

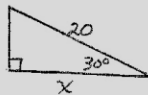
TRIGONOMETRY FINAL A PRE TEST

NAME _____

SEMINOLE COUNTY TEACHER EDUCATION CENTER

Show all work as necessary on this test or separate paper. Do ANY 10.

1. Find the exact value of x :



2. Evaluate $\sin^{-1}\left(\cos\frac{2\pi}{3}\right)$.

3. Find the length of an arc of a circle of radius 20 cm. that is intercepted by a central angle of 160° .

4. The terminal side of an angle in standard position passes through $(-5, -12)$. Find the six trigonometric functions of the angle.

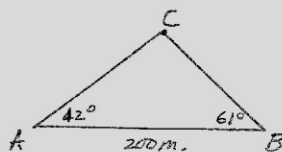
5. Prove the identity:

$$\sin 2x \tan x + \cos 2x = 1$$

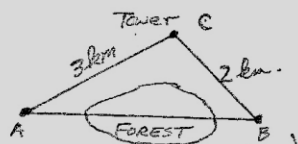
6. Solve for x , $0 \leq x \leq 2\pi$:

$$2 \cos^2 x + \sin x = 1$$

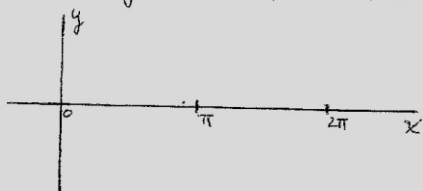
7. Two lifeguards at stations A and B are 200 m. apart. A swimmer is observed at angles of 42° and 61° respectively. Which lifeguard is closest to the swimmer at C? How far is the swimmer from each lifeguard? (Answer in terms of trig functions)



8. Two crews are working at points A and B on opposite sides of a forest, yet each is in sight of a tower at C. A lookout in the tower reports that $\angle ACB$ is 115° . Find the distance between A and B. (Answer in terms of trig functions)



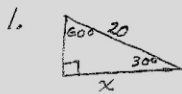
9. Graph $y = \tan x$ for $0 \leq x \leq 2\pi$



10. Simplify: $(\sqrt{3} + i)^{10}$
(Use trigonometric form)

10. Find a unit vector that is orthogonal to $\vec{v} = -15\hat{i} - 20\hat{j}$

TRIGONOMETRY PRE TEST Solutions Final A



$$\cos 30^\circ = \frac{x}{20}$$

$$x = 20 \cdot \frac{\sqrt{3}}{2}$$

$$= 10\sqrt{3}$$

$$2. \sin^{-1}\left(\cos \frac{2\pi}{3}\right)$$

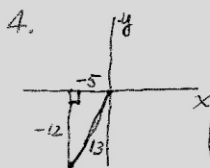
$$= \sin^{-1}\left(-\frac{1}{2}\right)$$

$$= -\frac{\pi}{6} \quad \text{Q IV}$$

$$3. A = r\theta \quad r = 20 \text{ cm.}$$

(θ must be in RADIANS) $\theta = 160^\circ \cdot \frac{\pi}{180} = \frac{8\pi}{9}$

$$A = 20 \text{ cm} \cdot \frac{8\pi}{9} = \frac{160\pi}{9} \text{ cm.}$$



$$\sin \theta = -\frac{12}{13} \quad \csc \theta = -\frac{13}{12}$$

$$\cos \theta = -\frac{5}{13} \quad \sec \theta = -\frac{13}{5}$$

$$\tan \theta = \frac{12}{5} \quad \cot \theta = \frac{5}{12}$$

$$5. \sin 2x \tan x + \cos 2x = 1$$

Left side = $2 \sin x \cos x \cdot \frac{\sin x}{\cos x} + (1 - 2 \sin^2 x)$

$$= 2 \sin^2 x + 1 - 2 \sin^2 x$$

$$= 1 = \text{Right side.}$$

$$6. 2 \cos^2 x + \sin x = 1$$

$$2(1 - \sin^2 x) + \sin x = 1$$

$$2 - 2 \sin^2 x + \sin x = 1$$

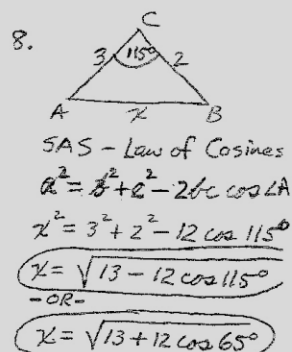
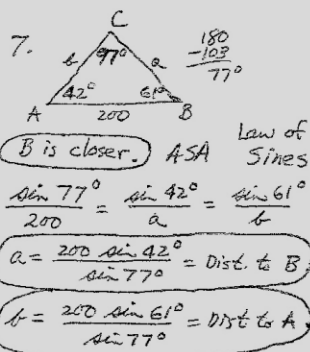
$$0 = 2 \sin^2 x + \sin x - 1$$

$$0 = (2 \sin x - 1)(\sin x + 1)$$

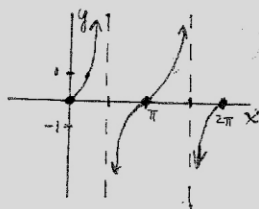
$$2 \sin x - 1 = 0 \quad \sin x + 1 = 0$$

$$\sin x = \frac{1}{2} \quad \sin x = -1$$

$$x = \frac{\pi}{6}, \frac{5\pi}{6} \quad \text{or} \quad x = \frac{3\pi}{2}$$



$x = \frac{\pi}{4}$	1
0	0
$\frac{\pi}{4}$	1
$\frac{\pi}{2}$	$\pm \infty$
$\frac{3\pi}{4}$	-1
π	0
$\frac{5\pi}{4}$	1
$\frac{3\pi}{2}$	$\pm \infty$
$\frac{7\pi}{4}$	-1
2π	0



$$10. \vec{V} = -15\hat{i} - 20\hat{j}$$

$$\vec{V}_\perp = a\hat{i} + b\hat{j}$$

where $-15a - 20b = 0$

Let $a = 4, b = -3$

$$\vec{V}_\perp = 4\hat{i} - 3\hat{j}$$

$$|\vec{V}| = \sqrt{4^2 + (-3)^2} = 5$$

$$\vec{u} = \frac{\vec{V}}{|\vec{V}|} = \frac{4}{5}\hat{i} - \frac{3}{5}\hat{j}$$

(Theorem of DeMoivre)

$$11. (\sqrt{3} + i)^{10}$$

$$z = \sqrt{3} + i$$

$$= 2\left(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6}\right) \quad \theta = \frac{\pi}{6} \quad r = 2$$

$$z^{10} = \left[2\left(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6}\right)\right]^{10}$$

$$= 2^{10} \left(\cos \frac{10\pi}{6} + i \sin \frac{10\pi}{6}\right)$$

$$= 1024 \left(\cos \frac{5\pi}{3} + i \sin \frac{5\pi}{3}\right)$$

$$= 1024 \left(\frac{1}{2} - \frac{\sqrt{3}}{2}i\right)$$

$$= 512(1 - i\sqrt{3})$$