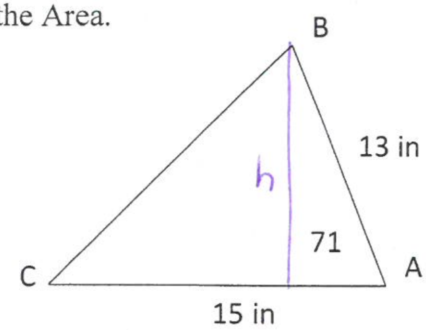
Section 6-3 Area of a Triangle

1. Find the Area.



$\text{Area} = \frac{1}{2} b \cdot h$ $\quad b = 15$

$\sin 71 = \frac{h}{13}$ $\quad h = ?$

$h = 13 \cdot \sin 71$

$\text{Area} = \frac{1}{2}(b)(c \sin A)$

$= \frac{1}{2}(15)(13 \sin 71)$

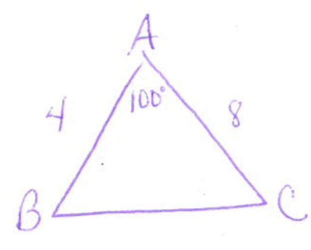
$= 92.188$ $\quad \boxed{\approx 92.2 \text{ un}^2}$

$A = \frac{1}{2} bc(\sin A)$

$A = \frac{1}{2} ab(\sin C)$ $\quad A = \frac{1}{2} ac(\sin B)$

Verbally: The area of a triangle equals half the product of two of its sides and the sine of the included angle.

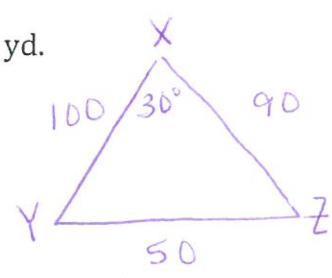
2. Find the area of ΔABC if b=8 m, c = 4 m, and A = 100°.



$A = \frac{1}{2}(4)(8)(\sin 100°)$

$A = 15.7569$ $\quad \boxed{A \approx 15.8 \text{ m}^2}$

3. Find the area of ΔXYZ if x = 50 yd, y = 90 yd, and z = 100 yd.



* must have an angle to use this formula, so would need to use Law of Cosines.

$x^2 = y^2 + z^2 - 2(y)(z)(\cos X)$

$50^2 = 90^2 + 100^2 - 2(90)(100)(\cos X)$

$-15600 = -18000 \cos X$

$.866\overline{6} = \cos X$ $\quad X \approx 30°$

$X = 29.9264$

$A = \frac{1}{2}(100)(90)(\sin 30°)$

$\boxed{A = 2250 \text{ yds}^2}$

It is possible to find the Area of a triangle directly from all 3 side lengths as in Example 3.

> **Hero's Formula** In ΔABC, the area is
>
> $$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$
>
> where s is the semi-perimeter (or half the perimeter) $s = \frac{1}{2}(a + b + c)$

Find the area of ΔXYZ if x = 50, y = 90, and z = 100.

$S = \frac{1}{2}(50 + 90 + 100)$

$S = 120$

$A = \sqrt{120(120-50)(120-90)(120-100)}$

$A = \sqrt{120(70)(30)(20)}$

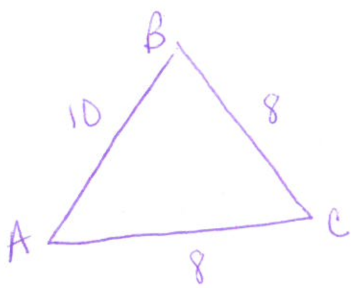
$A = \sqrt{5{,}040{,}000}$

$\boxed{A \approx 2245 \text{ un}^2}$

* Why is this area off a little from the answer on the front

We rounded the angle on the front

4. Find the area of ΔABC if a = 8, b = 8, c = 10 cm.



$S = \frac{1}{2}(8 + 8 + 10)$

$S = 13$

$A = \sqrt{13(13-10)(13-8)(13-8)}$

$A = \sqrt{13(3)(5)(5)}$

$A = \sqrt{975}$

$\boxed{A \approx 31.2 \text{ un}^2}$