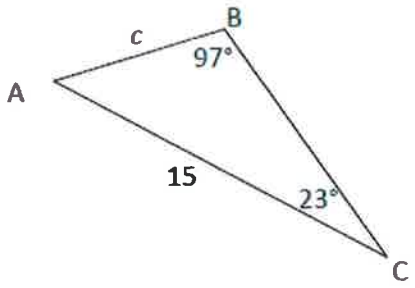
Name:_____**ANSWER KEY**_____ Hour: _____ Date: _____

# The Law of Sines: Assignment

**Part one:** Find the missing side or angle. Round the sides to the nearest hundredth and the angles to the nearest degree.

**1.**



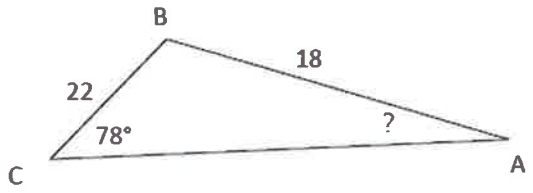

$$\frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\frac{\sin 97}{15} = \frac{\sin 23}{c}$$

$$c = \frac{15 (\sin 23)}{\sin 97}$$

$$c = 5.90$$

**2.**




$$\frac{\sin C}{c} = \frac{\sin A}{a}$$

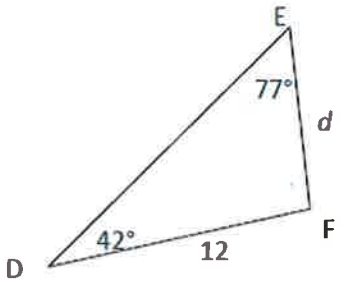
$$\frac{\sin 78}{22} = \frac{\sin A}{18}$$

$$\sin A = \frac{18 (\sin 78)}{22}$$

$$\sin^{-1}\left(\frac{18 (\sin 78)}{22}\right) = \angle A$$

$$\angle A = 53°$$

**3.**



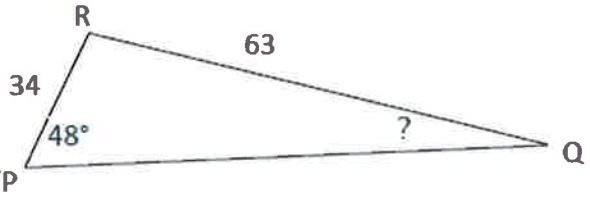

$$\frac{\sin D}{d} = \frac{\sin E}{e}$$

$$\frac{\sin 42}{d} = \frac{\sin 77}{12}$$

$$d = \frac{12 (\sin 42)}{\sin 77}$$

$$d = 8.24$$

**4.**




$$\frac{\sin P}{p} = \frac{\sin C}{c}$$

$$\frac{\sin 48}{63} = \frac{\sin C}{34}$$

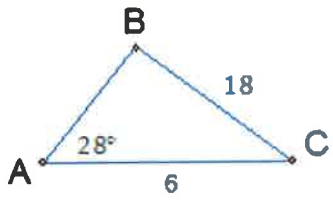
$$\sin C = \frac{34 (\sin 48)}{63}$$

$$\sin^{-1}\left(\frac{34 (\sin 48)}{63}\right) = \angle C$$

$$\angle C = 24°$$

**Part Two:** Solve each triangle completely. Round the sides to the nearest hundredth and the angles to the nearest degree.

9. **Solve $\triangle ABC$ if m $\angle A = 28°$, a = 18 and b = 6.**




$\angle B = 9°$

$\angle C = 143°$

$c = 23.07$

$\angle A + \angle B + \angle C = 180$
$28 + 9 + \angle C = 180$
$\angle C = 143$

$\frac{\sin A}{a} = \frac{\sin B}{b}$

$\frac{\sin 28}{18} = \frac{\sin B}{6}$

$\sin B = \frac{6(\sin 28)}{18}$

$\sin^{-1}\left(\frac{6(\sin 28)}{18}\right) = \angle B$

$\angle B = 9°$

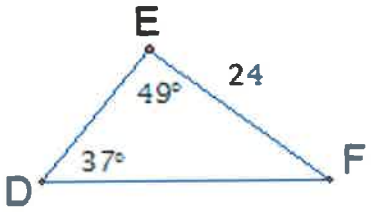
$\frac{\sin A}{a} = \frac{\sin C}{c}$

$\frac{\sin 28}{18} = \frac{\sin 143}{c}$

$c = \frac{18(\sin 143)}{\sin 28}$

$c = 23.07$

10. **Solve $\triangle DEF$ if m $\angle D = 37°$, m $\angle E = 49°$ and d = 24.**




$\angle F = 94°$

$e = 30.10$

$f = 39.78$

$\angle D + \angle E + \angle F = 180$
$37 + 49 + \angle F = 180$
$\angle F = 94$

$\frac{\sin D}{d} = \frac{\sin E}{e}$

$\frac{\sin 37}{24} = \frac{\sin 49}{e}$

$e = \frac{24(\sin 49)}{\sin 37}$

$e = 30.10$

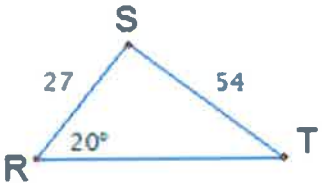
$\frac{\sin D}{d} = \frac{\sin F}{f}$

$\frac{\sin 37}{24} = \frac{\sin 94}{f}$

$f = \frac{24(\sin 94)}{\sin 37}$

$f = 39.78$

11. **Solve $\triangle RST$ if m $\angle R = 20°$, r = 54 and t = 27.**




$\angle S = 150°$

$\angle T = 10°$

$s = 78.94$

$\angle R + \angle S + \angle T = 180$
$20 + \angle S + 10 = 180$
$\angle S = 150$

$\frac{\sin R}{r} = \frac{\sin T}{t}$

$\frac{\sin 20}{54} = \frac{\sin T}{27}$

$\sin T = \frac{27(\sin 20)}{54}$

$\sin^{-1}\left(\frac{27(\sin 20)}{54}\right) = \angle T$

$\angle T = 10°$

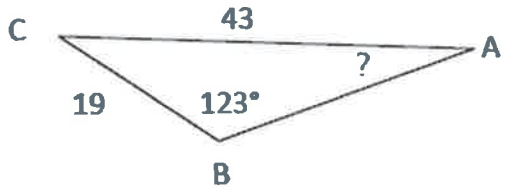
$\frac{\sin R}{r} = \frac{\sin S}{s}$

$\frac{\sin 20}{54} = \frac{\sin 150}{s}$

$s = \frac{54(\sin 150)}{\sin 20}$

$s = 78.94$

**5.**




$$\frac{\sin B}{b} = \frac{\sin A}{a}$$

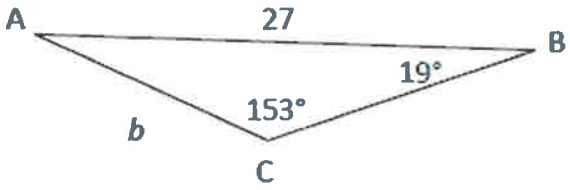
$$\frac{\sin 123}{43} = \frac{\sin A}{19}$$

$$\sin A = \frac{19 (\sin 123)}{43}$$

$$\sin^{-1}\left(\frac{19 (\sin 123)}{43}\right) = \angle A$$

$\angle A = 22°$

**6.**



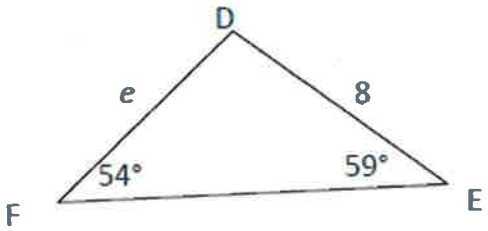

$$\frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\frac{\sin 19}{b} = \frac{\sin 153}{27}$$

$$b = \frac{27 (\sin 19)}{\sin 153}$$

$b = 19.36$

**7.**




$$\frac{\sin F}{f} = \frac{\sin E}{e}$$

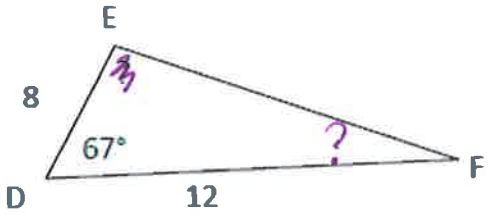
$$\frac{\sin 54}{8} = \frac{\sin 59}{e}$$

$$e = \frac{8 (\sin 59)}{\sin 54}$$

$e = 8.48$

8.48

**8.**




$$\frac{\sin D}{d} = \frac{\sin E}{e}$$

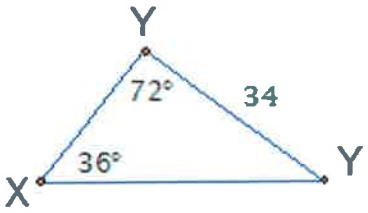
$$\frac{\sin 67}{12} = \frac{\sin F}{8}$$

$$\sin E = \frac{8 (\sin 67)}{12}$$

$$\sin^{-1}\left(\frac{8 (\sin 67)}{12}\right) = \angle E$$

$\angle F = 38°$

**12. Solve $\triangle XYZ$ if $m\angle X = 36°$, $m\angle Y = 72°$ and $x = 34$.**




$\angle Z = 72°$

$z = 55.01$

$y = 55.01$

$\angle X + \angle Y + \angle Z = 180$
$36 + 72 + \angle Z = 180$
$\angle Z = 72$

$\frac{\sin X}{x} = \frac{\sin Y}{y}$

$\frac{\sin 36}{34} = \frac{\sin 72}{y}$

$y = \frac{34(\sin 72)}{\sin 36}$

$y = 55.01$

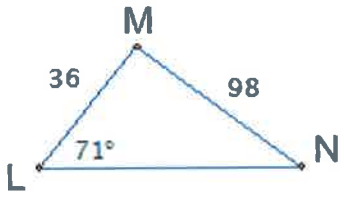
$\frac{\sin X}{x} = \frac{\sin Z}{z}$

$\frac{\sin 36}{34} = \frac{\sin 72}{z}$

$z = \frac{34(\sin 72)}{\sin 36}$

$z = 55.01$

**13. Solve $\triangle LMN$ if $m\angle L = 71°$, $l = 36$ and $n = 98$**




$\angle N = 20°$

$\angle M = 89°$

$m = 103.63$

$\angle L + \angle M + \angle N = 180$
$71 + \angle M + 20 = 180$
$\angle S = 89$

$\frac{\sin L}{l} = \frac{\sin N}{n}$

$\frac{\sin 71}{98} = \frac{\sin N}{36}$

$\sin N = \frac{36(\sin 71)}{98}$

$\sin^{-1}\left(\frac{36(\sin 71)}{98}\right) = \angle N$

$\angle N = 20°$

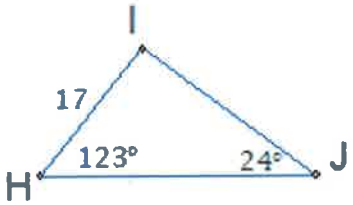
$\frac{\sin L}{l} = \frac{\sin M}{m}$

$\frac{\sin 71}{98} = \frac{\sin 89}{m}$

$m = \frac{98(\sin 89)}{\sin 71}$

$m = 103.63$

**14. Solve $\triangle HIJ$ if $m\angle H = 123°$, $m\angle J = 24°$ and $j = 17$.**




$\angle I = 33°$

$e = 35.05$

$f = 22.76$

$\angle H + \angle I + \angle J = 180$
$123 + \angle I + 24 = 180$
$\angle I = 33$

$\frac{\text{Sin } J}{j} = \frac{\text{Sin } H}{h}$

$\frac{\text{Sin } 24}{17} = \frac{\text{Sin } 123}{h}$

$h = \frac{17(\sin 123)}{\sin 24}$

$h = 35.05$

$\frac{\text{Sin } J}{j} = \frac{\text{Sin } I}{i}$

$\frac{\text{Sin } 24}{17} = \frac{\text{Sin } 33}{i}$

$i = \frac{17(\sin 33)}{\sin 24}$

$i = 22.76$