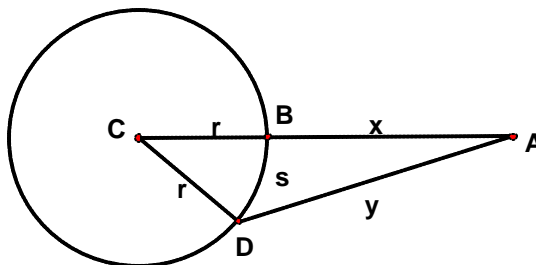


7.1, 7.2, and 7.3 Triangles – Applications

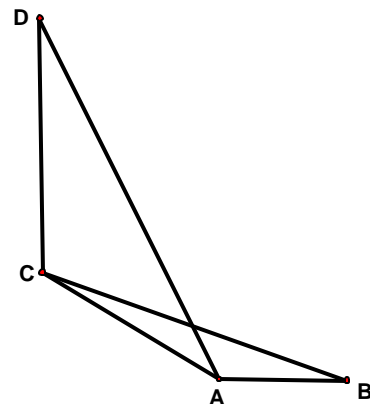
1. Textbook 7.1 #21

If $A = 31^\circ$, $s = 11$, $r = 12$, find x .



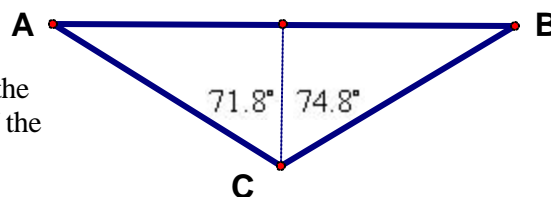
2. Textbook 7.1 #25 A man standing near a radio station antenna observes that the angle of elevation to the top of the antenna is 64° . He then walks 100 feet further away and observes that the angle of elevation to the top of the antenna is 46° . Find the height of the antenna to the nearest foot.

3. Textbook 7.1 #31 The figure shows how Colleen estimates the height of a tree that is on the other side of a stream. She stands at point A facing the tree CD and find that the angle of elevation from A to the top of the tree to be 51° . Then she turns 105° and walks 25 feet to point B, where she measures the angle between her path and the base of the tree. She finds that angle to be 44° . Find the height of the tree.



4. Textbook 7.1 #33 A ship is anchored off a long straight shoreline that runs north and south. From two observation points 18 miles apart on shore, the bearings of the ship are $N31^\circ E$ and $S53^\circ E$. What is the distance from the ship to each of the observation points?

5. Textbook 7.1 #37 If you have ever ridden on a chair lift at a ski area and had it stop, you know that the chair will pull down on the cable, dropping you down to a lower height than when the chair is in motion. The figure shows a gondola that is stopped. Find the magnitude of the tension in the cable toward each end of the cable if the total weight of the gondola and its occupants is 1850 pounds.



NAVIGATION – There are two ways to specify the direction of a moving object

1) The **bearing of a line l** is the acute angle formed by the north-south line and the line l .

Examples

The bearing of A from O is $N50^\circ E$.

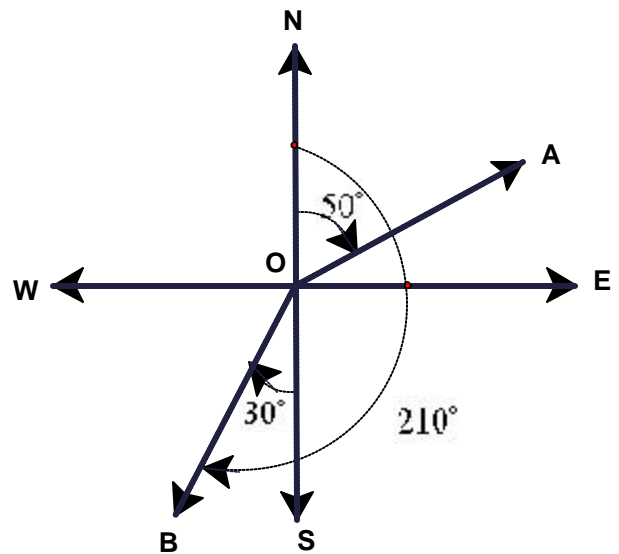
The bearing of B from O is $S30^\circ W$.

2) The **heading** of an object is the angle, measured clockwise from due north, to the vector representing the path of the object.

Examples

The direction of a ship traveling in the direction given by the vector OA is 50° from due north,

while the direction of a ship traveling in the direction given by the vector OB is 210° from due north.



Vocabulary:

- the direction in which a plane or boat is headed is called its **heading** (the direction the plane or boat would travel if there were no wind or current); the **airspeed** of a plane is the speed with which it is moving through the air.
- the direction in which the plane or boat is actually moving with respect to the ground is called its **true course**; the **ground speed** is the speed of a plane with respect to the ground below.

6. Textbook 7.2 # 29 A ship headed due east is moving through the water at a constant speed of 12 miles per hour. However, the true course of the ship is 60° . If the currents are a constant 6 miles per hour, what is the ground speed of the ship?

7. Textbook 7.3 # 27 A plane has an airspeed of 195 miles per hour and a heading of 30° . The ground speed of the plane is 207 miles per hour, and its true course is in the direction of 34° . Find the speed and direction of the air currents, assuming they are constants.

8. Textbook 7.3 # 25 A plane is flying with an airspeed of 244 miles per hour and heading of 150° . The wind currents are running at 35 miles per hour at 165° clockwise from due north. Use vectors to find the true course and ground speed of the plane.