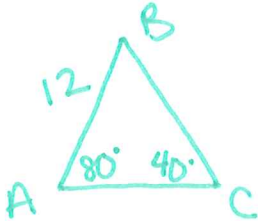# Law of Sines and Cosines HW#1

It is expected that you draw the triangle when one is not given to you.
Find each measure using the given measures of Triangle ABC. Find the measure.
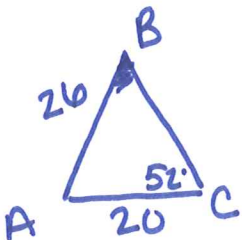
1. If $c = 12$, $m\angle A = 80$, and $m\angle C = 40$, find a.

$$\frac{\sin(80)}{a} = \frac{\sin(40)}{12}$$

$$\boxed{a \approx 18.4}$$

2. If $b = 20$, $c = 26$, and $m\angle C = 52$, find $m\angle B$.
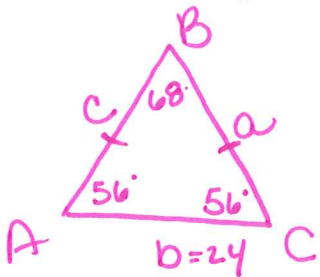
$$\frac{\sin B}{20} = \frac{\sin(52)}{26}$$

$$\sin B = \frac{20 \cdot \sin(52)}{26}$$

$$\angle B = \sin^{-1}\left(\frac{20 \cdot \sin(52)}{26}\right)$$

$$\boxed{\angle B \approx 37.3°}$$

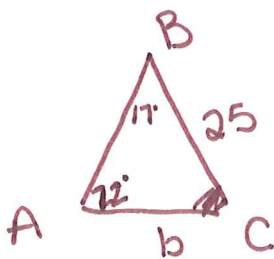3. Isosceles $\triangle ABC$ has a base of 20cm and a vertex angle of 68°. Find the perimeter of the triangle.

$$\frac{\sin(68)}{24} = \frac{\sin(56)}{a}$$

$$a \approx 21.5 cm$$

$$\boxed{P \approx 67 cm}$$

4. If a = 25, m<A = 72°, and m<B= 17°, solve the triangle.

$$\boxed{\angle C = 91°} \text{ by } \triangle \text{ sum}$$

$$\frac{\sin(17)}{b} = \frac{\sin(72)}{25}$$

$$\boxed{b \approx 7.7}$$

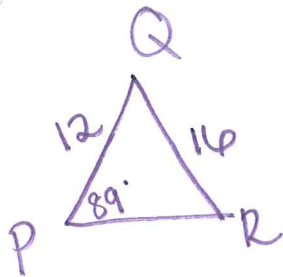$$\frac{\sin(91)}{c} = \frac{\sin(72)}{25}$$

$$\boxed{c \approx 26.3}$$

5. SOLVE the triangle. (Triangle PQR)

$m\angle P = 89, p = 16, r = 12$

Q

12 ⟋ 16

89°

P ⟍ R

$\dfrac{\sin R}{12} = \dfrac{\sin(89)}{16}$

$\boxed{\angle R \approx 48.6°}$

$\boxed{\angle Q \approx 42.4°}$

by $\triangle$ sum

$\dfrac{\sin(42.4)}{q} = \dfrac{\sin(89)}{16}$

$\boxed{q \approx 10.8}$

6. In a scalene triangle, one side is 12 feet and another side is 20 feet. The angle opposite 20 feet is 83 degrees. Find the measure of the angle opposite the side that is 12 feet.

12

20

83°   θ
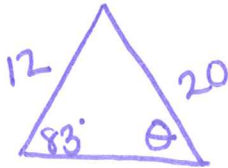
$\dfrac{\sin \theta}{12} = \dfrac{\sin(83)}{20}$

$\theta \approx 36.6°$ or $36.5°$ fine ☺

7. The famous Leaning Tower of Pisa was originally 184.5 feet high. At a distance of 123 feet from the base of the tower, the angle of elevation to the top of the tower is found to be 60°. Solve the triangle and round to the nearest tenth.

C

184.5 ft

60°

A   123 ft   B
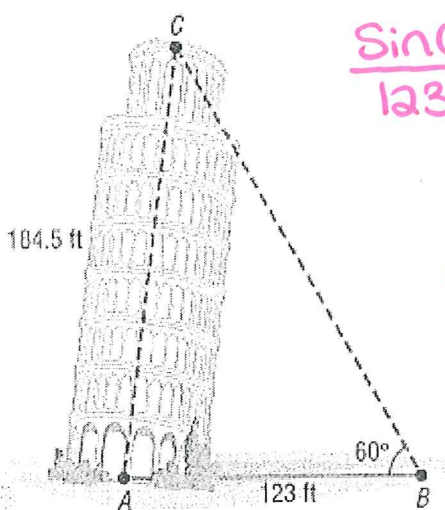
$\dfrac{\sin C}{123} = \dfrac{\sin(60)}{184.5}$ $\angle C \approx 35.3°$

$\dfrac{\sin(84.7)}{a} = \dfrac{\sin(60)}{184.5}$

m<C= __35.3°__

m<A= __84.7°__

CB = __212.1 ft__
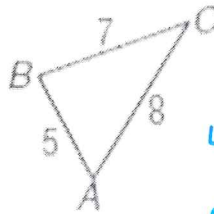
8. Find c.
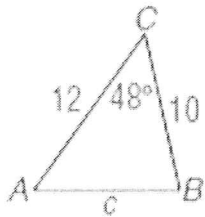
$$c^2 = 10^2 + 12^2 - 2 \cdot 10 \cdot 12 \cos(48)$$

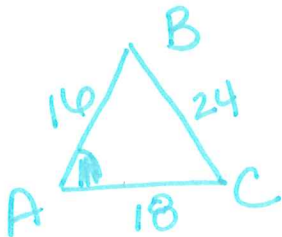$$\boxed{c \approx 9.13}$$

9. Find the m∠A.

$$7^2 = 5^2 + 8^2 - 2 \cdot 5 \cdot 8 \cos A$$

$$49 = 89 - 80 \cos A$$

$$\boxed{\angle A \approx 60°}$$

10. If a = 24, b = 18, and c = 16. Solve the triangle.

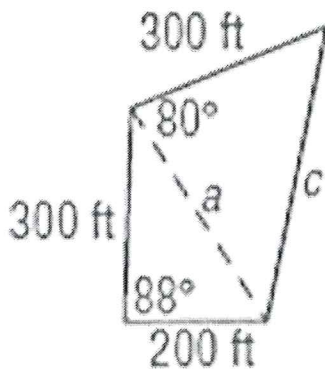

$$24^2 = 16^2 + 18^2 - 2 \cdot 16 \cdot 18 \cos A$$

$$\boxed{\angle A \approx 89.6°}$$

$$\frac{\sin B}{18} = \frac{\sin(89.6)}{24}$$

$$\boxed{\angle B \approx 48.6°}$$

$$\boxed{\angle C \approx 41.8°}$$

11. Ms. Jones wants to purchase a piece of land with the shape shown here. Find the perimeter of the property.

$$a^2 = 300^2 - 200^2 - 2 \cdot 300 \cdot 200 \cos(88)$$

$$\boxed{a \approx 354.7 \text{ft}}$$

$$c^2 = 354.7^2 + 300^2 - 2 \cdot 354.7 \cdot 300 \cos(80)$$

$$\boxed{c \approx 422.9 \text{ft}}$$

$$\left(P \approx 1222.9 \text{ft}\right)$$