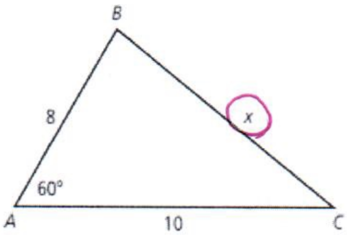
Name: key Period: _____

11.6 Law of Cosines

Practice

Use the Law of Cosines. Find length *x* to the nearest tenth.

1)



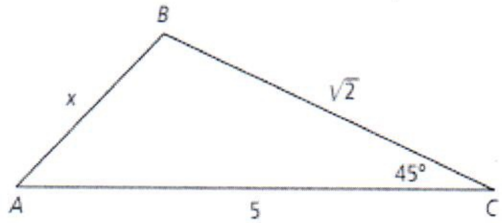
$x^2 = 8^2 + 10^2 - 2(8)(10)\cos 60°$

$x^2 = 164 - 160\cos 60°$

$x^2 = 84$

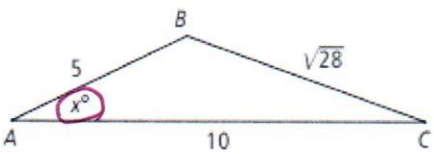
$\boxed{x = 9.2}$

2)



Use the Law of Cosines. Find measure *x* to the nearest degree.

3)



$(\sqrt{28})^2 = 5^2 + 10^2 - 2(5)(10)\cos x$

$28 = 125 - 100\cos x$

$-125 \quad -125$

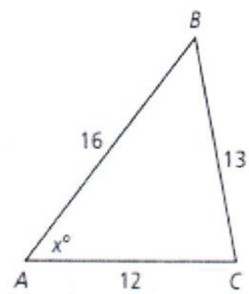
$\frac{-97}{-100} = \frac{-100\cos x}{-100}$

$0.97 = \cos x$

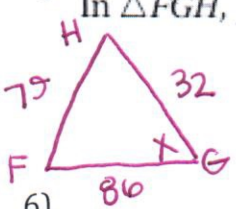
$x = \cos^{-1}(0.97)$

$\boxed{x = 14°}$

4)



5) In $\triangle FGH$, $f = 32$ in., $g = 79$ in., and $h = 86$ in. Find $m\angle G$.



$79^2 = 32^2 + 86^2 - 2(32)(86)\cos G$

$6241 = 8420 - 5504\cos G$

$-8420 \quad -8420$

$\frac{-2179}{-5504} = \frac{-5504\cos G}{-5504}$

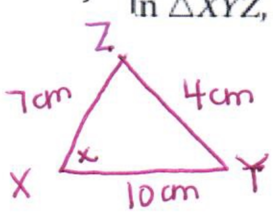
$0.396 = \cos G$

$G = \cos^{-1}(0.396)$

$\boxed{G = 67°}$

6) In $\triangle ABC$, $a = 3$ ft, $b = 2.9$ ft, and $c = 4.6$ ft. Find $m\angle C$.

7) In $\triangle XYZ$, $x = 4$ cm, $y = 7$ cm, and $z = 10$ cm. Find $m\angle X$.



$4^2 = 7^2 + 10^2 - 2(7)(10)\cos X$

$16 = 149 - 140\cos x$

$-149 \quad -149$

$\frac{-133}{-140} = \frac{-140\cos x}{-140}$

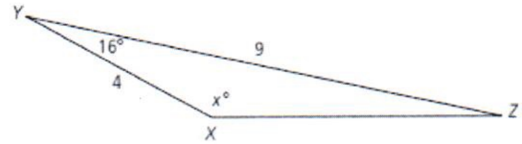
$0.95 = \cos x$

$x = \cos^{-1}(0.95)$

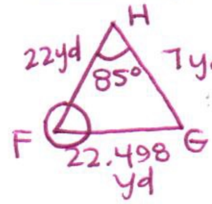
$\boxed{x = 18°}$

Use the Law of Cosines $\boxed{\text{and}}$ the Law of Sines. Find measure x to the nearest tenth.

8)



9) In $\triangle FGH$, $f = 7$ yd, $g = 22$ yd, and $m\angle H = 85°$. Find $m\angle F$



$h^2 = 7^2 + 22^2 - 2(7)(22)\cos 85$

$h^2 = 533 - 308\cos 85$

$h^2 = 506.156 \longrightarrow h = 22.498$

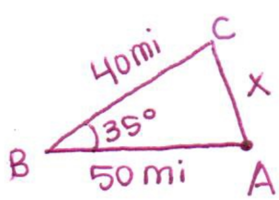
$\frac{\sin 85}{22.498} = \frac{\sin F}{7}$

$\sin F = \frac{7\sin 85}{22.498}$

$F = \sin^{-1}\left(\frac{7\sin 85}{22.498}\right) = \boxed{18.1°}$

10) The sides of a triangular lot are 158 ft, 173 ft, and 191 ft. Find the measure of the angle opposite the longest side to the nearest tenth of a degree.

11) A car travels 50 miles due west from point A. At point B, the car turns and travels at an angle of 35° north of due east. The car travles in this direction for 40 miles, to point C. How far is point C from Point A?



$x^2 = 50^2 + 40^2 - 2(50)(40)\cos 35°$

$x^2 = 4100 - 4000\cos 35°$

$x^2 = 823.39$

$\boxed{x = 28.7 \text{ mi}}$

12) In $\Delta ABC, m\angle A = 81.4°, b = 4.8, and\ c = 7.2$. Use the Law of Cosines to find a and then use the Law of Sines to find the measure of angles B and C. Round to the nearest tenth.

Your classmate says that this triangle does not exist. You say that it does. Who is correct? Explain.

Verify the following identities.

13) $\boxed{\csc x \sec x - \cot x} = \tan x$

$$\frac{1}{\sin x} \cdot \frac{1}{\cos x} - \frac{\cos x}{\sin x}$$

$$\frac{1}{\sin x \cos x} - \frac{\cos x}{\sin x} \cdot \frac{\cos x}{\cos x}$$

Need common denominator

$$\frac{\overbrace{1-\cos^2 x}^{\sin^2 x}}{\sin x \cos x} = \frac{\sin^{\cancel{2}} x}{\cancel{\sin x} \cos x}$$

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

14) $\cos\left(\frac{\pi}{2} - x\right) = \sin x$

15) $\underbrace{\sin 2x}_{\alpha} \underbrace{\cos x}_{\beta} - \cos 2x \sin x = \sin x$

sum/difference identity

$\sin(2x - x)$

$= \sin x$

16) $\frac{\cos x}{1+\sin x} + \frac{1-\sin x}{\cos x} = \frac{2\cos x}{1+\sin x}$