

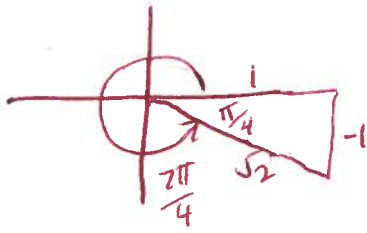
Name: _____

40pts total To be adjusted to a mark / 6

Each question is worth 2pt unless noted otherwise

A ① Determine the exact value of $\csc \frac{7\pi}{4}$.

- A. $-\sqrt{2}$
- B. $\sqrt{2}$
- C. $-\frac{1}{\sqrt{2}}$
- D. $\frac{1}{\sqrt{2}}$



$\sin = \frac{y}{r}$
 $\csc = \frac{r}{y}$
 $\frac{\sqrt{2}}{-1}$

B ② In a circle, an arc of length 30 cm contains a central angle of 120° . Determine the radius of this circle.

- A. $\frac{36}{\pi}$ cm
- B. $\frac{45}{\pi}$ cm
- C. 20π cm
- D. 45π cm

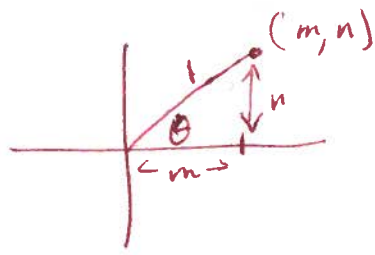
$a = r\theta$
 $r = \frac{a}{\theta} = \frac{30 \text{ cm}}{\frac{2\pi}{3}}$
 $\frac{30 \text{ cm} \left(\frac{3}{2\pi}\right)}{1} = \frac{90 \text{ cm}}{2\pi} = \frac{45}{\pi} \text{ cm}$

$\frac{120^\circ \left(\frac{\pi}{180^\circ}\right)}{90^\circ} = \text{radius}$
 $\frac{60^\circ \pi}{90^\circ} \rightarrow \frac{20\pi}{30} \rightarrow \frac{2\pi}{3}$

D ③ The terminal arm of angle θ in standard position intersects the unit circle at the point (m, n) . Which expression represents $\cot \theta$?

- A. m
- B. n
- C. $\frac{n}{m}$
- D. $\frac{m}{n}$

$\cot \theta = \frac{x}{y}$
 $\cot \theta = \frac{m}{n}$

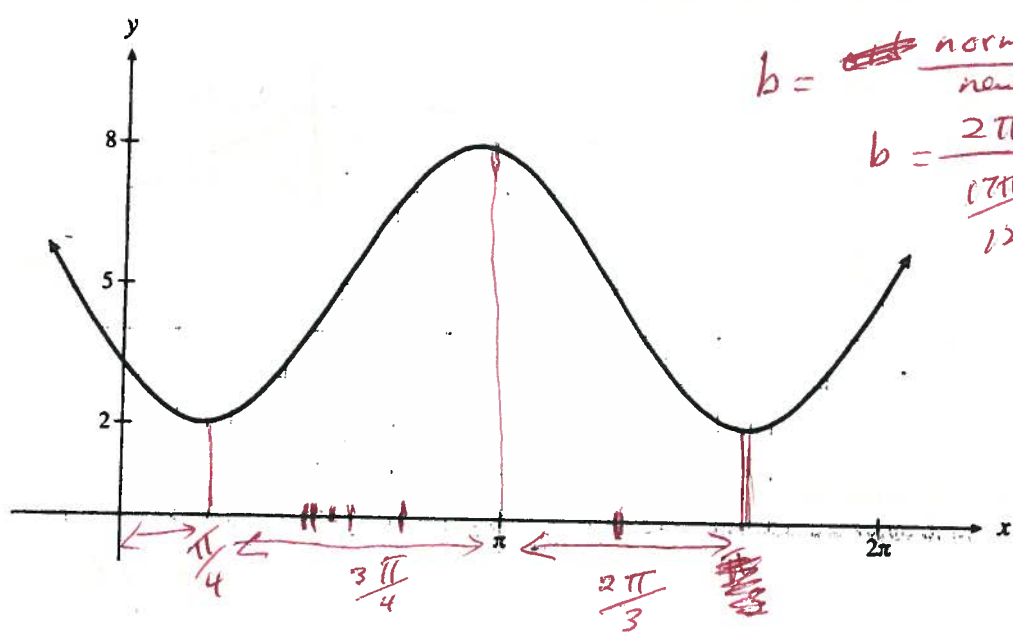


B ④ Determine the phase shift of $y = -4 \sin(2x - 6)$.

- A. 2 to the right
- B. 3 to the right
- C. 4 to the right
- D. 6 to the right

$y = -4 \sin(2(x-3))$

B (5) Given the graph of the function $y = a \sin(b(x-c)) + d$ below, determine the value of b .



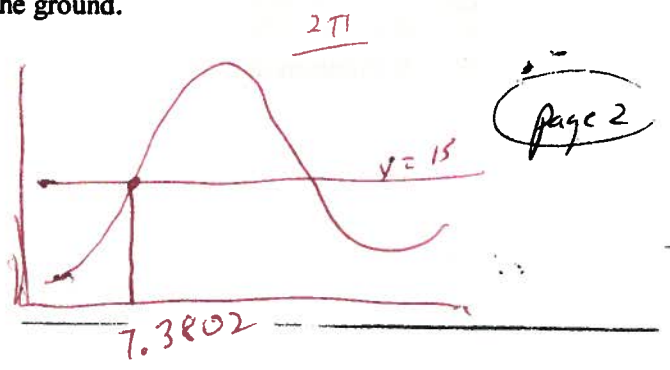
- A. $\frac{10\pi}{7}$
 - B. $\frac{7}{5} = 1.4$
 - C. $\frac{5\pi}{7}$
 - D. $\frac{14}{5} = 2.8$
- $\frac{3\pi}{4} + \frac{2\pi}{3} = \text{period}$
 $\frac{9\pi}{12} + \frac{8\pi}{12} = \frac{17\pi}{12}$
 $b = \frac{2\pi}{\frac{17\pi}{12}} = \frac{24}{17} = 1.41$

D (6) Determine the period of the function $y = 3 \cos \frac{\pi}{4} x$.

- A. $\frac{\pi}{4}$
 - B. $\frac{\pi}{2}$
 - C. 4
 - D. 8
- $\text{period} = \frac{2\pi}{b}$
 $= \frac{2\pi}{\frac{\pi}{4}} = \frac{2\pi \cdot 4}{\pi} = 8$

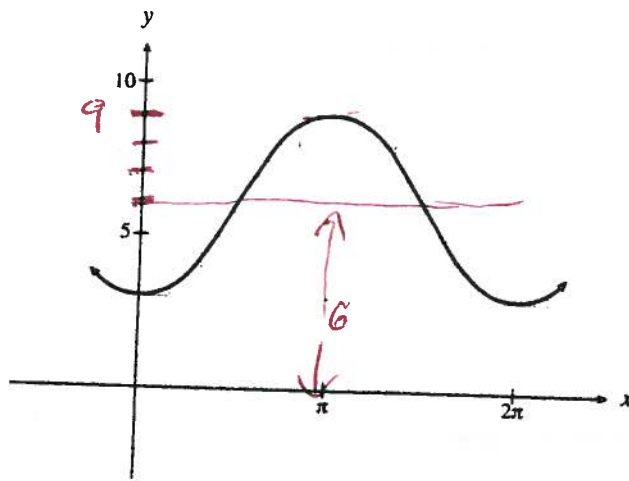
A (7) The height above the ground, h metres, of a person on a Ferris wheel at time t seconds, is given by the formula $h(t) = -20 \cos \frac{2\pi}{40} t + 23$, where $t \geq 0$. Determine the earliest time at which the person will be 15 m above the ground.

- A. 7.38 s
- B. 12.62 s
- C. 32.62 s
- D. 37.14 s



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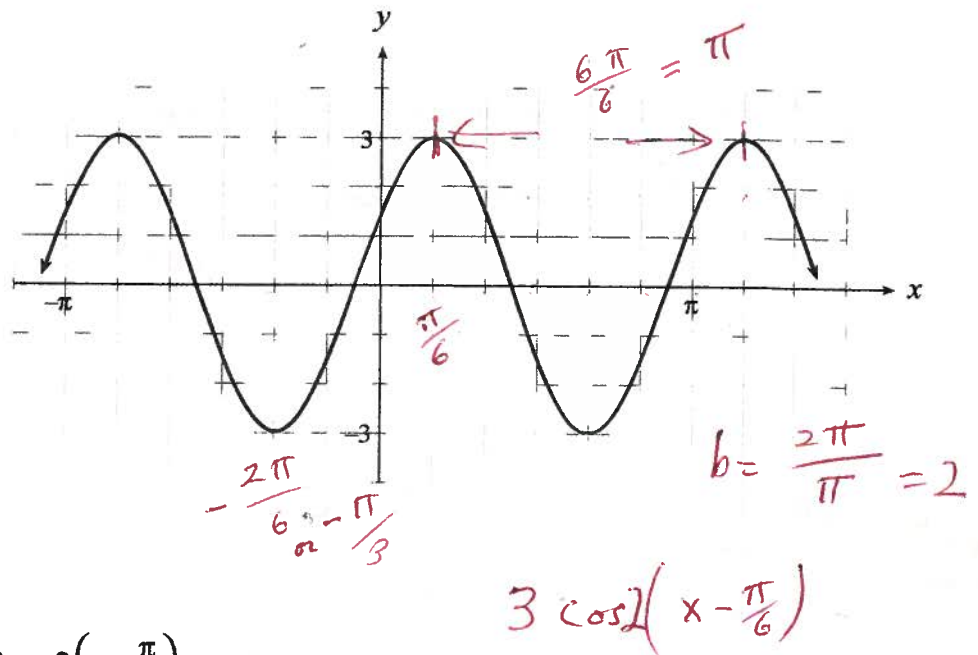
8) If the graph of the function shown below has the equation $y = a \cos b(x - c) + d$, determine the value of d .



(page 3)

- A. 3
- B. 5
- C. 6
- D. 9

9) Determine an equation of the cosine function graphed below.



- A. $y = 3 \cos 2\left(x - \frac{\pi}{6}\right)$
- B. $y = 3 \cos 2\left(x + \frac{\pi}{6}\right)$
- C. $y = 3 \cos 2(x - 1)$
- D. $y = 3 \cos 2(x + 1)$

D 10 What is the period of the function $y = \sin \frac{1}{2} x$?

- A. $\frac{\pi}{2}$
- B. π
- C. 2π
- D. 4π

period = $\frac{2\pi}{\frac{1}{2}} = (2\pi) \left(\frac{2}{1}\right) = 4\pi$

C 11 Convert $\frac{2\pi}{7}$ radians to degrees.

- A. 0.02°
- B. 0.90°
- C. 51.43°
- D. 102.86°

$\frac{2\pi}{7} \left(\frac{180}{\pi}\right) = \frac{360}{7} = 51.43$

Written Response:

1 A minimum value of a sinusoidal function is at $(\frac{\pi}{4}, 3)$. The nearest maximum value to the right of this point is at $(\frac{7\pi}{12}, 7)$. Determine an equation of this function. (3 marks)

Handwritten work for Question 1:

b period = $\frac{2\pi}{\text{new period}}$

one half period = $\frac{7\pi}{12} - \frac{3\pi}{4} = \frac{7\pi}{12} - \frac{9\pi}{12} = -\frac{2\pi}{12} = -\frac{\pi}{6}$

$\frac{1}{2} \text{ period} = \frac{\pi}{6} \Rightarrow \text{period} = \frac{2\pi}{3}$

$\frac{1}{3} \left(\frac{\pi}{4}\right) = \frac{\pi}{12}$

$\frac{7-3}{2} = \frac{4}{2} = 2$ amplitude

$y = -2 \sin 3 \left(x - \frac{\pi}{6}\right) + 5$

$y = -2 \cos 3 \left(x - \frac{\pi}{4}\right) + 5$

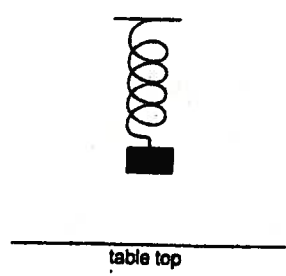
$y = 2 \sin 3 \left(x - \frac{5\pi}{12}\right) + 5$

$y = 2 \cos 3 \left(x - \frac{\pi}{12}\right) + 5$

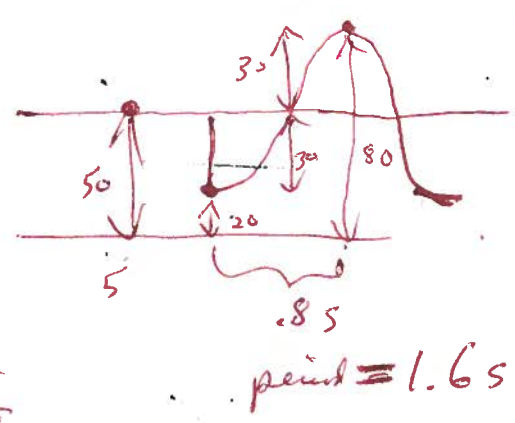
$b = \frac{2\pi}{\frac{8\pi}{12}} = \frac{2\pi \cdot 12}{8\pi} = \frac{24}{8} = 3$

2

A mass is supported by a spring so that it rests 50 cm above a table top, as shown in the diagram below. The mass is pulled down to a height of 20 cm above the table top and released at time $t = 0$. It takes 0.8 seconds for the mass to reach a maximum height of 80 cm above the table top. As the mass moves up and down, its height h , in cm, above the table top, is approximated by a sinusoidal function of the elapsed time t , in seconds, for a short period of time.



Determine an equation for a sinusoidal function that gives h as a function of t . (4 marks)



amplitude = $\frac{80 - 20}{2} = 30$

$h = 30 \sin \frac{\pi}{1.6} (t - 0.4) + 50$

$h = -30 \cos \frac{2\pi}{1.6} (t) + 50$

$h = -30 \cos \frac{\pi}{0.8} (t) + 50$

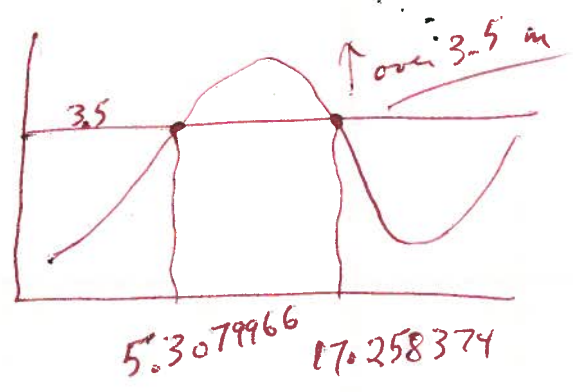
$h = 30 \cos \frac{\pi}{0.8} (t - 0.8) + 50$

$h = -30 \sin \frac{\pi}{0.8} (t - 1.2) + 50$

$b = \frac{2\pi}{1.6}$

3

In a seaport, the function $d(t) = 2.6 \sin 0.25(t - 5) + 3.3$ can be used to approximate the depth of the water, d metres, at time t hours after midnight. Estimate the number of hours in the 24-hour interval starting at $t = 0$ when the depth of the water is at least 3.5 m. (3 pts)



17.258374
 $- 5.3079966$

11.95 h

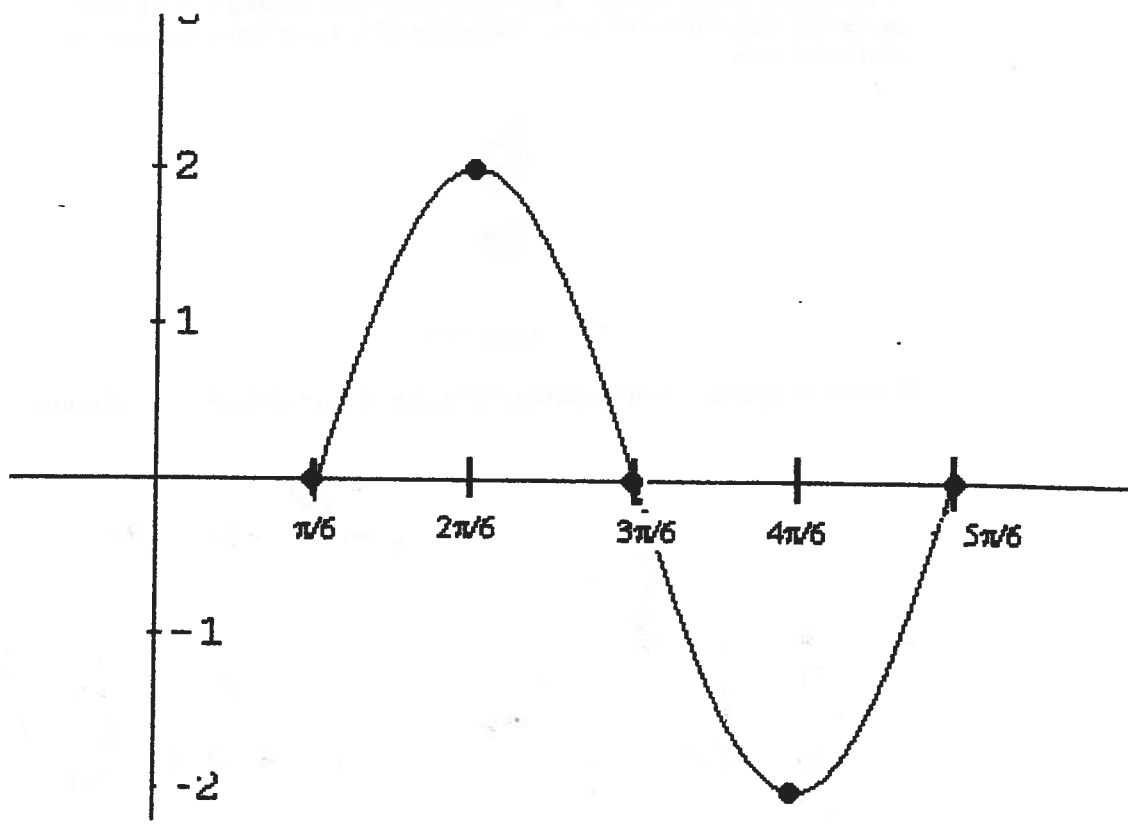
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Math 12: Trig Transformations REQUIZ

4

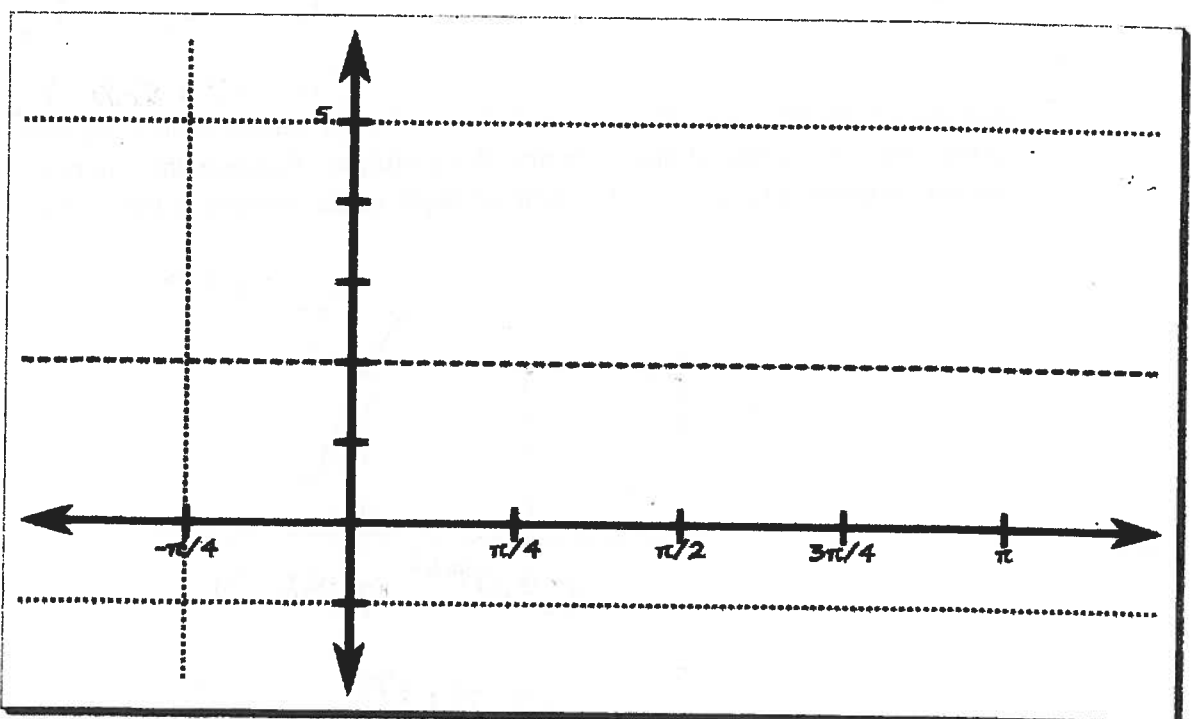
Determine the equation of the following Trig graph in terms of $y = a \cos b(x-c)$ where $a \leq 0$ (3 pts)

(3 pts)



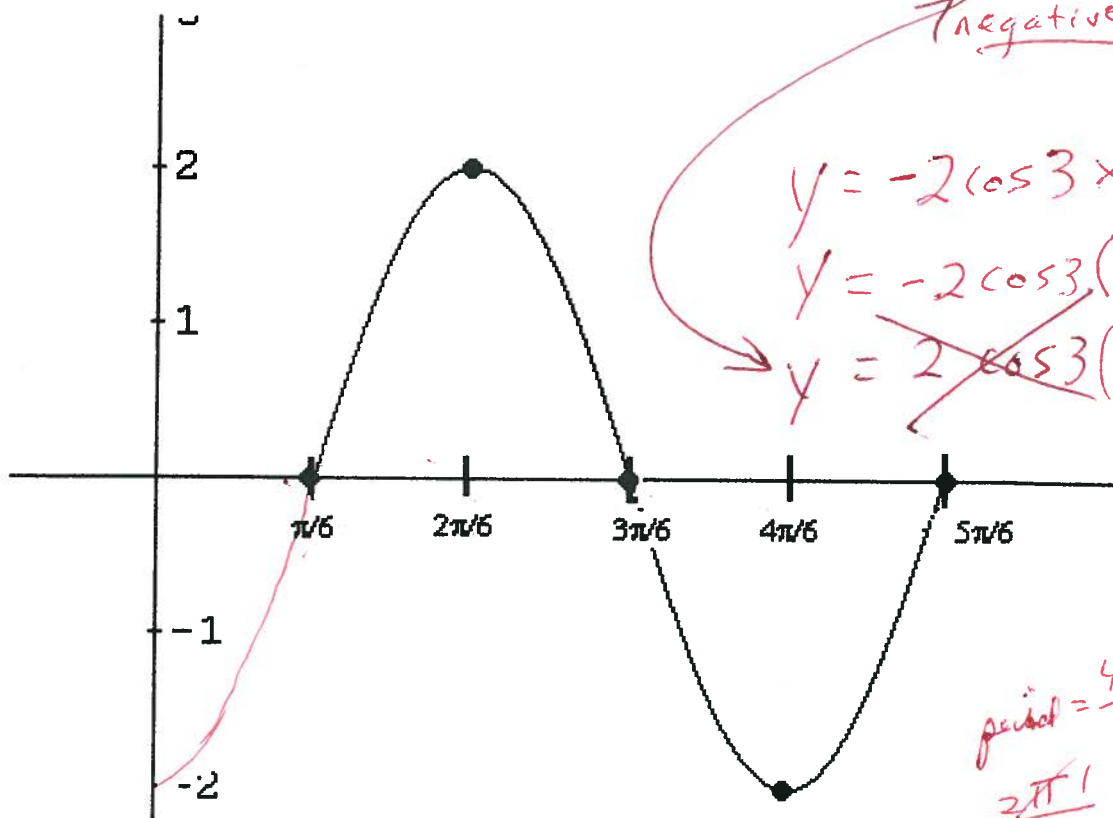
5

On the grid below, graph $y = -3 \sin(8/3)(x - \pi/4) + 1$ (4 pts)



Math 12: Trig Transformations REQUIZ

6. Determine the equation of the following Trig graph in terms of $y = a \cos b(x-c)$ where $a \leq 0$ (2 pts)



6.

7. On the grid below, graph $y = -3 \sin(\frac{8}{3})(x - \frac{\pi}{4}) + 1$ (3 pts)

