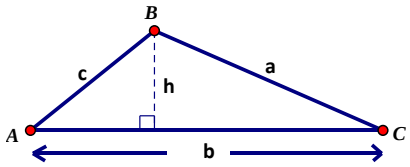
**Geometry** (G.SRT.9)
**Unit Two: Area of Non-Right Triangles (IC/HW29)**

Name: _____
Date: _____ Period: _____

**1. What is an oblique triangle?**

Any triangle that does NOT have a right angle.

**2. Given ΔABC, derive the area formula** $Area = \frac{1}{2}bc\sin A$

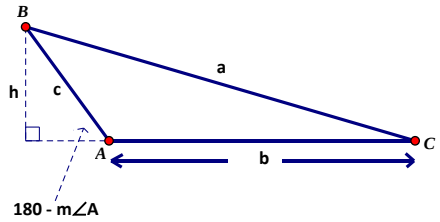



Area = $\frac{1}{2}bh$ But h→ sin A = $\frac{h}{c}$

h = c sin A

Area = $\frac{1}{2}bc\sin A$

**3. Given ΔABC, derive the area formula** $Area = \frac{1}{2}bc\sin A$



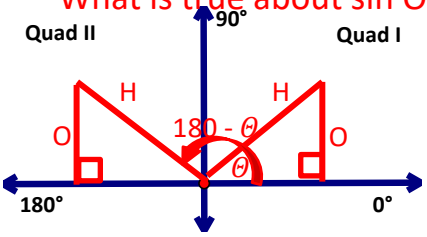

Area = $\frac{1}{2}bh$ But h→ sin Θ = $\frac{h}{c}$

h = c sin Θ

Area = $\frac{1}{2}bc\sin\Theta$

**4. Explain why sin Θ = sin (180° - Θ).**

*What is true about sin Θ and sin A? They are equal, so … Area = $\frac{1}{2}bc\sin A$




sin Θ = $\frac{O}{H}$

sin (180 – Θ) = $\frac{O}{H}$

If sin A = sin B, then A + B = 180°
Remember:
If sin A = cos B, then A + B = 90°

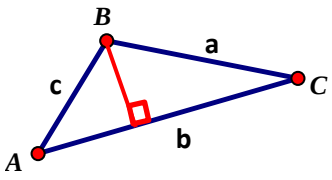
*This is like a reflection of the angle Θ. Do the opp & hyp change if Θ is reflected? NO!

**5. Determine the missing angle that makes the equation true. (some new… some review)**

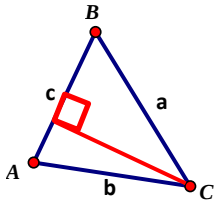
a) sin 23° = sin 157°
b) sin 67° = sin 113°
c) sin 87° = sin 93°
d) sin 143° = sin 37°
e) sin 140° = sin 40°
f) sin 155° = sin 25°
g) sin 53° = cos 37°
h) sin 76° = cos 14°
i) cos 50° = sin 40°
j) sin 45° = cos 45°
k) sin 90° = cos 0°
l) cos 5° = sin 85°

**6. Given the ΔABC, draw in the altitude (height) to the named base.**

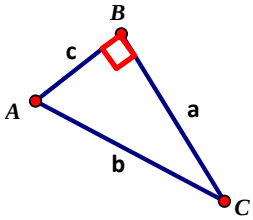
a) Base b



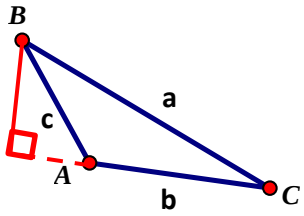

b) Base c



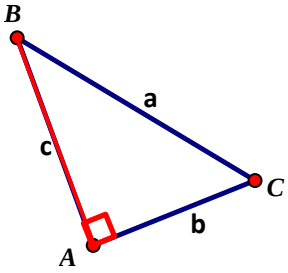

c) Base a



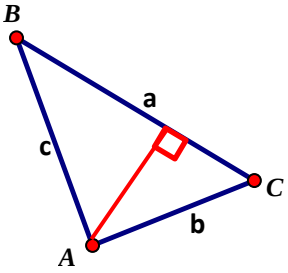

d) Base b



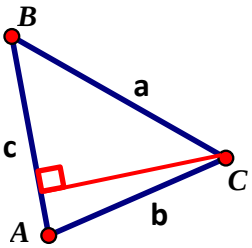

e) Base b



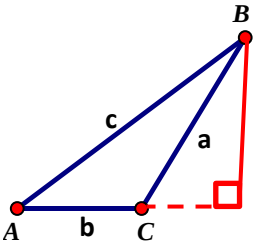

f) Base a




g) Base c

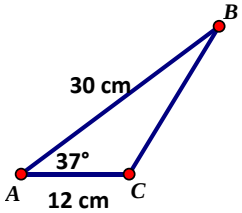



h) Base b




**7. Calculate the area of the given triangles.**

**a)**



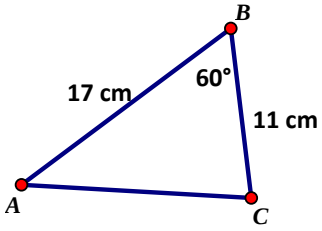

Area = $\frac{1}{2}\ bc \sin A$

$= \frac{1}{2}\ (12)(30) \sin 37$

$= 180 \sin 37$

$= 108.33\ \text{cm}^2$

**b)**




Area = $\frac{1}{2}\ ac \sin B$

$= \frac{1}{2}\ (11)(17) \sin 60$

$= 80.97\ \text{cm}^2$

**c)**

Area = $\frac{1}{2}\ ab \sin C$

$= \frac{1}{2}\ (3)(11) \sin 82$

$= 16.34\ \text{cm}^2$

**d)**

Area = $\frac{1}{2}\ ab \sin C$

$= \frac{1}{2}\ (3)(4) \sin 90$

$= 6\ \text{cm}^2$

OR

Area = $\frac{1}{2}\ bh = \frac{1}{2}\ (3)(4)$

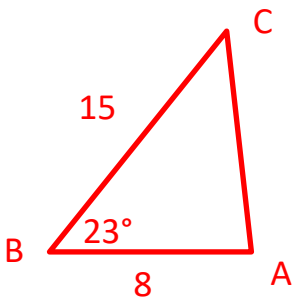
Area = 108.33 $\text{cm}^2$ Area = 80.97 $\text{cm}^2$ Area = 16.34 $\text{cm}^2$ Area = 6 $\text{cm}^2$

**8. Diagram ΔABC and then calculate the area.**

a)
m∠B = 23°
a = 15 cm
c = 8 cm

Calculate the Area of ΔABC

Diagram ΔABC




Area $= \frac{1}{2}\ ac \sin B$

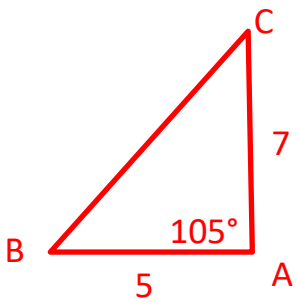
$= \frac{1}{2}\ (15)(8) \sin 23$

$\approx 23.44 \text{ cm}^2$

b)
m∠A = 105°
b = 7 cm
c = 5 cm

Calculate the Area of ΔABC

Diagram ΔABC



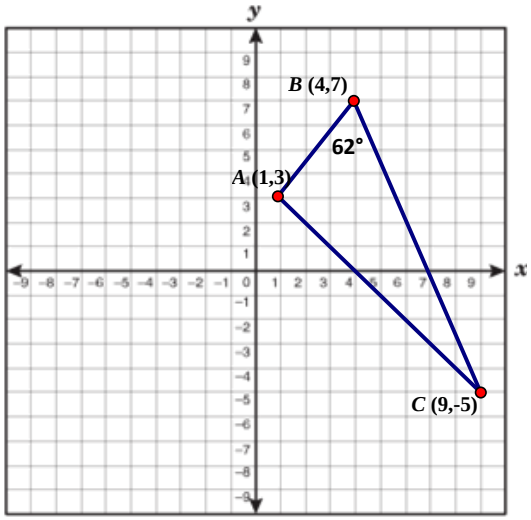

Area $= \frac{1}{2}\ bc \sin A$

$= \frac{1}{2}\ (7)(5) \sin 105$

$\approx 16.90 \text{ cm}^2$

**9. Given three points of a triangle, determine the area.**

Remember that the distance formula is $\text{distance} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$




a) A (1,3) B (4,7) C (9,-5)

$d_{AB} = \sqrt{(4 - 1)^2 + (7 - 3)^2}$

$= \sqrt{9 + 16}$

$= 5$

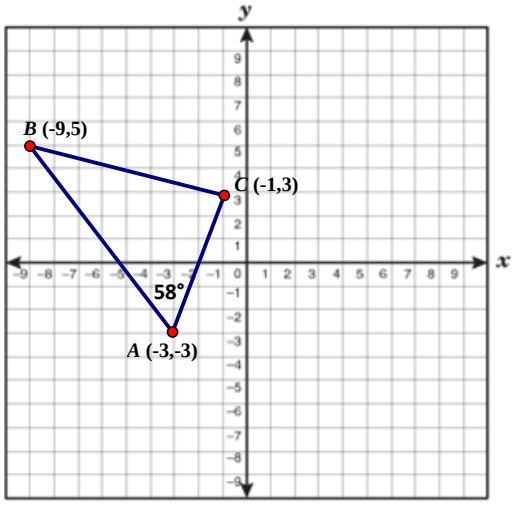
$d_{BC} = \sqrt{(9 - 4)^2 + (-5 - 7)^2}$

$= \sqrt{25 + 144}$

$= 13$

Area $= \frac{1}{2}\ (5)(13) \sin 62$

Area = $28.7 \text{ u}^2$




b) A (-3,-3)  B (-9,5)  C (-1,3)

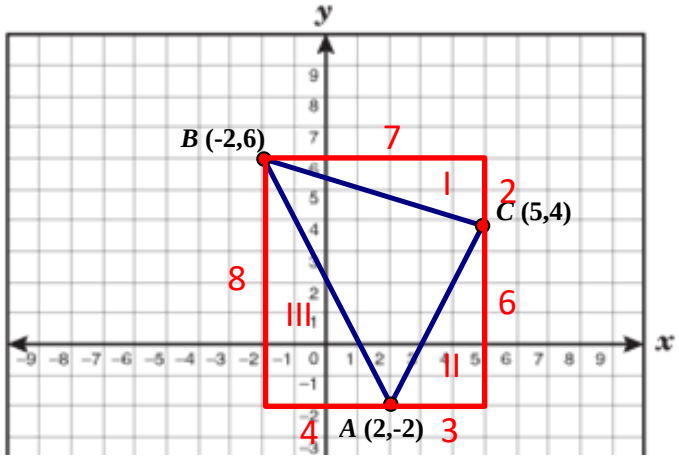
$d_{AB} = \sqrt{(-9+3)^2 + (5+3)^2}$
$= \sqrt{36+64}$
$= 10$

$d_{AC} = \sqrt{(-1+3)^2 + (3+3)^2}$
$= \sqrt{4+36}$
$= \sqrt{40}$
$= 2\sqrt{10}$

Area $= \frac{1}{2}(10)(2\sqrt{10})\sin 58$

Area = 26.82 $u^2$

**10. The following area problem was given to a student but no angles were provided. How could she find the area of the triangle? Determine the area.**




$A_{rect} = 7(8) = 56$

$A_{\Delta I} = \frac{1}{2}(7)(2) = 7$

$A_{\Delta II} = \frac{1}{2}(3)(6) = 9$

$A_{\Delta III} = \frac{1}{2}(8)(4) = 16$

Area = 24 $u^2$

Rect - ΔI - ΔII - ΔIII = 56 – 7 – 9 – 16 = 24 $u^2$