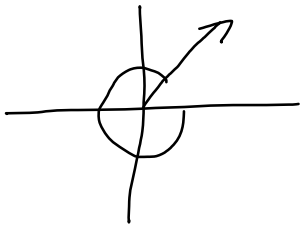
1.

a) Draw the angle $-\frac{11\pi}{6}$ in standard position.



b) determine an angle that is co-terminal to $-\frac{11\pi}{6}$

$\frac{\pi}{6}$, $-\frac{23\pi}{6}$

c) Determine the reference angle of $-\frac{11\pi}{6}$

$\frac{\pi}{6}$

2. Which pair of angles are co-terminal with $\frac{2\pi}{3}$?

a. $-\frac{4\pi}{3}, \frac{8\pi}{3}$

b. $\frac{4\pi}{3}, \frac{8\pi}{3}$

c. $-\frac{4\pi}{3}, -\frac{8\pi}{3}$ a

d. $-\frac{\pi}{3}, \frac{\pi}{3}$

3. During a routine, a figure skater completes $-13\frac{11}{18}$ rotations. How many degrees has the figure skater turned?

a. $4900°$

b. $-4900°$ a

c. $6900°$

d. $-6900°$

4. If the angle p is $-4000°$ in standard position, it can be described as having made

a. $22\frac{2}{9}\ rotations$

b. $-22\frac{2}{9}\ rotations$

c. $11\frac{1}{9}\ rotations$ d

d. $-11\frac{1}{9}\ rotations$

5. $\frac{5\pi}{3}\ radians$ is equal to how many degrees?

a. $300°$

b. $600°$

c. $60°$ a

d. $120°$

6. A grandfather clock shows a time of 8 o'clock. What is the exact radian measure of the angle between the hour hand and the minute hand?

$2\pi/3$

7. $\frac{3\pi}{4}$ $radians$ is equal to how many degrees?

a. $135°$

b. $315°$

c. $45°$ a

d. $225°$

8. Which of the following angles, in degrees, is co terminal with, but not equal to $\frac{3\pi}{2}$ radians?

a. $270°$

b. $450°$

c. $630°$ c

d. $540°$

9. An angle of $240°$ expressed in radians is:

a. $\frac{4\pi}{3}$

b. $\frac{\pi}{3}$ a

c. $\frac{5\pi}{4}$

d. $\frac{7\pi}{6}$

10. Covert 3.8 radians to the nearest degree

218°

11. Calculate the arc length that subtends an angle of 1.64 radians at the center of a circle with radius 20m

32.4 m

12. Determine the arc length of a circle with radius 5.1cm if it is subtended by a central angle of π radians. Round your answer to one decimal place.

a. 14.2cm

b. 3.1cm

c. 30.2cm

d. 16.02cm

d

13. The radian measure of an angle is $\frac{2\pi}{5}$. The arc that subtends the angle has a length of 2π. Determine the radius the of circle.

5

14. A bicycle has a front wheel that is 36cm in diameter and a rear wheel that is 18cm in diameter. If the front wheel rotates through an angle of 120°, through how many degrees does the rear wheel rotate?

a. $120°$

b. $60°$

c. $360°$

d. $240°$

d

15. A child swings on a playground swing set. If the length of the swing's chain is 4 m and the child swings through an angle of π/16, what is the exact arc length through which the child travels?

$\frac{\pi}{4}$ m

16. Identify a measure for the central angle p in the interval $0 \leq \theta \leq 2\pi$ such that the point $(0,-1)$ is on the terminal arm.

a. 0

b. $\frac{\pi}{2}$

c. π

d. $\frac{3\pi}{2}$ d

17. The angle θ lies in Quadrant II with point Q on the terminal arm and $\tan\theta = -\frac{2}{5}$

Determine the exact value of $\sin\theta$.

$\frac{2}{\sqrt{29}}$ or $\frac{2\sqrt{29}}{29}$

18. Angle θ lies in Quadrant III with point A $(-4,-6)$ on the terminal arm. Point p is the point of intersection of the terminal arm of θ and the unit circle centered at $(0,0)$. Determine the exact value of the x-coordinate of point P.

$$\frac{2}{\sqrt{13}}$$

19. If $cos\theta = \frac{5}{13}$ and angle θ is in Quadrant IV. Determine the possible coordinates for point P on the terminal arm of angle θ.

$$P(5,-12)$$

20. Determine the exact value of the following.

a) $\sin\frac{-11\pi}{6}$

$\frac{1}{2}$

b) $\cos\frac{-3\pi}{4}$

$-\frac{\sqrt{2}}{2}$

c) $\tan\frac{2\pi}{3}$

$-\sqrt{3}$

d) $\cos\frac{7\pi}{4}$

$\frac{\sqrt{2}}{2}$

e) $\cot\frac{\pi}{6}$

$\sqrt{3}$

f) $\sec\frac{\pi}{4}$

$\sqrt{2}$

g) $\csc\pi$

undefined

h) $\tan\left(-\frac{5\pi}{3}\right)$

$\sqrt{3}$

i)

$$\left[\cos\left(\frac{5\pi}{6}\right)\right]^2-\left[\sin\left(\frac{5\pi}{6}\right)\right]^2 = \frac{1}{2}$$

21. The point (–2, 5) is located on the terminal arm of ∠A in standard position.

a. Determine the primary trigonometric ratios for ∠A.

$\sin A = \frac{5}{\sqrt{29}}$ $\quad\quad$ $\tan A = -\frac{5}{2}$

$\cos A = -\frac{2}{\sqrt{29}}$

b. Determine the primary trigonometric ratios for ∠B with the same sine as ∠A, but different signs for the other two primary trigonometric ratios.

$\sin B = \frac{5}{\sqrt{29}}$

$\cos B = \frac{2}{\sqrt{29}}$

$\tan B = \frac{5}{2}$

c. Use a calculator to determine the measures of ∠A and ∠B, to the nearest degree.

$\angle B = 68^\circ$

$\angle A = 112^\circ$

22. Determine the period of each function

a) $y = tan\frac{2}{3}x$

$\frac{3\pi}{2}$

b) $y = sin4x$

$\frac{\pi}{2}$

c) $y = 5\cos(tx)$

$\frac{2\pi}{t}$

23. The number of solutions to the equation $cos5x = -\frac{\sqrt{3}}{2}$, for $0 \leq x \leq 2\pi$ is:

10

24. The number of solutions to the equation $tan\frac{1}{2}x = \frac{\sqrt{3}}{1}$, for $0 \leq x \leq 2\pi$ is:

1

25. The number of solutions to the equation $sin2x = \frac{\sqrt{2}}{2}$, for $0 \leq x \leq 2\pi$ is:

4

26. Determine the amplitude, period, phase shift and vertical displacement of the following functions:

$y = -5\sin\left(4x + \frac{5}{4}\right) + 10$

Amp = 5

Period = $\frac{\pi}{2}$

P.S = Left $\frac{5}{16}$

V.D. = 10 up

$y = 12\cos(5x + 10) - 2$

Amp = 12

Period = $\frac{2\pi}{5}$

P.S = Left 2

V.D. = 2 down

$y = 100\tan(30x + 1) + 2$

Amp = none

Period = $\frac{\pi}{30}$

P.S. = Left $\frac{1}{30}$

V.P. = 2 up

27. A cosine function has a maximum value of 10 and a minimum value of -2, a period of 7, and a phase shift of 12. Write an equation representing this cosine function.

$y = 6\cos\left[\frac{2\pi}{7}(x-12)\right]+4$

28. Given an equation for a transformed cosine function with an amplitude of $\frac{2}{7}$, a period of 3, a phase shift of $\frac{3}{2}$ rad to the left, and a vertical translation of 3 units up.

a. $\frac{2}{7}\cos\left(3x+\frac{3}{2}\right)+3$

b. $\frac{2}{7}\cos\left(3x+\frac{9}{2}\right)+3$

c. $\frac{2}{7}\cos\left(\frac{2\pi}{3}x+\frac{3}{2}\right)+3$

d. $\frac{2}{7}\cos\left(\frac{2\pi}{3}x+\pi\right)+3$

d

29. The period of the graph $y = cosx$ is

a. $360°$

b. $180°$

c. $720°$

d. $0°$

a

30. The period of the graph $y = tanx$ is

a. $360°$

b. $180°$

b

c. $720°$

d. $0°$

31.What is the period of the sinusoidal function $y = -4\sin(-2(x - \pi)) + 5$

a. $\frac{\pi}{2}$

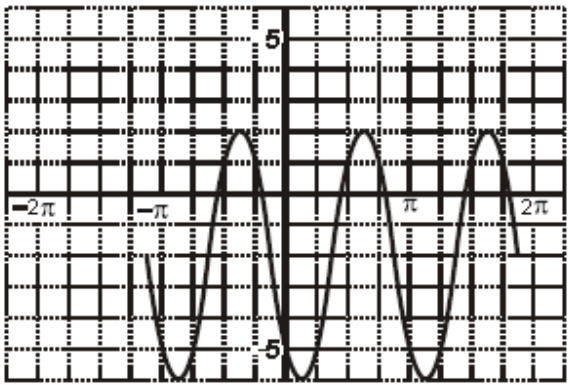
b. $-\pi$

d

c. 2π

d. π

32.Determine the period of the sinusoidal graph below.



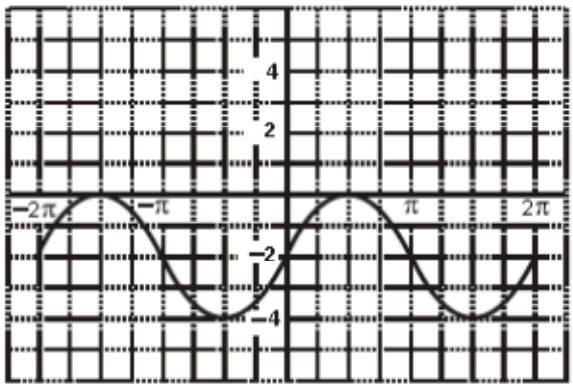
a. 2π

b. π b

c. $\frac{1}{2}$

d. $\frac{3\pi}{2}$

33. The graph of a periodic function is shown below. Determine the amplitude.



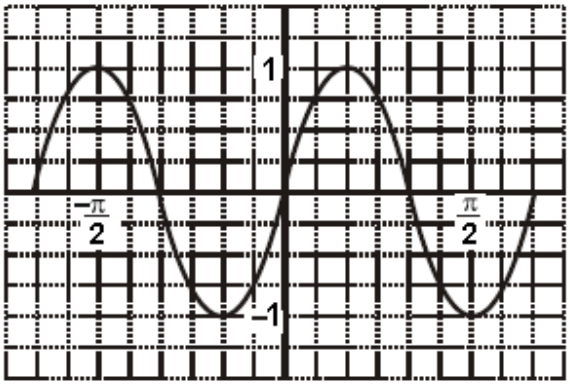
a. 4

b. 3

c. 2 C

d. 1

34. Which of the following is an equation for the graph shown?



a. $y = sin\frac{1}{2}x$

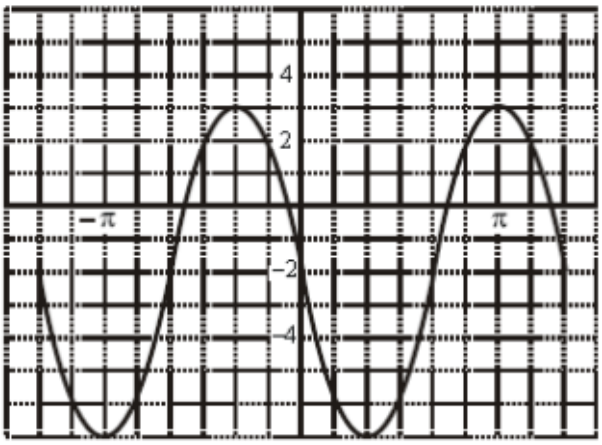
b. $y = sin\frac{1}{3}x$

c. $y = sin\frac{2\pi}{3}x$

d. $y = sin3x$

d

35. Which of the following is an equation for cosine function graphed below?



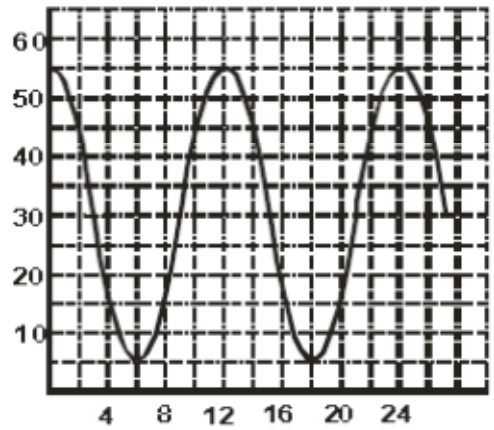
a. $y = 7cos\frac{3}{2}\left(x - \frac{\pi}{3}\right) - 2$

b. $y = 7cos\frac{3}{2}\left(x + \frac{\pi}{3}\right) - 2$ b

c. $y = 3cos\frac{4}{3}\left(x + \frac{\pi}{3}\right) - 2$

d. $y = 3cos\frac{4}{3}\left(x - \frac{\pi}{3}\right) - 2$

36. For the graph below, write the equation in form $y = acos\frac{2\pi}{12}x + b$



$y = 25\cos\left[\frac{2\pi}{12}(x)\right] + 20$

37. Which two functions below have the same period?

a. $y = 2\sin\left(3x - \frac{\pi}{6}\right)$

b. $y = -5\cos\left(3x - \frac{\pi}{12}\right)$

a and b

c. $y = 3sin\frac{x}{6}$

d. $y = 2\cos\left(x - \frac{x}{12}\right)$

38. The range of the function defined by $y = 3\sin\left(x - \frac{\pi}{6}\right) - 4\ is$:

a. $1 \leq y \leq 7$

b. $-7 \leq y \leq -1$

b

c. $-3 \leq y \leq 3$

d. $-2\pi \leq y \leq 2\pi$

39. Determine the range of the function $y = a\cos\left(x - \frac{\pi}{2}\right) + b$, given a is less than zero.

a. $-a - b \leq y \leq a - b$

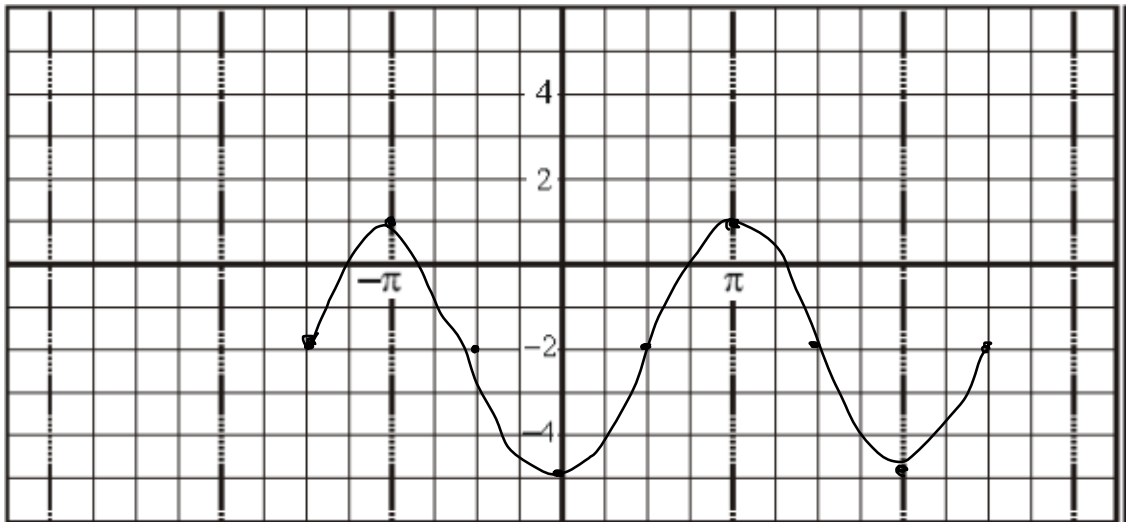
b. $-a \leq y \leq a$

c. $-ba \leq y \leq ba$

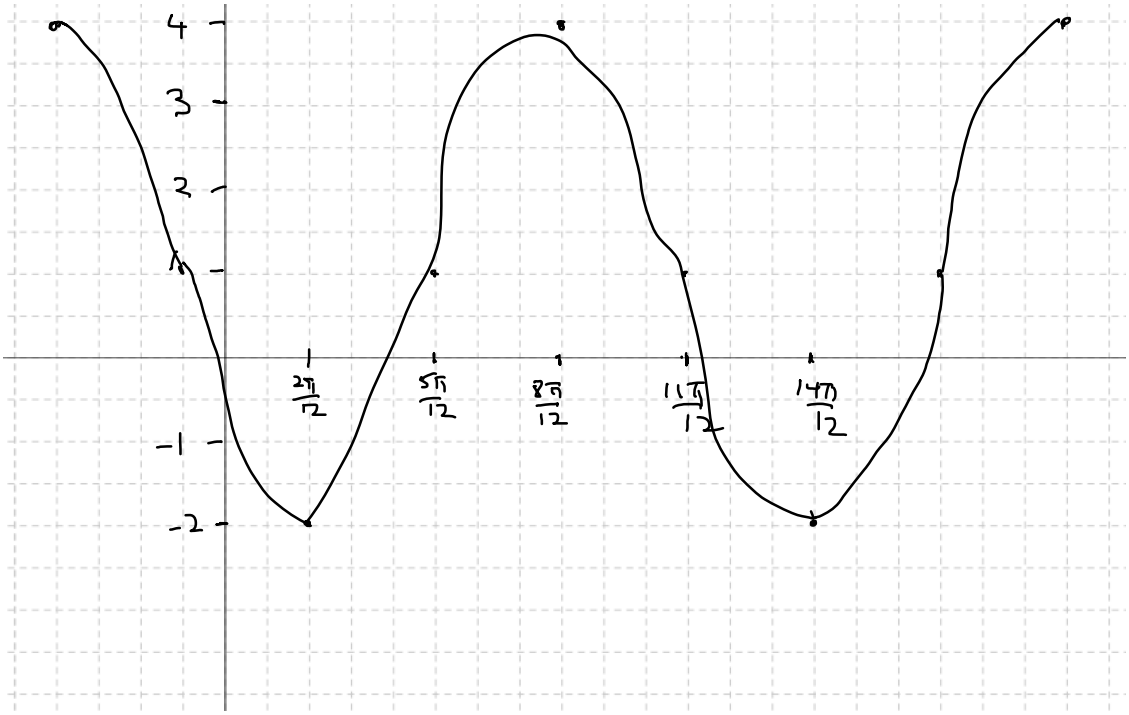
d. $a + b \leq y \leq -a + b$

d

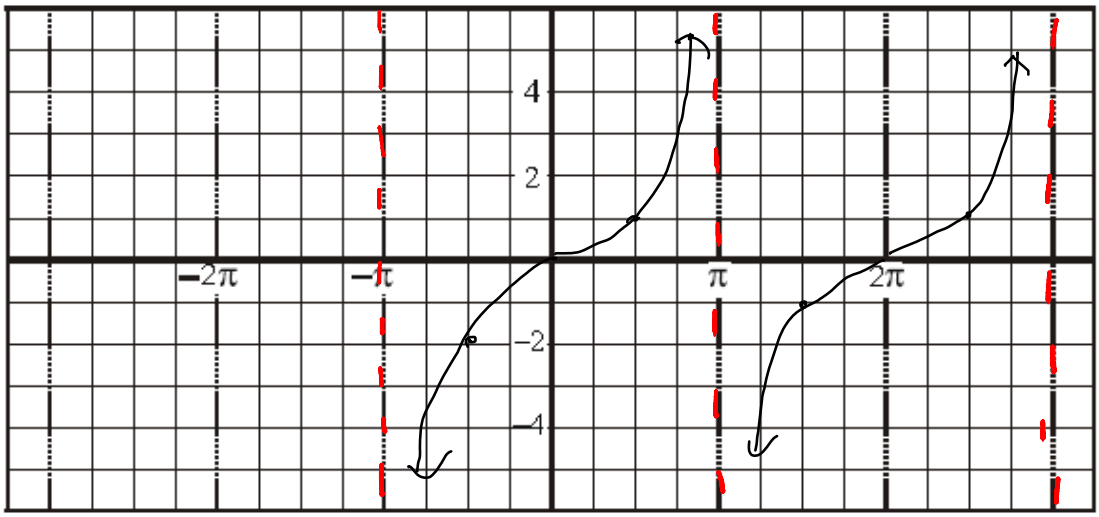
40. Graph two periods of $y = 3\sin\left(x - \frac{\pi}{2}\right) - 2$



41. Graph two periods of $y = -3cos2\left(x - \frac{\pi}{6}\right) + 1$

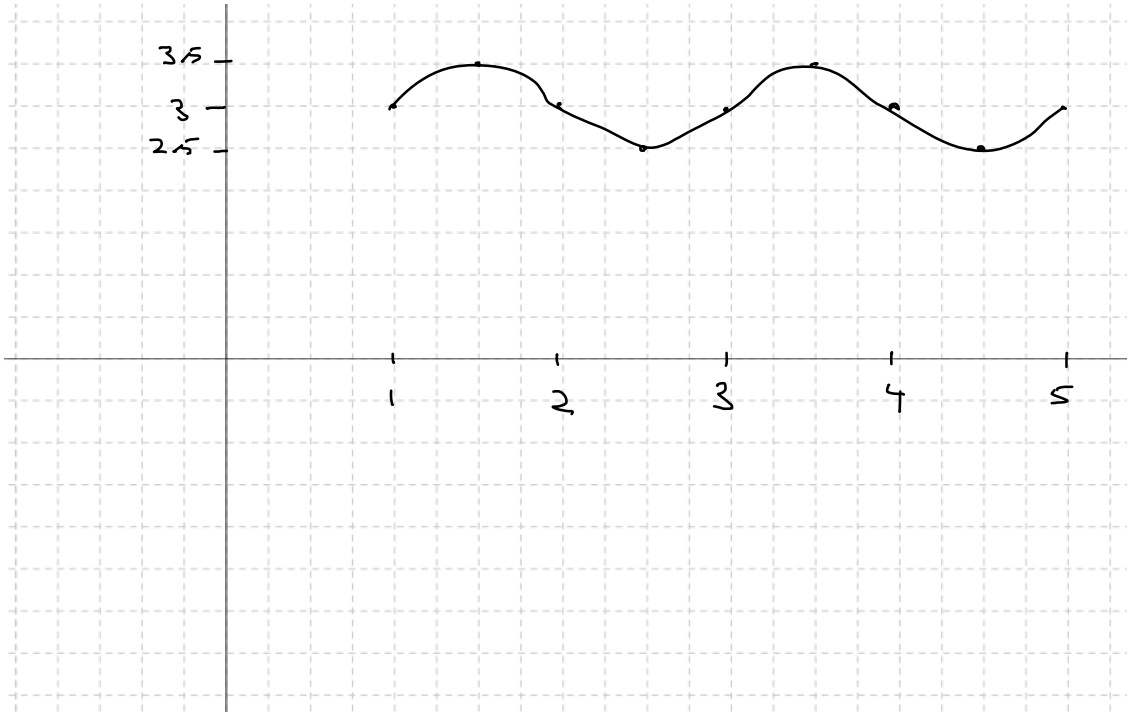


42. Graph two periods of $y = tan\frac{1}{2}x$



43. Sketch the graph of the following for two cycles, where angles are in radians

$$y = \frac{1}{2}\sin[\pi(x-1)] + 3$$



44. The time of sunrise , t hours on a given day of the year d is given by:

$$t = 2.65cos2\pi\frac{(d+11)}{365} + 6.15$$

What time does the sunrise on May 23rd, the 143rd day of a non-leap year.

a. 3:49am

b. 5:41am

a

c. 7:32am

d. 9:13am

45. The voltage, v, in an electric circuit is measured in millivolts and is given by the formula $v = 0.2sin0.1\pi(T - 0.5) + 0.3$, where T is the time in seconds from the start of an experiment. Use the graph of the function to estimate how many seconds in the 40 second interval starting at T=0 during which the voltage is below 0.21mV

a. 7.03s

b

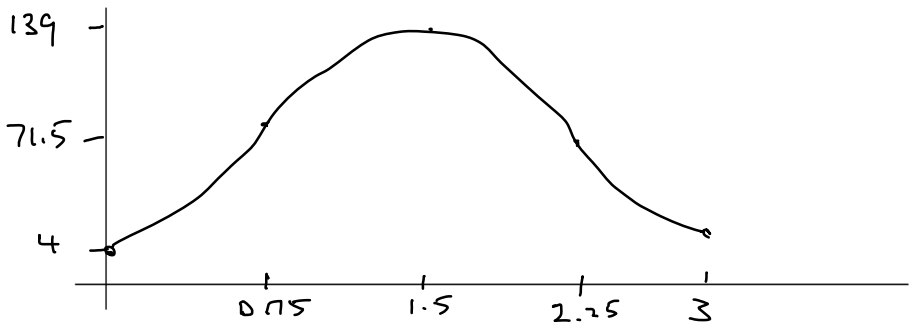
b. 14.06s

c. 12.97s

d. 27.16s

46. One of the largest Ferris wheels ever built is the British Airways London Eye which was completed in year 2000. The diameter is 135m and passengers get on at the bottom 4m above the ground. The wheel rotates once every 3 minutes.

a. Draw a graph which represents the height of a passenger in meters as a function of time in minutes.



b. Determine the equation that express your height h as a function of elapsed time t.

$$h(t) = -67.5 \cos\left[\frac{2\pi}{3}(t)\right] + 71.5$$

c. How high is a passenger 5 minutes after the wheel starts rotating?

105.25m

d. How many seconds after the wheel starts rotating is a passenger 90m above the ground for the first time? Answer to the nearest tenth.

53 sec

47. At a certain ocean bay, the maximum height of the water is 2 m above mean sea level at 7:00 a.m. The height is at a maximum again at 7:24 p.m. Assuming that the relationship between the height, h, in metres, and the time, t, in hours, is sinusoidal, determine the height of the water above mean sea level, to the nearest tenth of a metre, at 11:00 a.m.

$-0.9\,m$