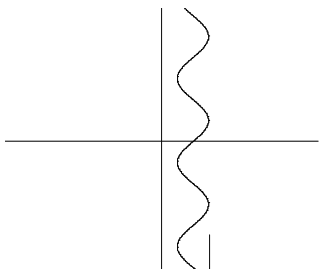
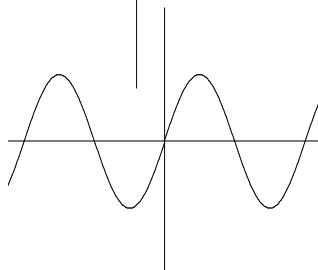
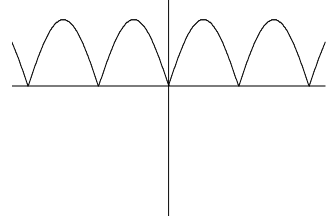
Chapter 3 Trigonometry 1

1. The graph below shows the height of a pebble stuck in a tire tread. What is the radius of the tire, in metres?

- (A) -0.5
- (B) 0.5
- (C) 1
- (D) 2



2. Which of the following graphs represents a function that is periodic and sinusoidal?

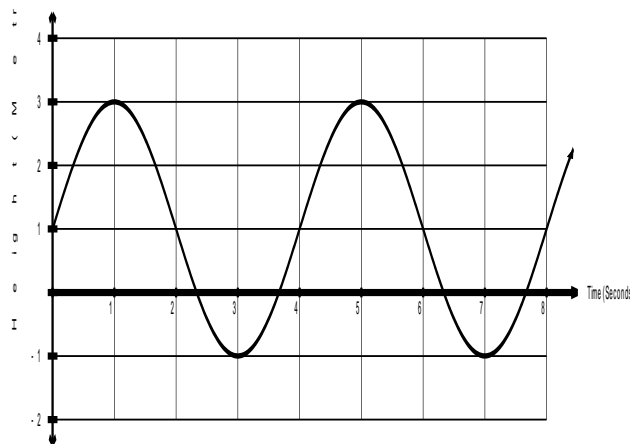
- (A) 
- (B) 
- (C) 
- (D) 

3. What is the amplitude of the graph represented by the equation  $3y + 6 = \sin \frac{1}{2}x - 90^\circ$  ?

- (A) -6
- (B)  $\frac{1}{3}$
- (C) 3
- (D) 6

4. The graph below shows the height of the nail on a water wheel with respect to the water level. How many seconds does it take to make one complete revolution?

- (A) 2
- (B) 3
- (C) 4
- (D) 5

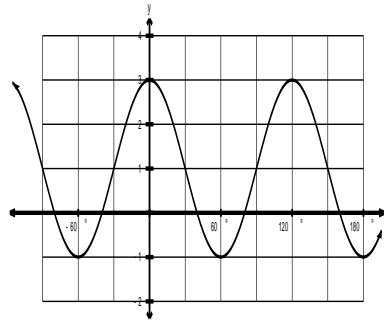


5. Which of the following mapping rules will transform  $y = \cos x$  to the relation  $\frac{1}{5}y + 1 = \cos 2x + 45^\circ$  ?

- (A)  $x, y \rightarrow \left(\frac{1}{2}x + 45^\circ, 5y - 1\right)$
- (B)  $x, y \rightarrow \left(\frac{1}{2}x - 45^\circ, 5y - 1\right)$
- (C)  $x, y \rightarrow \left(2x + 45^\circ, \frac{1}{5}y + 1\right)$
- (D)  $x, y \rightarrow \left(2x - 45^\circ, \frac{1}{5}y - 1\right)$

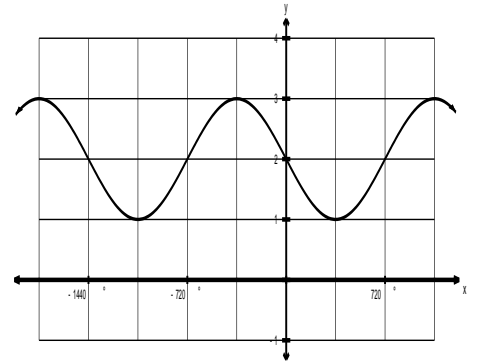
6. What is the range of the graph to the right?

- (A)  $x | x \in \mathbf{R}$
- (B)  $x | -1 \leq x \leq 3, x \in \mathbf{R}$
- (C)  $y | y \in \mathbf{R}$
- (D)  $y | -1 \leq y \leq 3, y \in \mathbf{R}$



7. What is the equation of the sinusoidal axis of the graph below?

- (A)  $x = 1$
- (B)  $x = 2$
- (C)  $y = 1$
- (D)  $y = 2$



8. If the image of  $y = \cos x$  is given by  $x, y \rightarrow \left(\frac{1}{3}x + 45^\circ, \frac{1}{2}y - 7\right)$ , what is the period of the image?

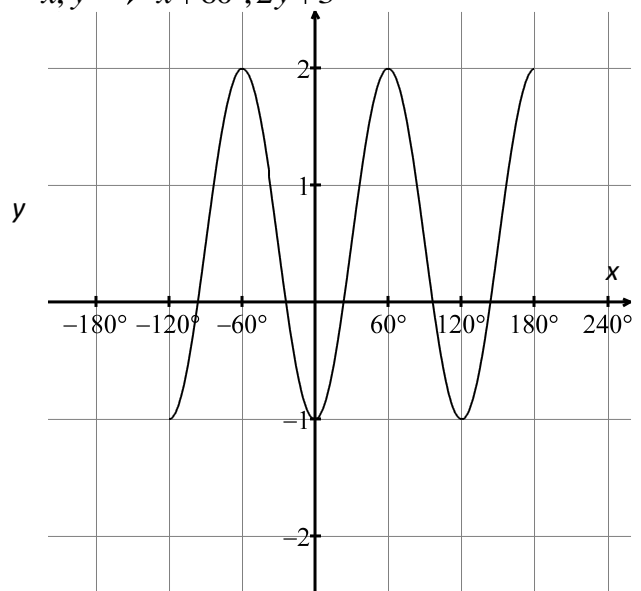
- (A)  $120^\circ$
- (B)  $180^\circ$
- (C)  $720^\circ$
- (D)  $1080^\circ$

9. Which mapping rule will transform  $y = \cos x$  to the relation  $2y + 3 = \cos x + 60^\circ$ ?

- (A)  $x, y \rightarrow x - 60^\circ, -2y - 3$
- (B)  $x, y \rightarrow \left(x - 60^\circ, \frac{1}{2}y - 3\right)$
- (C)  $x, y \rightarrow \left(x + 60^\circ, \frac{1}{2}y + 3\right)$
- (D)  $x, y \rightarrow x + 60^\circ, 2y + 3$

10. What is the range of the graph below?

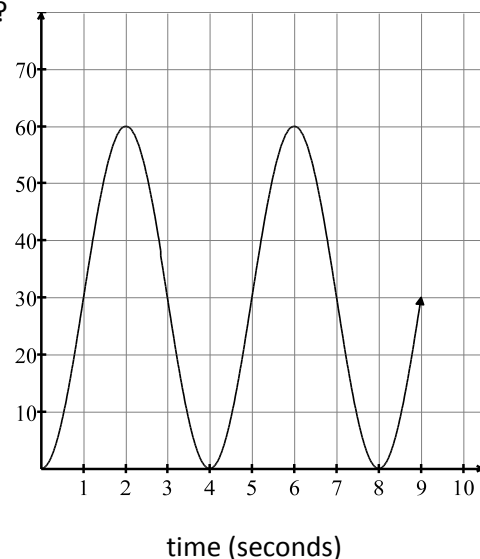
- (A)  $x | x \in \square$
- (B)  $x | -120^\circ \leq x \leq 180^\circ, x \in \square$
- (C)  $y | y \in \square$
- (D)  $y | -1 \leq y \leq 2, y \in \square$



11. A pebble is stuck in a car tire. The height of the pebble varies sinusoidally with time as shown in the graph below. What is the radius, in centimetres, of the tire?

- (A) 4
- (B) 8
- (C) 30
- (D) 60

height (cm)



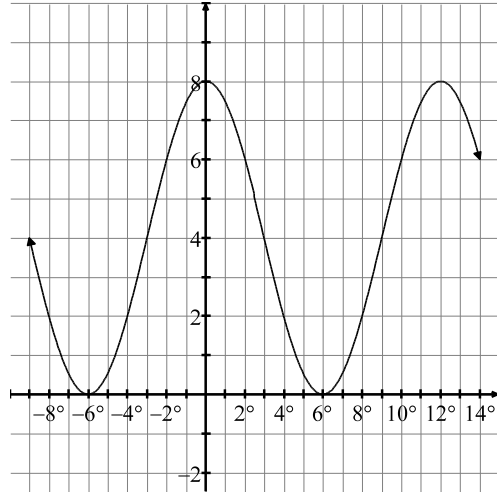
12. Given the table of values below for a sinusoidal function, what is the period of the function?

$x$	$-45^\circ$	$0^\circ$	$45^\circ$	$90^\circ$	$135^\circ$
$y$	$-2$	$1$	$-2$	$-5$	$-2$

- (A)  $45^\circ$       (B)  $90^\circ$       (C)  $180^\circ$       (D)  $360^\circ$

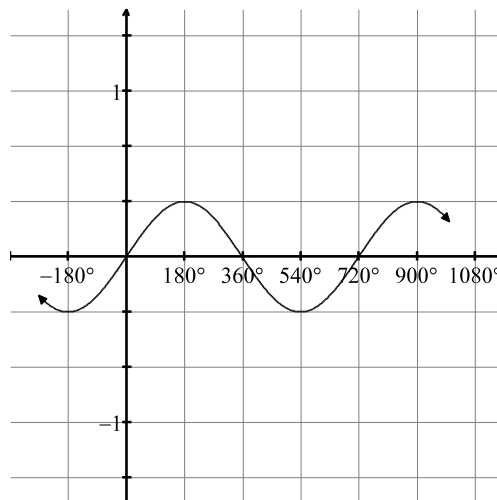
13. What is the equation of the sinusoidal axis of the function graphed below?

- (A)  $y = -4$   
 (B)  $y = 0$   
 (C)  $y = 4$   
 (D)  $y = 8$



14. What is the equation of the sinusoidal function graphed below?

- (A)  $\frac{1}{3}y = \sin\left(\frac{1}{2}x\right)$   
 (B)  $\frac{1}{3}y = \sin 2x$   
 (C)  $3y = \sin\left(\frac{1}{2}x\right)$   
 (D)  $3y = \sin 2x$

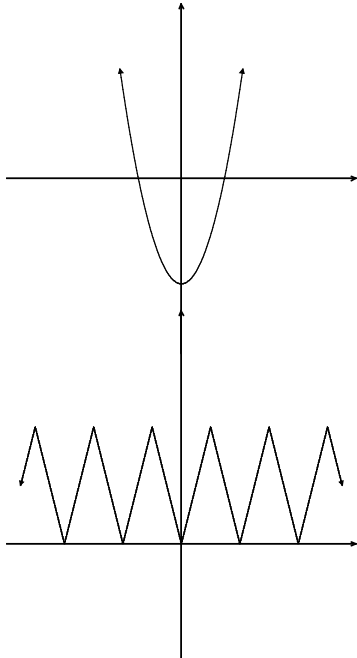


15. Which mapping rule produces an image of  $y = \cos x$  with a period of  $180^\circ$ ?

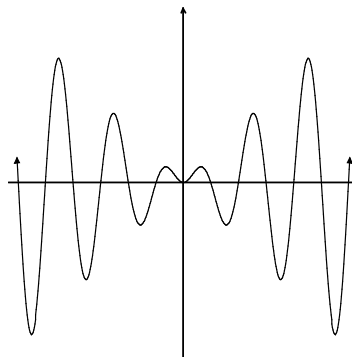
- (A)  $x, y \rightarrow \left(\frac{1}{2}x, y\right)$       (B)  $x, y \rightarrow \left(x, \frac{1}{2}y\right)$   
 (C)  $x, y \rightarrow x, 2y$       (D)  $x, y \rightarrow 2x, y$

16. Which graph represents a periodic function?

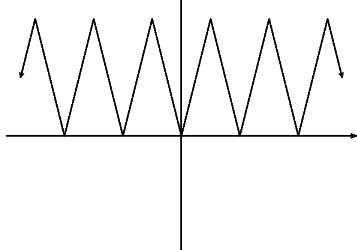
(A)



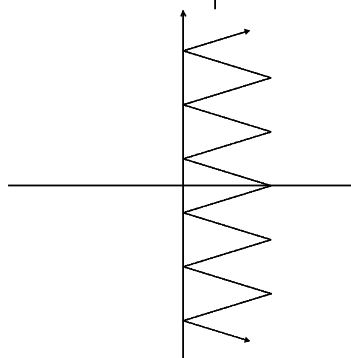
(B)



(C)



(D)



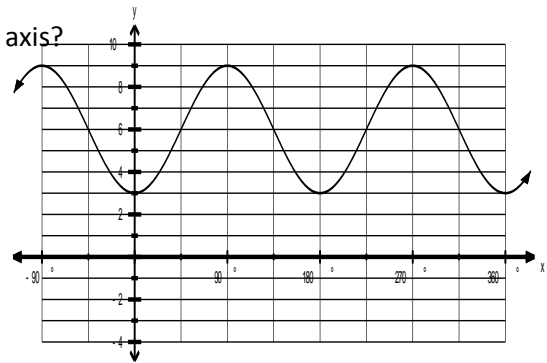
17. What is the amplitude of the function  $y = -4 \sin x - 180^\circ$  ?
- A) -180                      B) -4                      C) 4                      D) 180

18. Which of the following situations would produce a graph which is periodic and sinusoidal ?

- A) The value of a car over a period of time. Time is the independent variable and the value is the dependent variable.
- B) The purchasing of candy by the pound. Weight in the independent variable and the cost is the dependent variable.
- C) The depth of water changing in Corner Brook harbour as a result of constant rising and falling tides. Time is the independent variable and the depth of the water is the dependent variable.
- D) The filling of a truck's gas tank at a constant rate. Time is the independent variable and the amount of gas is the dependent variable.

19. Given the graph of the function below, what is the equation of the sinusoidal axis?

- A)  $y = 3$   
 B)  $y = 6$   
 C)  $x = 3$   
 D)  $x = 6$

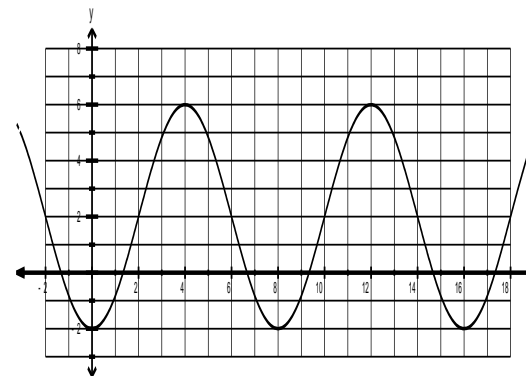


20. If the image of  $y = \sin x$  is given by the mapping rule  $x, y \rightarrow \frac{1}{2}x - 60^\circ, 3y + 2$ , what is the equation of the image?

- A)  $\frac{1}{3} y - 2 = \cos \frac{1}{2} x - 60^\circ$                       B)  $\frac{1}{3} y - 2 = \sin 2(x + 60^\circ)$   
 C)  $3 y + 2 = \sin \frac{1}{2} x - 60^\circ$                       D)  $3 y + 2 = \sin 2(x + 60^\circ)$

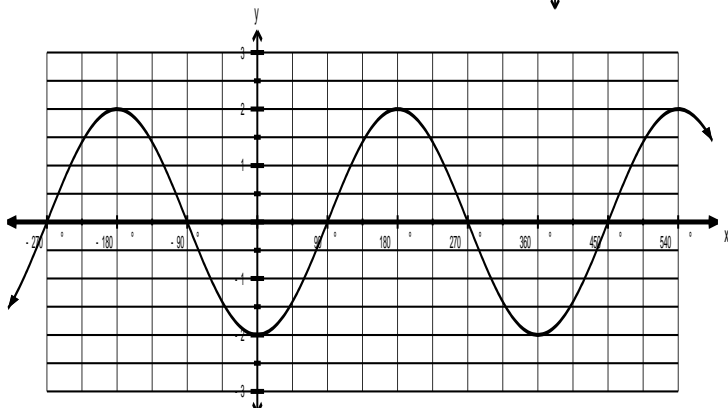
21. What is the horizontal stretch factor for the graph of the function shown below?

- A)  $\frac{1}{45}$                       B)  $\frac{1}{8}$                       C)  $\frac{1}{2}$                       D) 4



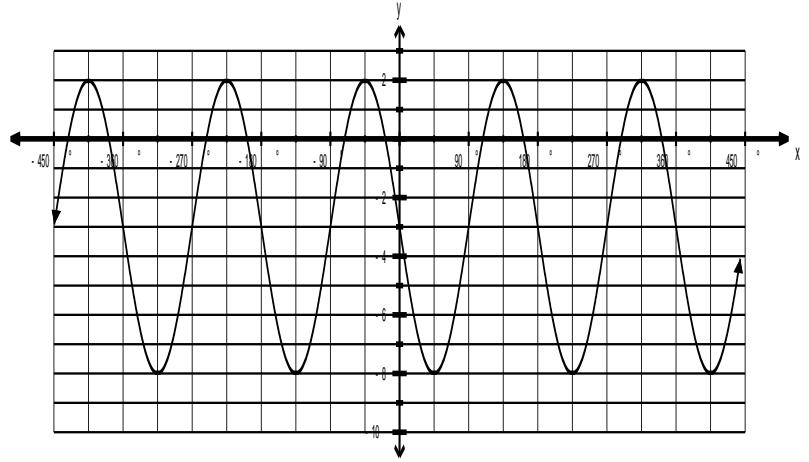
22. Which equation represents the function graphed below?

- A)  $\frac{1}{2} y = \sin x - 90^\circ$   
 B)  $\frac{1}{2} y = \sin x + 90^\circ$   
 C)  $2y = \sin x - 90^\circ$   
 D)  $2y = \sin x + 90^\circ$



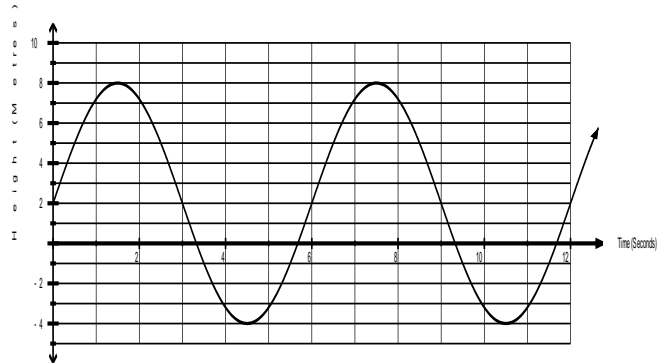
23. What is the range of the graph below?

- A)  $x | x \in \square$
- B)  $y | y \in \square$
- C)  $y | -8 \leq y \leq 2, y \in \square$
- D)  $y | -2 \leq y \leq 8, y \in \square$



24. The graph below shows the height of a nail on a water wheel with respect to the water level. What is the radius of the water wheel?

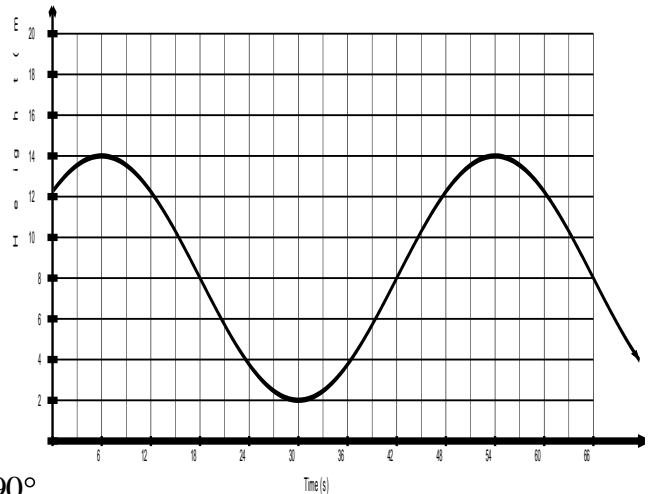
- A) -4 m
- B) 2 m
- C) 6 m
- D) 8 m



PART II:

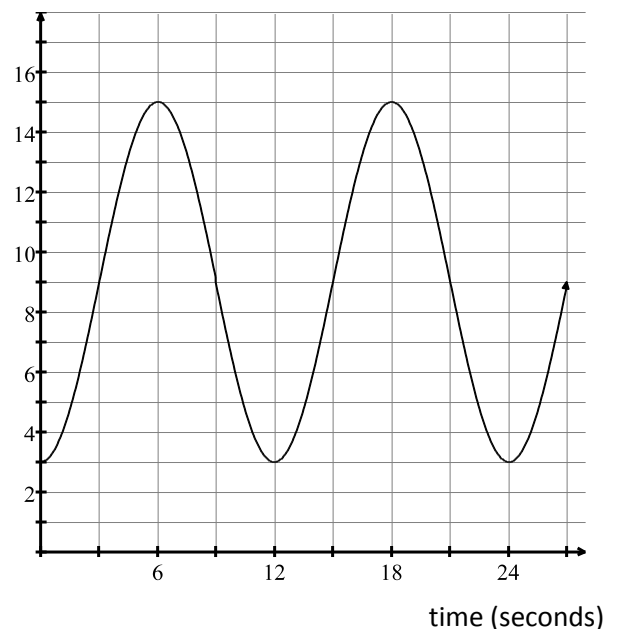
1. Graph the following relation:  $-\frac{1}{4}y + 2 = \cos 2x - 90^\circ$ .

2. Jack is riding a Ferris wheel. The graph below shows his height above the ground with relation to time. Determine the equation of the function in terms of sine **or** cosine that describes Jack's height above the ground in relation to time.



3. Graph the following relation:  $-\frac{1}{2}y + 1 = \sin 3x - 90^\circ$

4. A mother puts her child on a Merry-Go-Round. To watch her child, she stands at a point that is initially 3 metres away from the child, which is distance (m) the closest distance between the mother and child. At 6 seconds, the child is 15 metres from his mother, which is the farthest distance between the mother and child. Assuming the distance between the mother and child varies sinusoidally with time, determine the relation that models this situation.



5. A Ferris wheel rotates at a uniform speed of 1 revolution every 20 seconds. When the Ferris wheel begins to move, you are at the lowest point on the wheel which is 2 m above the ground. The highest height you reach is 22 m above the ground.

A) Sketch a graph for your ride which is 3 revolutions of the wheel.

B) Write an equation in terms of sine or cosine for  $h$  the height, in metres, of your seat above the ground  $t$  seconds after the ride starts.

6. Graph the following relation:  $-(y + 2) = \sin \frac{1}{2} x + 90^\circ$