25	26	147	29		(form)	8

MHF 4UO TRIGONOMETRIC

DATE : NAM

KNOWLEDGE/UNDERSTANDING

Multiple Choice: *Identify the choice that best completes the s stion.[10]*

C 1. $\frac{3}{5}$ of a revolution represents approximately how many radians?

a. 6.28
b. 3.14
c. 3.77
d. 108.00

C 2. Determine the approximate degree measure for an angle of 1.32 radians.

a. 136.4°
b. 4.2°
c. 75.6°
d. 2.4°

b 3. Which graph of the following trigonometric functions has no zeros?

a. $y = \tan x$
b. $y = \sec x$
c. $y = \cot x$
d. $y = \cos x$

b 4. Which graph of the following functions does not have vertical asymptotes?

a. $y = \cot x$
b. $y = \sin x$
c. $y = \tan x$
d. $y = \sec x$

d 5. Which trigonometric function has zeros at $x = n\pi, n \in I$, and has vertical asymptotes midway between the zeros?

a. $y = \csc x$
b. $y = \cot x$
c. $y = \sec x$
d. $y = \tan x$

a 6. The domain of y = secx

a. $x \neq \frac{\pi}{2} + 2n\pi, n \in I$
b. $x \neq \pi + 2n\pi, n \in I$
c. $x \neq \frac{\pi}{2} + n\pi, n \in I$
d. $x \neq \pi + n\pi, n \in I$

b 7. the locations of the local maximums for y = cscx

a. $x = \frac{\pi}{2} + 2n\pi, n \in I$
b. $x = \frac{3\pi}{2} + 2n\pi, n \in I$
c. $x = \frac{3\pi}{2} + n\pi, n \in I$
d. $x = \pi + 2n\pi, n \in I$

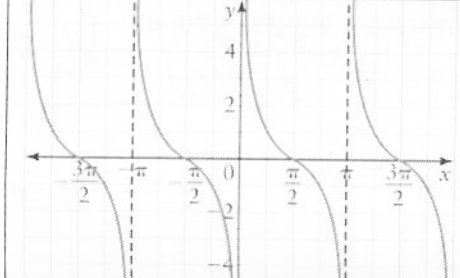
C 8. the locations of the zeros for y = cot x

a. $x = \frac{\pi}{2} + 2n\pi, n \in I$
b. $x = \pi + 2n\pi, n \in I$
c. $x = \frac{\pi}{2} + n\pi, n \in I$
d. $x = \pi + n\pi, n \in I$

a 9. Give an equation for a transformed sine function with an amplitude of $\frac{2}{3}$, a period of 3π, a phase shift of $\frac{2\pi}{3}$ rad to the left, and a vertical translation of $\frac{2}{3}$ units up.

a. $y = \frac{2}{3}\sin\left(\frac{2}{3}x + \frac{4\pi}{9}\right) + \frac{2}{3}$
b. $y = \frac{2}{3}\sin\left[\frac{2}{3}\left(x + \frac{4\pi}{9}\right)\right] + \frac{2}{3}$
c. $y = \frac{2}{3}\sin\left(\frac{2}{3}x - \frac{4\pi}{9}\right) + \frac{2}{3}$
d. $y = \frac{2}{3}\sin\left[\frac{2}{3}\left(x - \frac{4\pi}{9}\right)\right] + \frac{2}{3}$

a 10. The graph shown is of the function



a. $y = \cot x$
b. y = sinx
c. y = tanx
d. y = secx

are required.

[4]

$\csc\theta = -2$

$\frac{1}{\sin\theta} = -2$

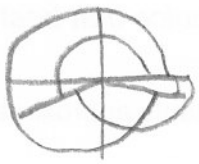
$\sin\theta = \frac{-1}{2}$

$\beta = \sin^{-1}(-\frac{1}{2}) = -\frac{1}{6}\pi$

sine is negative so in the tan and cos quadrant

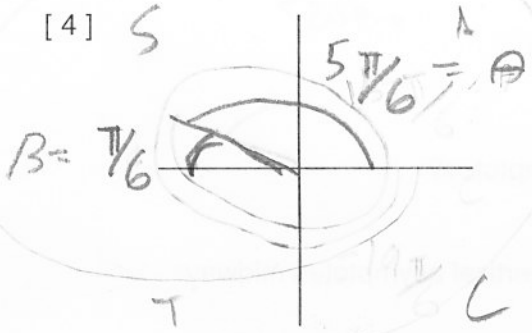
S	A
T	C

$\theta = -\frac{1}{6}\pi, -\frac{5}{6}\pi, \frac{7}{6}\pi, \frac{11\pi}{6}$



12. Determine the **exact value** of $\cot(-\frac{19\pi}{6})$ using a **diagram** showing the angle in standard position and the **reference angle** placed in the appropriate quadrants

[4]



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

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

$-3\pi - \frac{\pi}{6}$

$\beta = \frac{\pi}{6}$

$\therefore$ in the sin quadrant

$\therefore \cot(\frac{-19\pi}{6}) < 0$

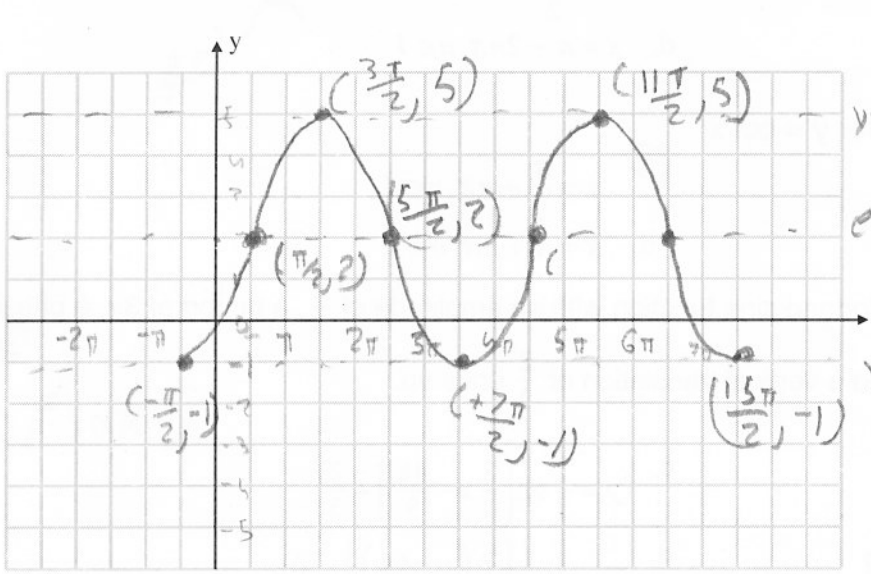
$\cot(\frac{\pi}{6}) = \frac{1}{\tan\frac{\pi}{6}} = \sqrt{3}$

$\therefore$ The value of $\cot(\frac{-19\pi}{6}) = -\sqrt{3}$

13. Sketch **two cycles** of the graph of the function. $y = -3\cos\left[\frac{1}{2}x + \frac{1}{4}\pi\right] + 2$
Clearly show the used scale on each axis and 5 key points for one cycle.

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

[6]



$P = \frac{2\pi}{\frac{1}{2}} = 4\pi$

14. A circle of radius 3 cm has a central angle of 45°. Determine the length of the arc that subtends the angle.

[2]

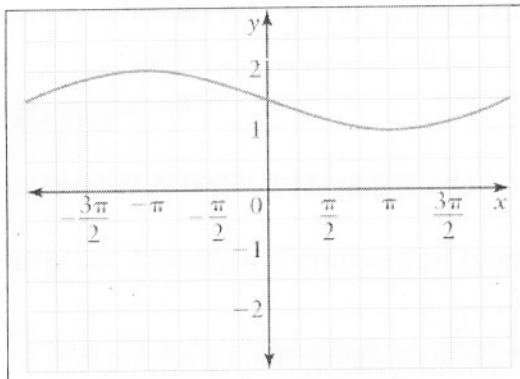
$r = 3$

$a = r\theta$

$(45^\circ)(\frac{2\pi}{360}) = \frac{1}{4}\pi$

$\theta = \frac{1}{4}\pi$

[10]



c.o.a = 1.5 = c

amp = 2 − 1.5 = 0.5 = ½

$P = 2\pi \to 2\pi = 4\pi$

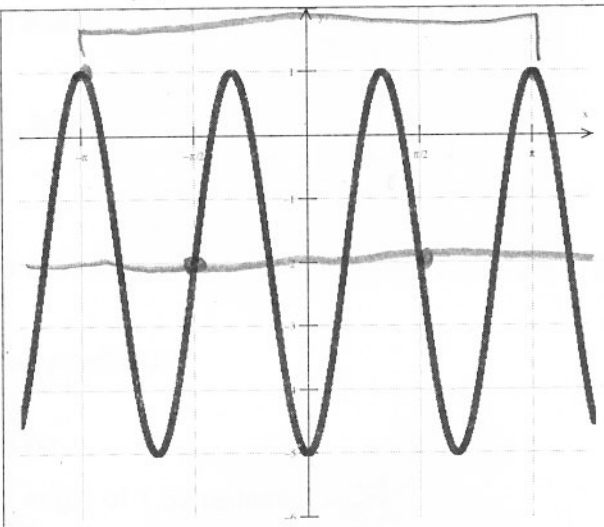
$k = \frac{2\pi}{P} = \frac{2\pi}{4\pi} = \frac{1}{2}$

negative because decreasing from $(-\pi, \pi)$

$f(x) = -\frac{1}{2}\sin\left(\frac{1}{2}(x)\right) + 1.5$

$f(x) = \frac{1}{2}\cos\left(\frac{1}{2}(x+\pi)\right) + 1.5$

shift pi to the left as originally peak should be at $x = 0$



3 periods $2\pi/3$

c.o.a = c = −2

amp = 1 − −2 = 3

$k = \frac{2\pi}{(2\pi/3)} = \frac{6\pi}{2\pi} = 3$

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

$f(x) = -3\cos(3x) - 2$ negative because increasing from $(0, \pi)$

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

shift $\pi/2$ left as originally c.o.a at $x = 0$ and is going up

(1 form)

16. A propeller on an aircraft has a radius of 4 metres and turns at about 8000 rpm.

a) What is the **exact** (no decimals) angular velocity in radians per second.

[2]

$\frac{8000 \text{ revs}}{1 \text{ minute}} = \frac{8000 \text{ revs}}{60\text{s}} = \frac{400 \text{ revs}}{3\text{sec}} = 133\frac{1}{3} \text{ revs/s}$

$\left(\frac{400 \text{ revs}}{3\text{sec}}\right)\left(\frac{2\pi \text{ radians}}{1 \text{ revolution}}\right) = \frac{800\pi \text{ radians}}{3\text{sec}} = \frac{800}{3}\pi \text{ radi}$

b) A red dot is located on the tip of the propeller. Approximately (one decimal place), how far (in metres)will the dot travel in 10 min?

[2]

$a = r\theta$ $a = (8000\text{rpm})(10\text{min}) = 80\,000$ revs in 10m

$(80\,000)(2\pi \text{ radians}) = 160\,000\pi \text{ radians}$

$a = r\theta$

$4(160\,000\pi) = 640\,000\pi$ m in 10 minutes

$= 2010619.3$ m in 10 minutes