

Problem 7

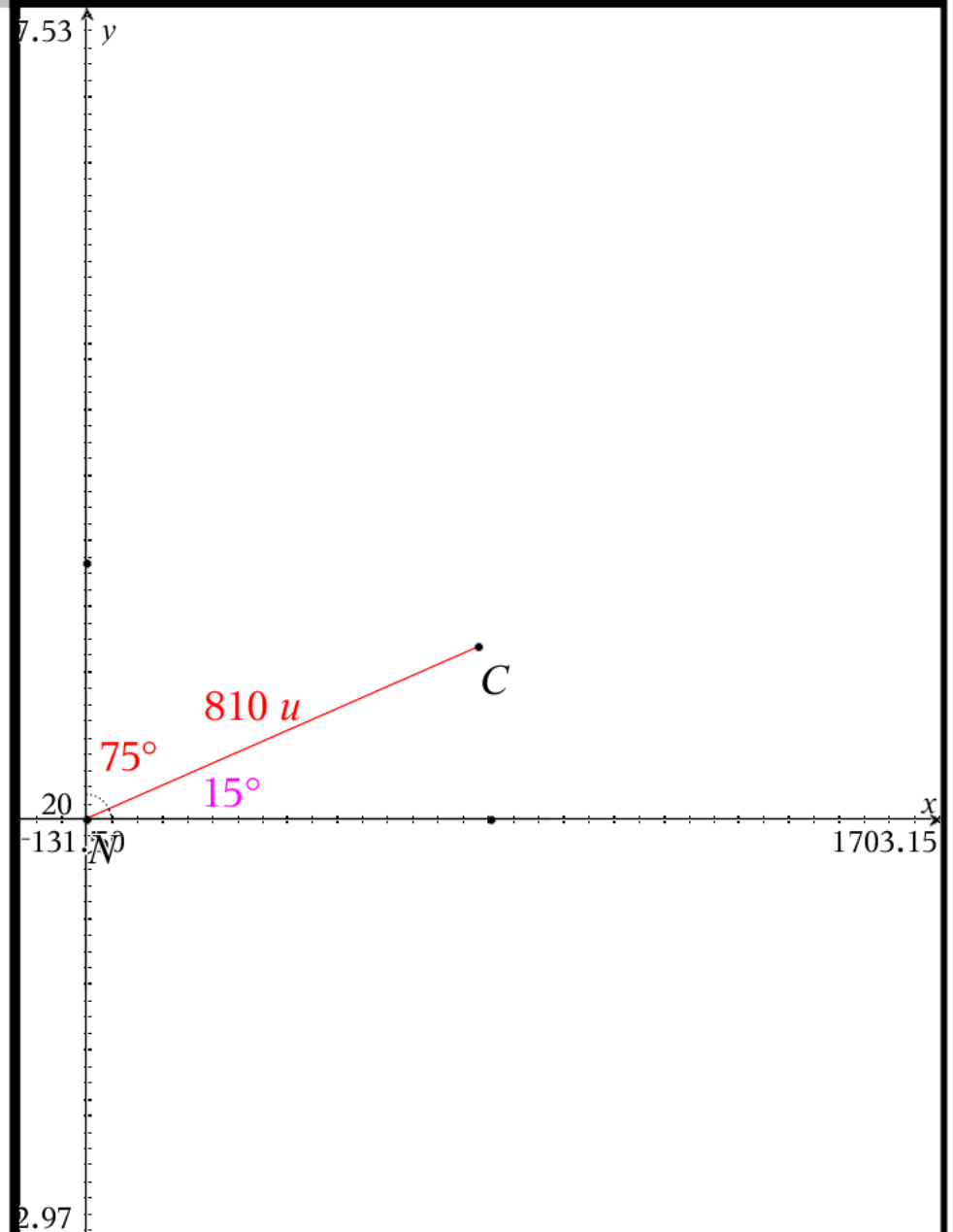
A plane flies 810 miles from Niagara to Cuyahoga with a bearing of N 75° E.

Then it flies 648 miles from Cuyahoga to Rosemont with a bearing of N 32° E.

Fact 1: A plane flies 810 miles from Niagara to Cuyahoga with a bearing of N 75° E.

This means that the magnitude of the vector NC is 810 and its heading is N 75° E.

This also leads to a portion of angle formed at NCR



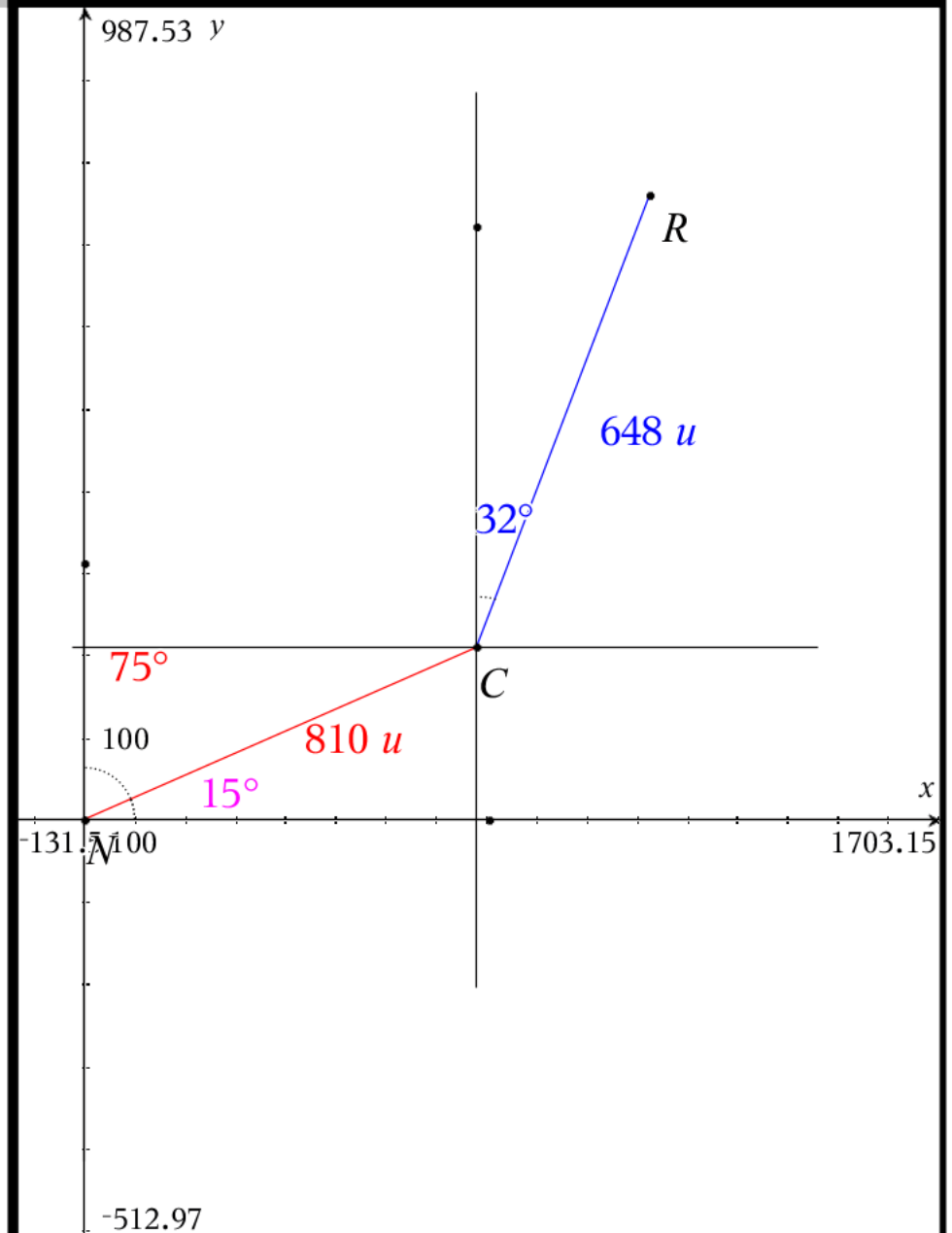
A plane flies 810 miles from Niagara to Cuyahoga with a bearing of N 75° E.

Then it flies 648 miles from Cuyahoga to Rosemont with a bearing of N 32° E.

Fact 2: Then it flies 648 miles from Cuyahoga to Rosemont with a bearing of N 32° E.

This means that the magnitude of the vector CR is 648 and its heading is N 32° E.

This also leads to a portion of angle formed at NCR



The measure of angle NCR

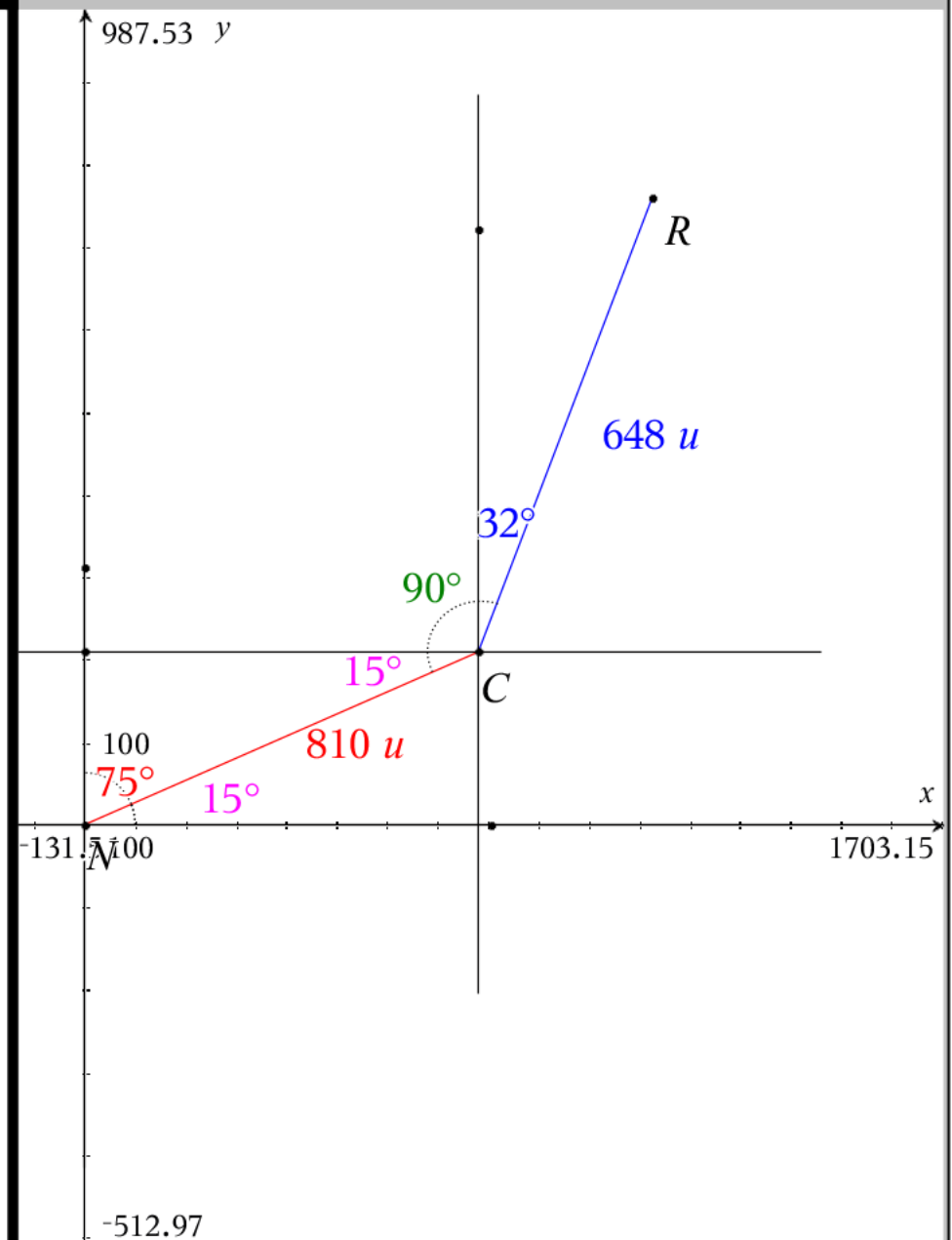
We get part of the angle from alternate interior angles or complements in a right triangle  
this is where we get  $15^\circ$

We get part of the angle from the heading of vector CR  
this is where we get  $32^\circ$

Since headings are built off of perpendicular lines we get  $90^\circ$  from these perpendicular lines.

this is where we get  $90^\circ$

So the angle at NCR is  $15+90+32 = 137$



The measure of angle NCR =  $137^\circ$

1. Find the straight line distance from  
Niagara to Rosemont

This is now a SAS triangle which means that  
the law of cosines applies

$$NR = \sqrt{810^2 + 648^2 - 2 \cdot 810 \cdot 648 \cdot \cos(137^\circ)}$$
$$= 1357.847511$$

Note  $810^2 + 648^2 \blacktriangleright 1076004$  and  
 $2 \cdot 810 \cdot 648 \blacktriangleright 1049760$

$$NR = \sqrt{1076004 - 1049760 \cdot \cos(137^\circ)} \blacktriangleright 1357.847511$$

