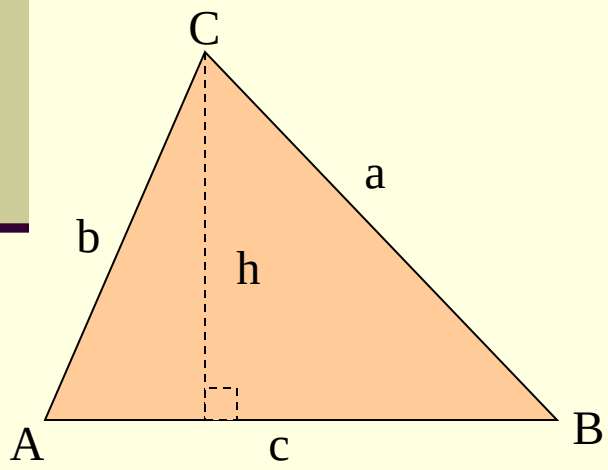
Lesson 3.1: Continued

Area of an Oblique Triangle

The area of any triangle is one-half the product of the lengths of two sides times the sine of their ***included*** angle.

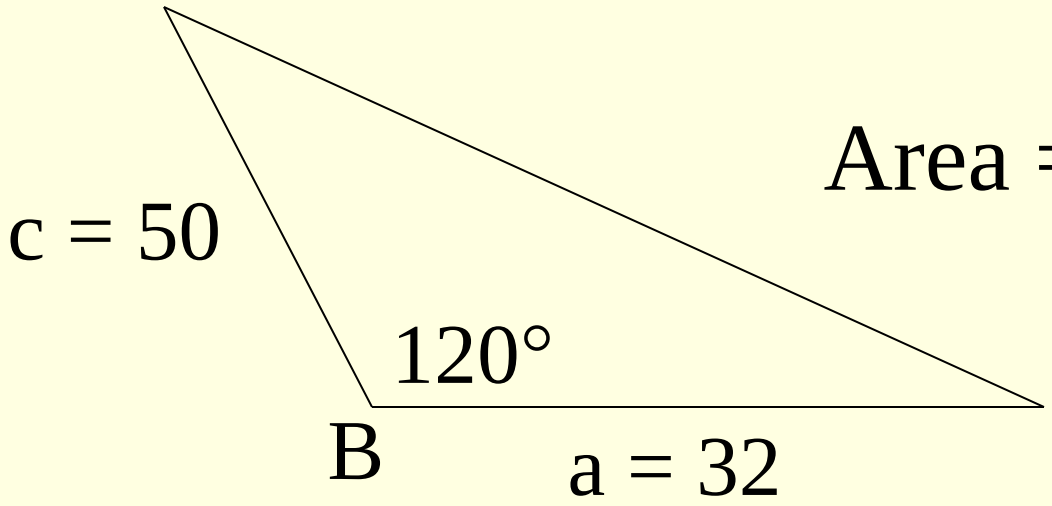


$$\text{Area} = \frac{1}{2}bc\sin A = \frac{1}{2}ac\sin B$$

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

Ex 1: Find the area of a triangle with:

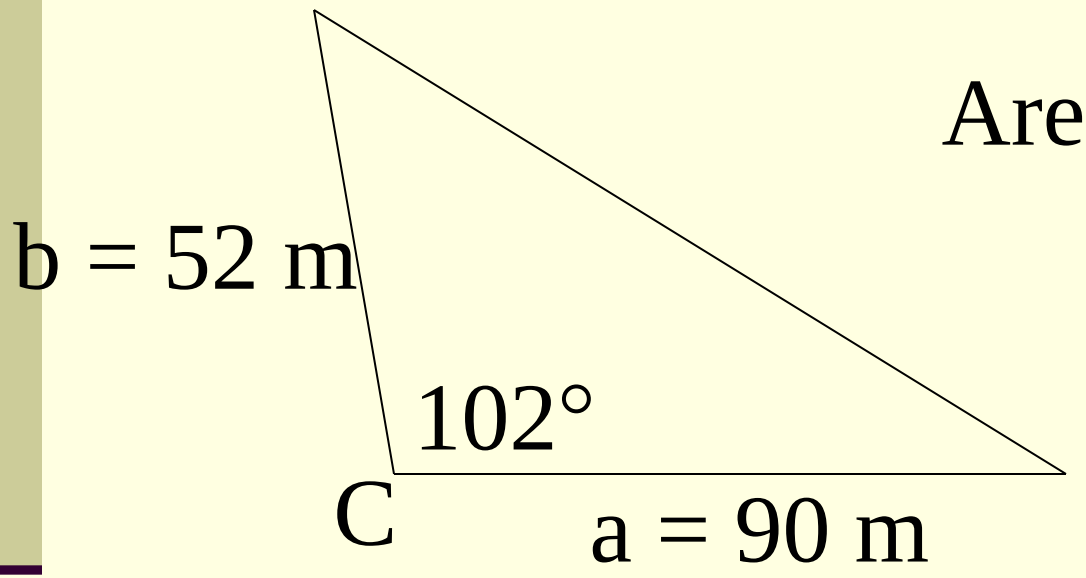
B = 120° a = 32 c = 50



Area = 1/2*ac*sin B

$$\text{Area} = \frac{1}{2}(32)(50)\sin 120^\circ = 692.8 \ \textit{units}^2$$

Ex 2: Find the area of a triangular lot having two sides of lengths 90 meters and 52 meters and an included angle of 102°.

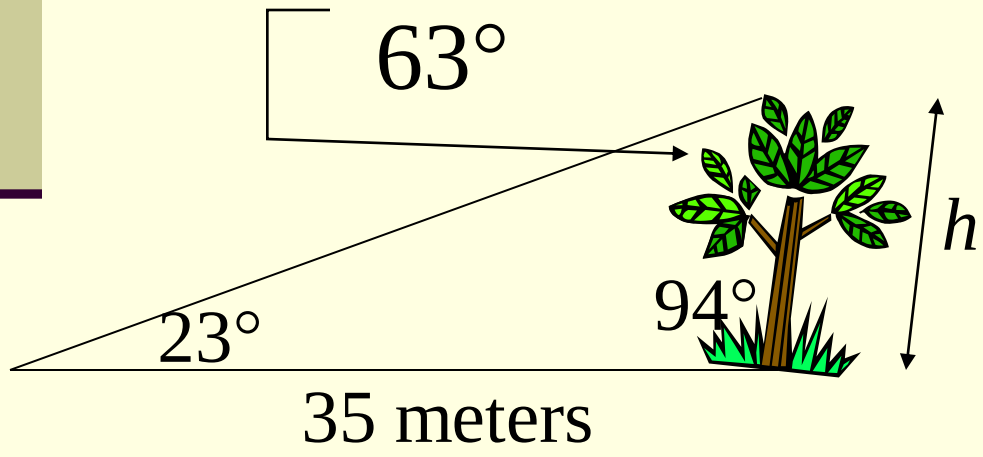


Area = 1/2*ab*sin C

$$\text{Area} = \frac{1}{2}(90)(52)\sin 102^\circ = 2288.9m^2$$

Applications for Law of Sines

Ex 3: Because of prevailing winds, a tree grew so that it was leaning 4° from the vertical. At a point 35 meters from the tree, the angle of elevation to the top of the tree is 23°. Find the height *h* of the tree.

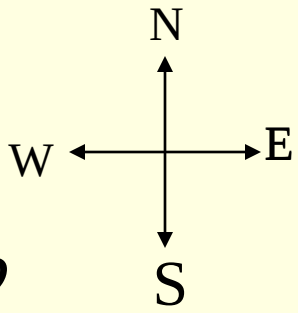


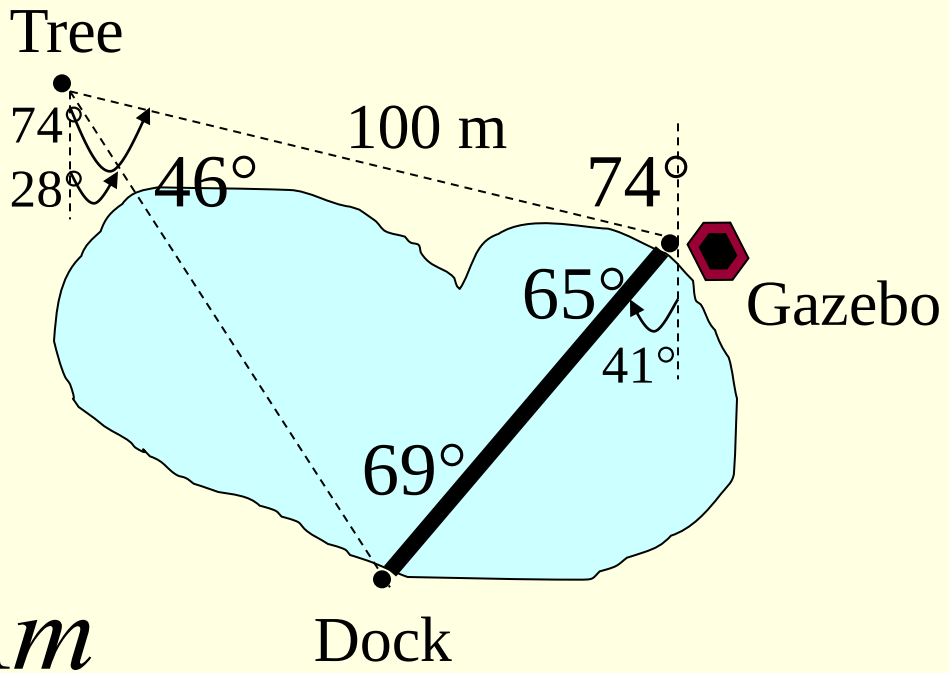
$$\frac{35}{\sin 63^\circ} = \frac{h}{\sin 23^\circ}$$

$$h = \frac{35 \sin 23^\circ}{\sin 63^\circ}$$

$$h \approx 15.3m$$

Ex 4: A bridge is to be built across a small lake from a gazebo to a dock. The bearing from the gazebo to the dock is S 41° W. From a tree 100 meters from the gazebo, the bearings to the gazebo and the dock are S 74° E and S 28° E, respectively. Find the distance from the gazebo to the dock.





$$\frac{100}{\sin 69^\circ} = \frac{b}{\sin 46^\circ}$$

$$h = \frac{100 \sin 46^\circ}{\sin 69^\circ} \approx 77.1m$$

Homework: p.284-285 #30 – 38 even