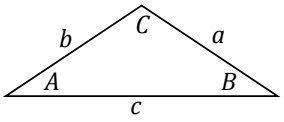
Section 9.2

The Law of Sines

THE LAW OF SINES



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

or

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

WHEN TO USE THE LAW OF SINES

The Law of Sines is used when you have:

(a) an angle-side-angle (ASA) triangle;
(b) an angle-angle-side (AAS) triangle; or
(c) a side-side-angle (SSA) triangle.

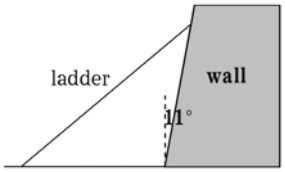
SSA TRIANGLES

Given A, a, b of a triangle.

(a) There is only one triangle if $A > 90°$ or if $a > b$.
(b) There is no triangle if a is much less than b and A is "too big."
(c) There are two triangles if $a < b$ and A is "small enough." (You can check this by seeing if the sum of the given angle and the supplement of the angle you found is less than 180°.)

EXAMPLE

A 47-foot long ladder is positioned 15 feet from the base of a wall that is 11° from vertical as shown in the diagram. How far up the wall does the ladder reach?



HEADING AND BEARING

In navigation and surveying, the angular direction in which a craft is traveling is called the **heading**. Heading is *always* expressed in terms of an angle measured *clockwise* from north.

The angular direction used to locate one object in relation to another object is called the **bearing**. Bearing is expressed in terms of an acute angle formed by a north-south line. For example: S 53° E.

EXAMPLE

A navigator on a ship sights a lighthouse at a bearing of N36°E. After traveling 8.0 miles with a heading of 332°, the navigator sights the lighthouse at a bearing of S82°E. How far is the ship from the lighthouse at the second sighting?