

CHAPTER 6 TEST: TRIGONOMETRIC FUNCTIONS

KNOW	APP	COMM	THINK	TOTAL
/16	/16	/5	/8	/45

Show all work to receive full marks. Leave answers in simplest exact form, unless otherwise stated.

1. True/False: State if each statement is true or false on the blank provided. If the statement is false, circle the mistake(s) and correct the statement. /6K,6A

T a) $\sin\left(\frac{\pi}{2}\right) + \cos(\pi) = 0$



$$1 - 1 = 0$$

T b) The period of the function $y = \sin(\pi x)$ is 2.

$$T = \frac{2\pi}{k} = \frac{2\pi}{\pi} = 2$$

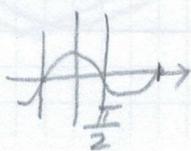
F c) The function $y = -3 \sin 2x + 1$ has an amplitude of -3 .

F d) The graph of $y = \sin\left(2x + \frac{\pi}{4}\right)$ has a phase shift of $-\frac{\pi}{4}$.

$$= \sin\left(2\left(x + \frac{\pi}{8}\right)\right) \quad d = -\frac{\pi}{8}$$

F e) The range of $y = \sec x$ is $\{y \in \mathbb{R} \mid y \neq \pm 1\}$.

F f) The graphs of $f(x) = \sec x$ and $g(x) = \tan x$ have the same asymptotes at $x = k\pi, k \in \mathbb{I}$.



$$\frac{1}{\cos}$$

$$= \frac{\sin}{\cos}$$

$$x = \frac{(2k+1)\pi}{2}, k \in \mathbb{I}$$

2. Short Answers:

/4K

- a) What is the equivalent degree measure of $\frac{32\pi}{5}$ radians?

$$\frac{32\pi \cdot 180}{5 \cdot \pi} = 1152^\circ$$

- b) How many radians are in $\frac{7}{8}$ of a revolution?

$$\frac{7 \cdot 2\pi}{8} = \frac{7\pi}{4} \text{ (rad.)}$$

- c) A cosine function $y = -15 \cos(kt)$ has a period of $\frac{6}{5}$. Determine the value of k .

$$T = 2\pi$$

$$k = \frac{2\pi}{T} = \frac{2\pi \cdot 5}{6} = \frac{5\pi}{3}$$

Leave answers in simplest exact form, unless otherwise stated.

d) State the maximum and minimum value of $y = 4 \sin(8\pi t) + 6.5$

max: 10.5 min: 2.5

4	-4
+6.5	+6.5
<u>10.5</u>	<u>2.5</u>

3. Determine the exact length of an arc subtended by an angle of 145° with a radius of 10 cm.

/2K,2T

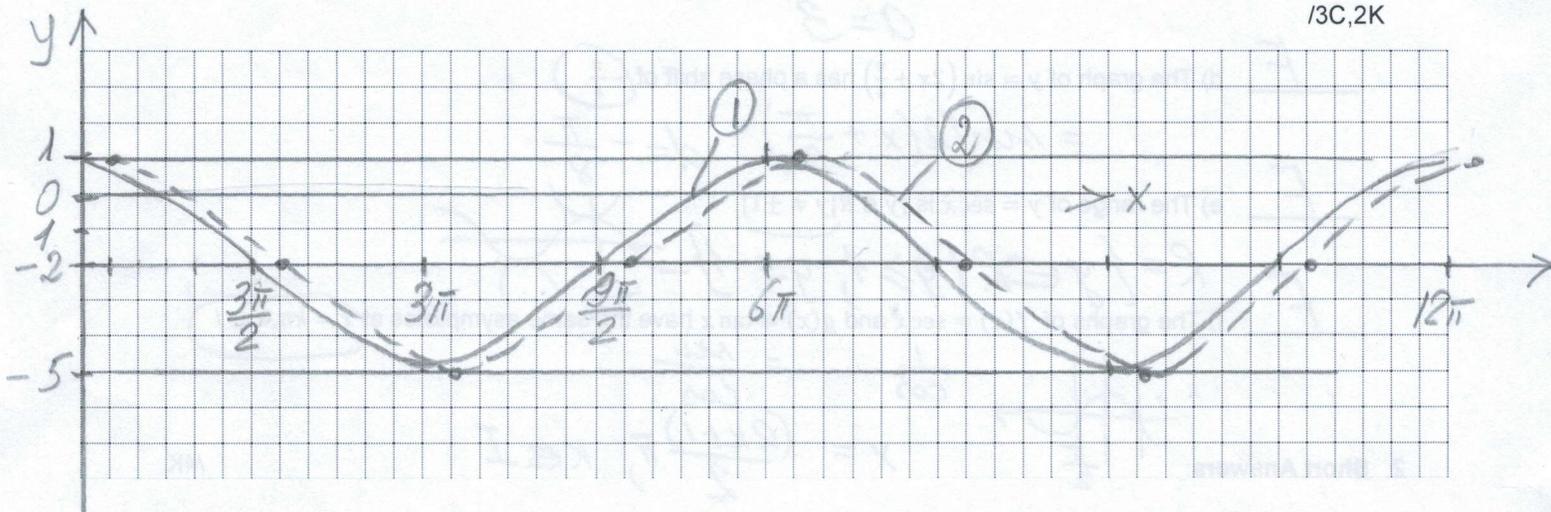
$$\theta = \frac{a}{r}; a = \theta \cdot r$$

$$\theta = \frac{145 \cdot \pi}{180} = \frac{29\pi}{36}; a = \frac{29\pi \cdot 10}{36} = \frac{145\pi}{18} \text{ (cm)}$$

For Question 4, properly label your graph and include all necessary key points.

4. Sketch two cycles of the function $f(x) = 3 \cos\left(\frac{1}{3}\left(x - \frac{\pi}{4}\right)\right) - 2$.

/3C,2K



$$a = 3$$

$$c = -2$$

$$d = \frac{\pi}{4} \rightarrow$$

$$k = \frac{1}{3} \rightarrow T = 2\pi \div \frac{1}{3} = 6\pi$$

Range:

3	-3
-2	-2
<u>1</u>	<u>-5</u>

$[-5, 1]$

$$\textcircled{1} - 3 \cos\left(\frac{1}{3}x\right) - 2$$

$$\textcircled{2} - 3 \cos\left(\frac{1}{3}\left(x - \frac{\pi}{4}\right)\right) - 2$$

Leave answers in simplest exact form, unless otherwise stated.

5. A bike tire with a diameter of 60 cm rotates 40 times in 1 minute. /2T,3A
- What is the angle that the tire rotates through, in radians, for the first 30 seconds?
 - Determine the angular velocity of the tire, in radians per second.
 - Determine the distance travelled by a pebble that is trapped in the thread after 45 seconds.

a) $\theta = \frac{40 \cdot 2\pi \cdot 30}{60} = 40\pi \text{ (rad)}$

b) $\omega = \frac{\theta}{t} = \frac{40 \cdot 2\pi}{60 \cdot 3} = \frac{4\pi}{3} \text{ (rad/sec)}$

c) $\omega = \frac{v}{r}$; $v = \omega \cdot r = \frac{4\pi}{3} \cdot 30 = 40\pi \text{ cm/sec}$
 $d = 40\pi \cdot 45 = 1800\pi \text{ (cm)} = 18\pi \text{ (m)}$

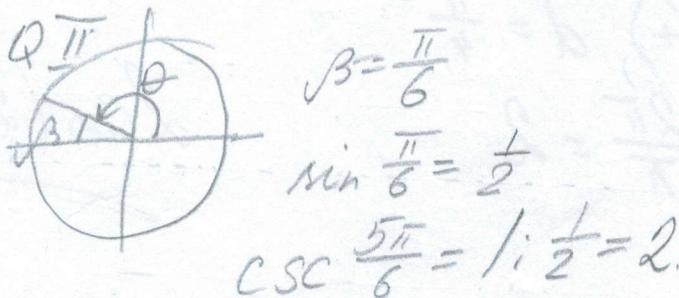
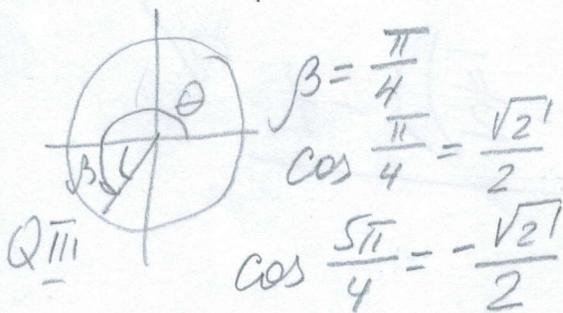
6. Determine the exact value of each trigonometric ratio

12C/2A
6

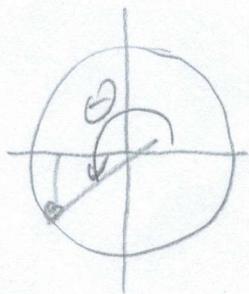
$\cos \frac{5\pi}{4}$

$\csc \frac{5\pi}{6}$

$\sin \frac{5\pi}{6}$



7. The terminal arm of an angle in standard position passes through the point (-4, -2). Find the radian value of the angle in the interval $[0, 2\pi]$, to the nearest hundredth. /3A,1T

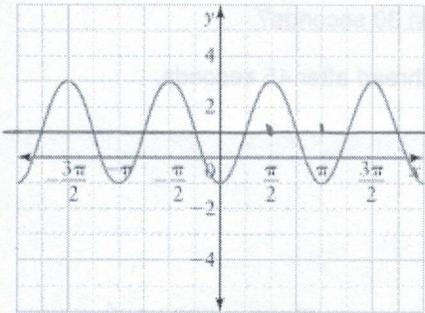


$\tan \beta = \frac{-2}{-4} = \frac{1}{2}$
 $\beta = \tan^{-1}\left(\frac{1}{2}\right) = 0.55$
 $\theta = 3.14 + 0.55 = 3.69 \text{ (rad)}$

Leave answers in simplest exact form, unless otherwise stated.

8. Determine a sine and cosine equation for the following graph.

/2K,3T



Sine Equation:

$$\underline{2 \sin\left(2\left(x - \frac{\pi}{4}\right)\right) + 1} \quad \textcircled{1}$$

Cosine Equation:

$$\underline{-2 \cos(2x) + 1} \quad \textcircled{2}$$

$$a = \frac{3 - (-1)}{2} = 2$$

$$c = \frac{3 - 1}{2} = 1$$

$$\cos(-) = d = 0$$

$$\sin(+), d = \frac{\pi}{4}$$

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

Check:

	0	$\pi/2$
①	-1	3
②	-1	3

$$\underline{2 \cos\left(2\left(x - \frac{\pi}{2}\right)\right) + 1} \quad \checkmark$$