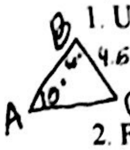
Secondary Math III
Practice Exam

Name: Key

Period: ________

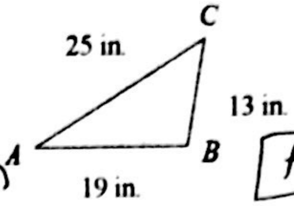
1 pt. each.

1. Use the *Law of Sines* to find side b in triangle ABC, given $A = 15^\circ, B = 60^\circ, a = 4.5$



$$\frac{4.5}{\sin 15} \times \frac{b}{\sin 60} \Rightarrow \frac{4.5 \cdot \sin 60}{\sin 15} = \frac{b \cdot \sin 15}{\cancel{\sin 15}} \quad b = \frac{4.5 \cdot \sin 60}{\sin 15} \quad \boxed{b = 15.1}$$

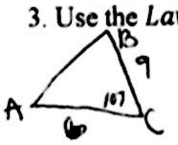
2. Find the area of the following triangle:



$$s = \frac{25+13+19}{2} = 28.5$$

$$A = \sqrt{28.5(28.5-25)(28.5-13)(28.5-19)} \quad \boxed{A = 121 \text{ in}^2}$$

3. Use the *Law of Cosines* to find side c in triangle ABC, given: $C = 107^\circ, a = 9, b = 6$



$$c^2 = 9^2 + 6^2 + 2(9)(6)\cos 107$$

$$c = 9.2$$

4. Find all solutions of the equation: $\sin^2 x - \sin x = 0$ in the interval $0 \le x < 2\pi$

$$\sin x(\sin x - 1) = 0 \qquad \sin x = 0 \qquad \sin x = 1$$

$$\boxed{x = 0, \pi, \pi/2}$$

5. Which of the following functions has an amplitude of 3 and a period of 6π?

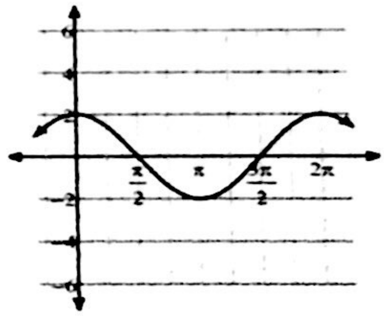
a. $f(x) = -3\sin(\frac{1}{3}x)$ amp = 3 p = 6π

b. $f(x) = \frac{1}{2}\sin(2x)$ amp = $\frac{1}{2}$ p = π

c. $f(x) = 2\sin x$ a = 2 p = 2π

d. $f(x) = -\frac{1}{3}\sin(\frac{1}{3}x)$ a = $\frac{1}{3}$ p = 6π

6. Write the function that best describes the following graph:



$y = 2\cos x$

Free Response. Show all work.

7. Graph two periods for the following function. State if there are any reflections. Find the amplitude and the period. Include scales on both axes. (4 pts.)

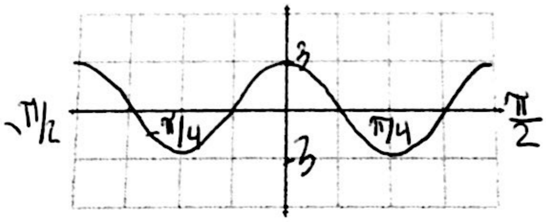
$$f(x) = 3\cos 4x$$

Reflection? Yes No

Amplitude: 3

Period: $\frac{1}{2}\pi$

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



8. Write an equation for the transformed function $g(x)$ if the graph of $f(x) = \cos x$ is reflected on the x-axis, shifted to the left $\pi/2$, and down 3. (3 pts.)

$g(x) =$ $\cos(x + \pi/2) - 3$

10. Find all solutions of the following equations in the interval $0 \le x < 2\pi$

a. $\cos x = \frac{\sqrt{3}}{2}$ (3 pts.)

$\boxed{X = \pi/6, 11\pi/6}$

RA: $\pi/6$

θ I & IV

b. $2\sin x \cos x + \cos x = 0$ (6 pts.)

$\cos x\,(2\sin x + 1) = 0$

$\cos x = 0$ $\quad$ $\sin x = -\frac{1}{2}$

θ uad. angle $\pi/2$, $3\pi/2$ $\quad$ RA: $\pi/6$ θ III IV

$\boxed{X = \pi/2, 3\pi/2, 7\pi/6, 11\pi/6}$

11. Find all solutions of the following equations in the interval $0 \le x < 360^\circ$

a. $\sqrt{3}\csc x + 2 = 0$ (4 pts.)

$\csc x = -\frac{2}{\sqrt{3}}$

$\sin x = -\frac{\sqrt{3}}{2}$

θ III IV

RA: 60°

$X = 240^\circ, 300^\circ$

b. $2\sin^2 x = 1$ (4 pts.)

$\sqrt{\sin^2 x} = \sqrt{\frac{1}{2}}$

$\sin x = \pm\frac{1}{\sqrt{2}} = \pm\frac{\sqrt{2}}{2}$ $\quad$ RA: 45° all θ

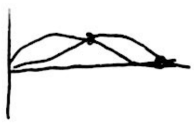
$\boxed{X = 45^\circ, 225^\circ, 135^\circ, 315^\circ}$

12. Use a graphing calculator to find approximate solutions in the interval [0°180°]. Show graph. (3 pts.)

$$2 - \cancel{\cos}^2 x = 1 + \sin(2x)$$

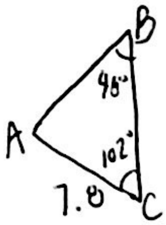
sin

$x \approx$ $68^\circ, 158^\circ$



13. Use the Law of Sines and/or Law of Cosines to solve triangle ABC. Identify given situation. Draw and label the triangle first. Round angle measures to the nearest degree and sides to the nearest tenth. If there are two triangles, find both. List all angles and sides in given spaces provided. (5 pts. each)

a. $B = 48^\circ,\ C = 102^\circ,\ b = 7.8$



$\frac{c}{\sin 102} \times \frac{7.8}{\sin 48}$ $\frac{a}{\sin 30°} \times \frac{7.8}{\sin 48}$

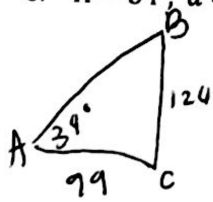
$\frac{c \sin 48}{\sin 48} = \frac{7.8 \cdot \sin 102}{\sin 48}$ $\frac{7.8 \sin 30}{\sin 48} = \frac{a \sin 48}{\sin 48}$

AAS Angle A = 30° = 180-102-48

Side a = 5.2

Side c = 10.3

b. $A = 34^\circ,\ a = 124,\ b = 99$



$\frac{\sin B}{99} \times \frac{\sin 34}{124}$

$\frac{124 \sin B}{124} = \frac{\sin 34 \cdot 99}{124}$

$B = \sin^{-1}(\sin 34 \cdot 99/124)$

SSA

27 < 34 only 1 triangle Angle B = 27°

Angle C = 119° 180 - 27 - 34

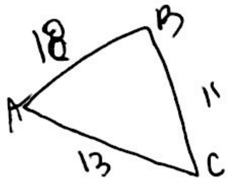
Side c = 193.9

$\frac{c}{\sin 119} \times \frac{124}{\sin 34}$

$\frac{124 \sin 119}{\sin 34} = \frac{c \sin 34}{\sin 34}$

c. $a = 11$ in, $b = 13$ in, $c = 18$ in

SSS



$\cos C = \frac{13^2 + 11^2 - 18^2}{2(13)(11)}$

$C = \cos^{-1}(-.11988..)$

180-37-97 Angle A = 37°

Angle B = 46°

Angle C = 97°

$\frac{\sin A}{11} \times \frac{\sin 97}{18}$

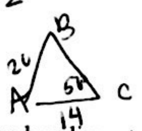
$\frac{18 \sin A}{18} = \frac{11 \cdot \sin 97}{18}$ $A = \sin^{-1}(.60655..)$

14. Given ΔABC with $b = 14$ cm, $c = 20$ cm and C = 50°, find the area. Round to the nearest whole number. (3 pts.)

Area = 139 cm²

$A = \frac{1}{2} b c \sin A$

$\frac{1}{2} \cdot 14 \cdot 20 \cdot \sin 98$

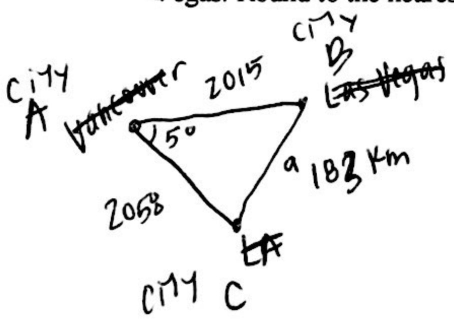


$\frac{\sin B}{14} \times \frac{\sin 50}{20}$ $B = \sin^{-1}(.536..)$

$\frac{14 \sin 50}{20} = \frac{20 \sin B}{20}$ $B = 32°$

$A = 180 - 32 - 50 = 98°$

15. Two airplanes leave ~~Vancouver~~ City A, one heading straight for ~~L.A.~~ City C and the other straight for ~~Las Vegas~~ City B. The angle formed is 5 degrees. The distance from ~~Vancouver~~ City A to ~~L.A.~~ City C 2058 km, and the distance from ~~Vancouver~~ City A to ~~Las Vegas~~ City B is 2015 km. Use the Law of Cosines to estimate the distance from ~~L.A.~~ to ~~Las Vegas~~ City C to City B. Round to the nearest tenth of a kilometer. (3 pts.)



$a^2 = b^2 + c^2 - 2ab \cos A$

$a^2 = 2058^2 + 2015^2 - 2(2058)(2015)\cos 5$

$\boxed{183 \text{ km}}$