

solutions to #1 and #2

	A	B
=		
1	side_1	5
2	side_2	9
3	angle_3	123
4		
5		
6		
7		
8		
9		
10	63.8908	
11		

Given information: SAS

side_1 = 5

side_2 = 9

included angle = **123** missing side (see below)

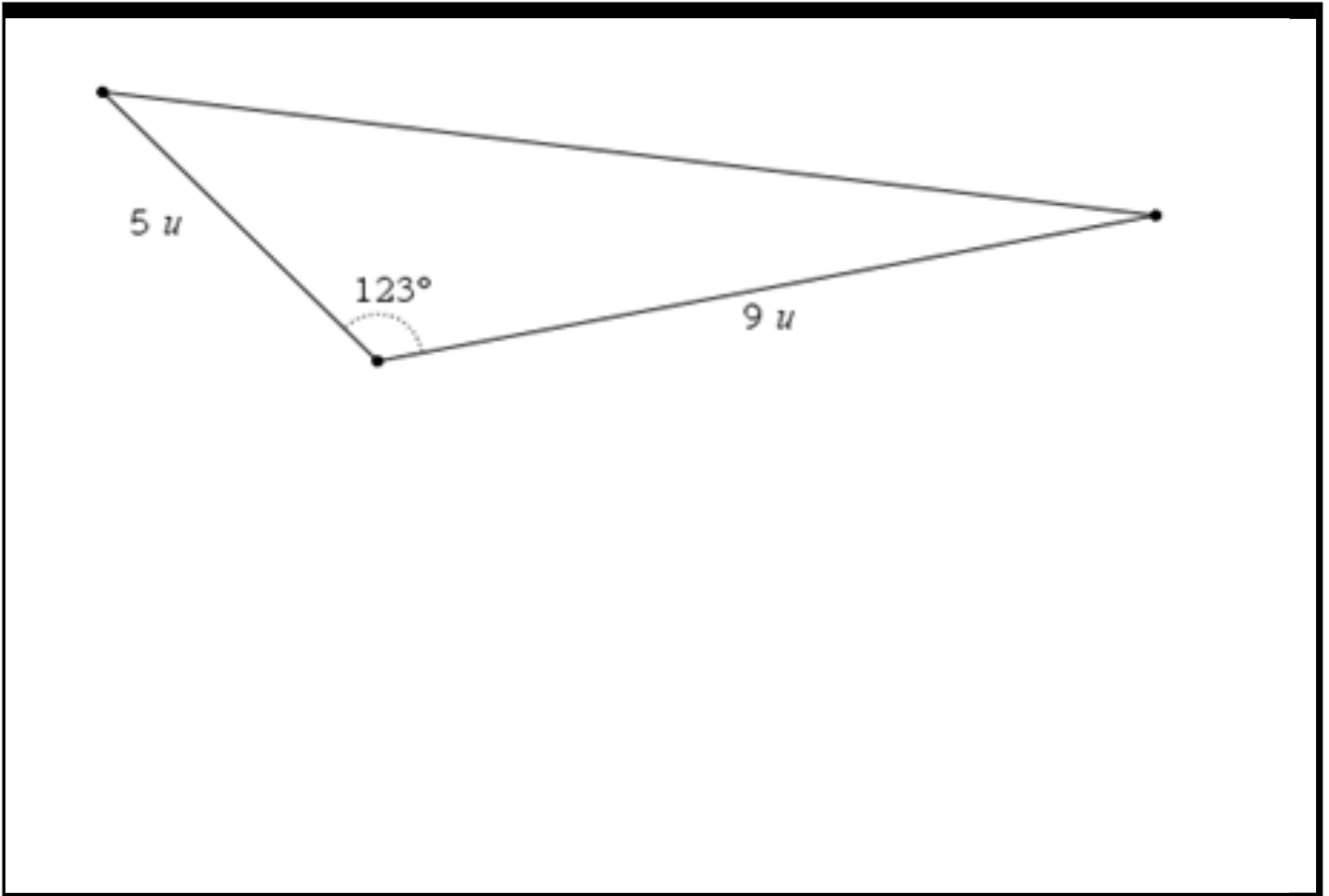
$$A = \frac{1}{2} (5)(9)\sin(123) \quad \approx 18.8701$$

$$P = 5 + 9 + 12.4506 \quad \approx 26.4506$$

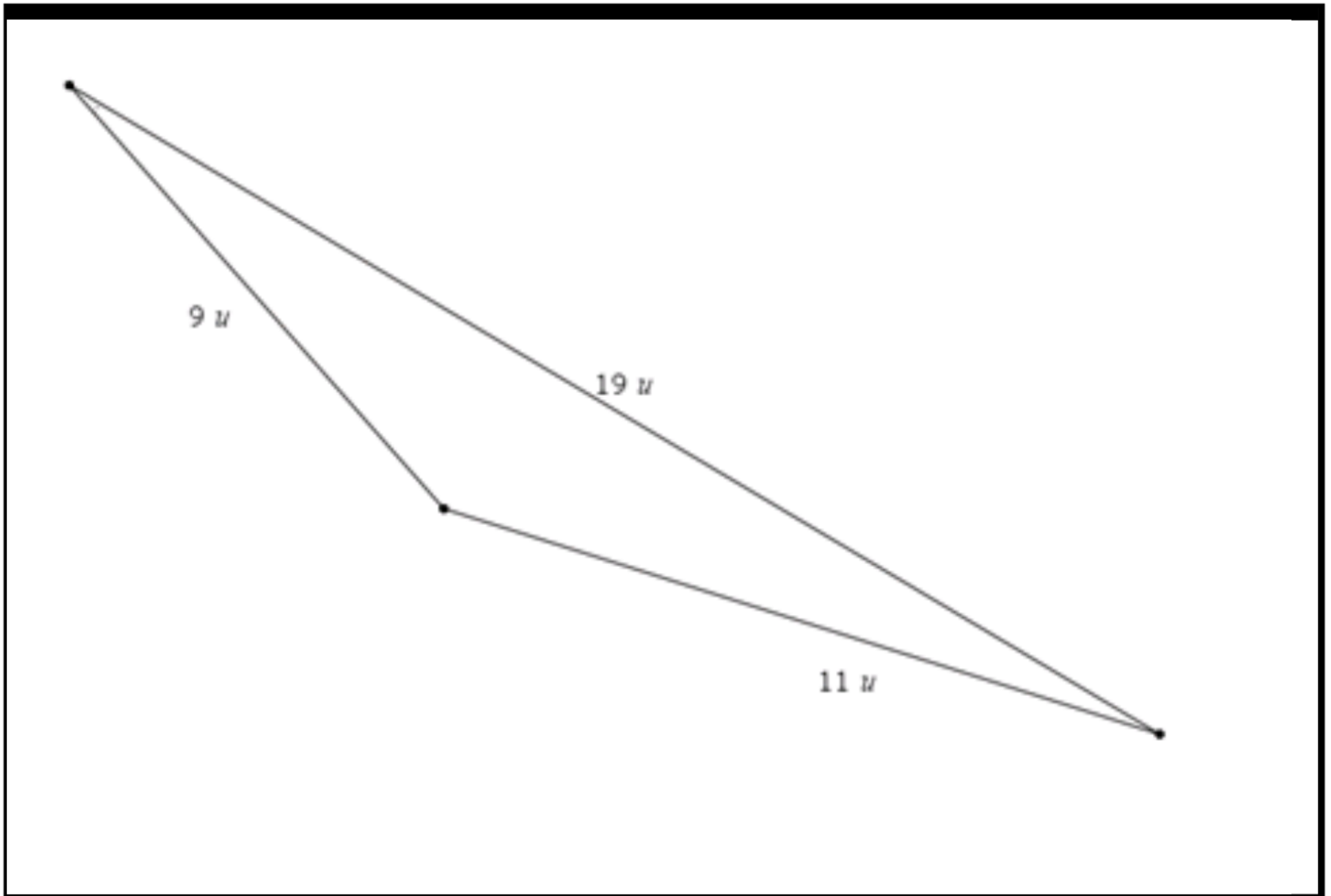
$$side\ 3 = \sqrt{(5)^2 + (9)^2 - 2(5)(9)\cos(123)}$$

$$\sqrt{106 - 90\cos(123)}$$

$$12.4506$$



solutions to #3 and #4



	A	B	C
	=		
1	side_1		9
2	side_2		11
3	side_3		19
4			
5			
6			
7			
8			
9			
10			
11			
A1 side_1			

Given information: SSS

$$\text{side}_1 = 9$$

$$\text{side}_2 = 11$$

$$\text{side}_3 = 19$$

$$\text{semiperimeter} = \frac{39}{2}$$

$$\begin{aligned}
 A &= \sqrt{[(19.5 - 9)(19.5 - 11)(19.5 - 19)]} \\
 &= \sqrt{[870.1875]} \\
 &\approx 29.4989
 \end{aligned}$$

$$P = 9 + 11 + 19 \approx 39$$



Solutions to #5

5) bearing of 279

5a) 351° South of West

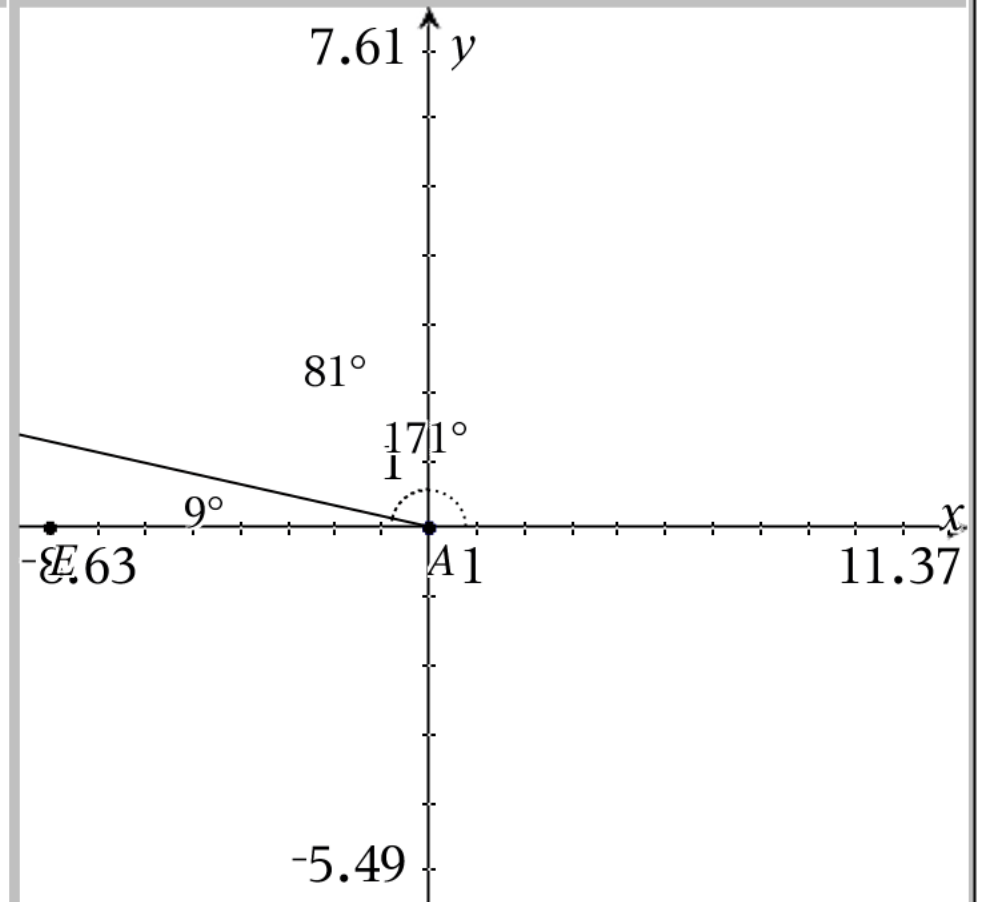
$$360 - 9$$

5b) 9° North of West

$$279 - 270$$

5c) S 99° W

$$90 + 9$$



	A	B	C	D
=				
1 bearing		309		
A1 bearing				

Solutions to #5

7) 27° East of South

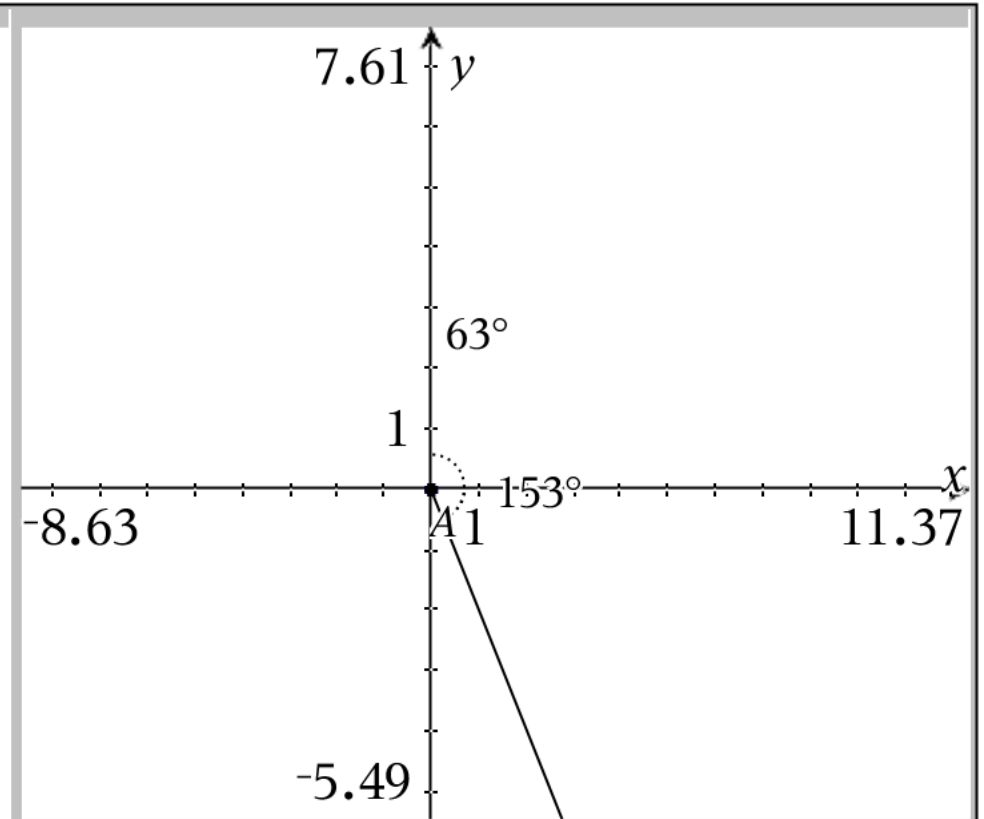
7a) bearing of $^\circ$

153°

7b) $^\circ$ East of North

153°

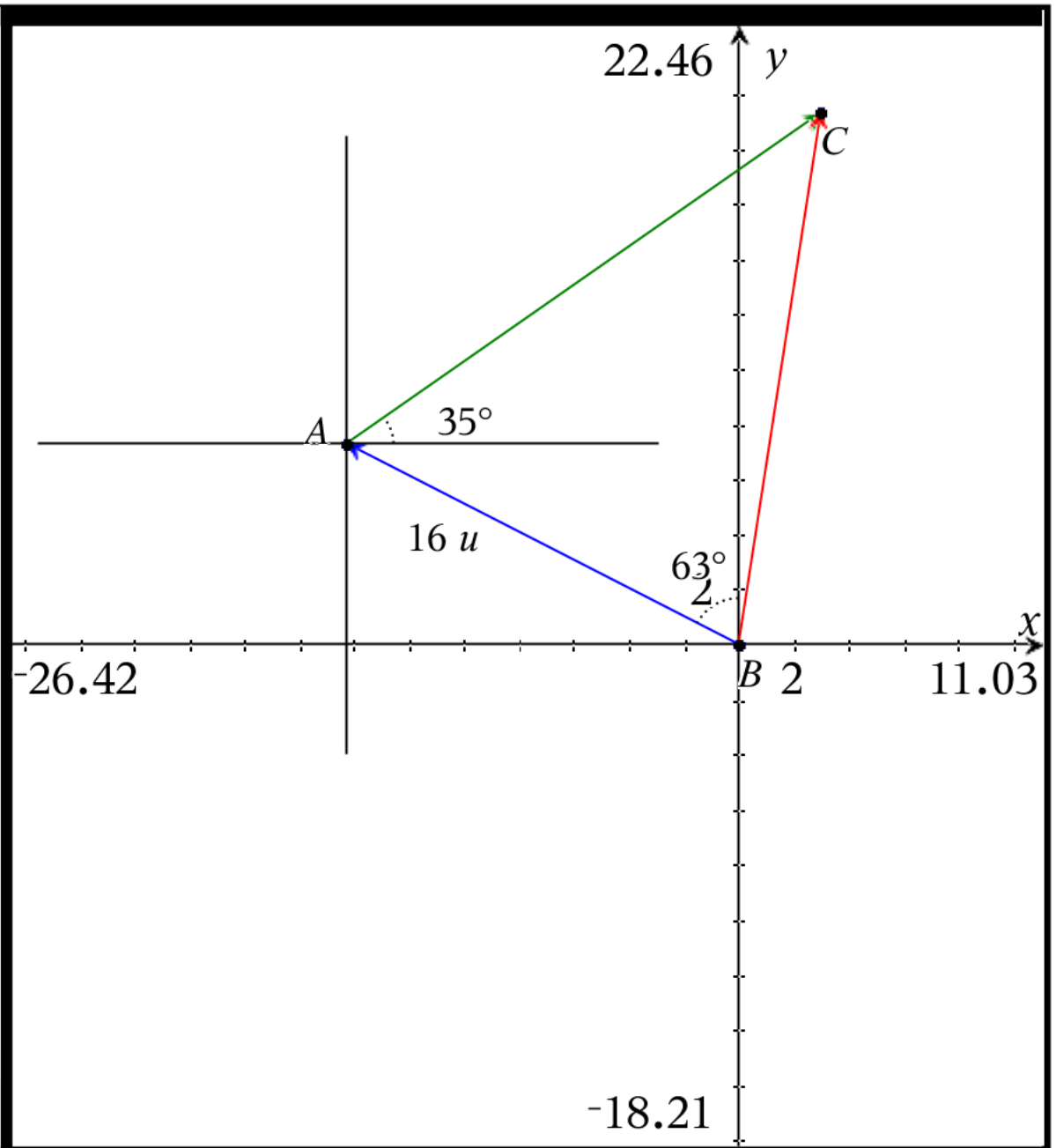
7c) N 207° W

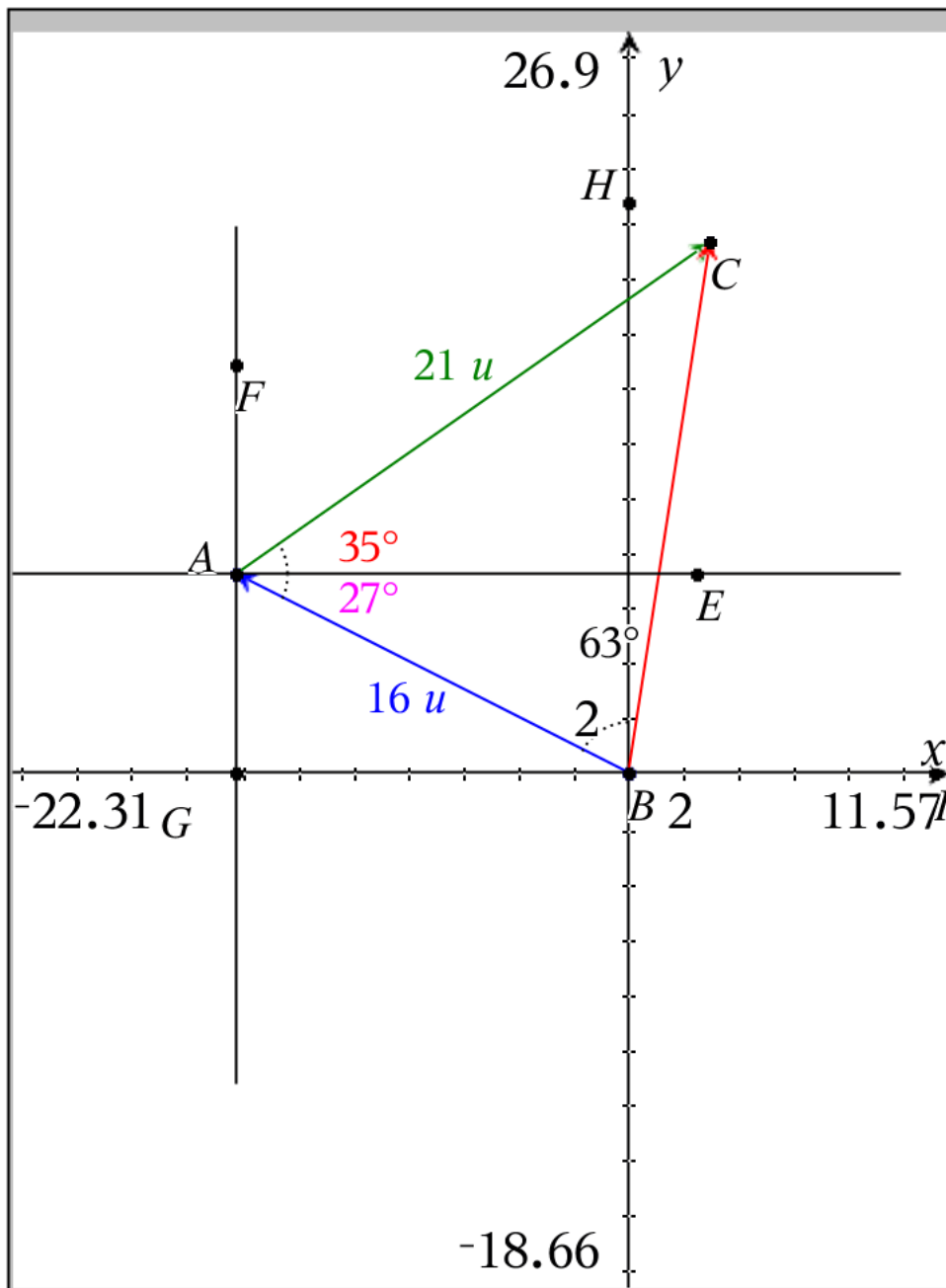


	A	B	C	D
=				
1	given_a...		27	
2				
A1	given_angle			

Solutions to #14, #15, #16

	A	B	C
=			
1	angle_1		63
2	magn_1		16
3	angle_2		125
4	magn_2		21
5			
6			
7			
8			
9			
10			
11			
<input type="text" value="A1 angle_1"/>			





Note $m\angle GAC = 125^\circ$ from given

We can find that $m\angle EAC = 35^\circ$

$$125 - 90$$

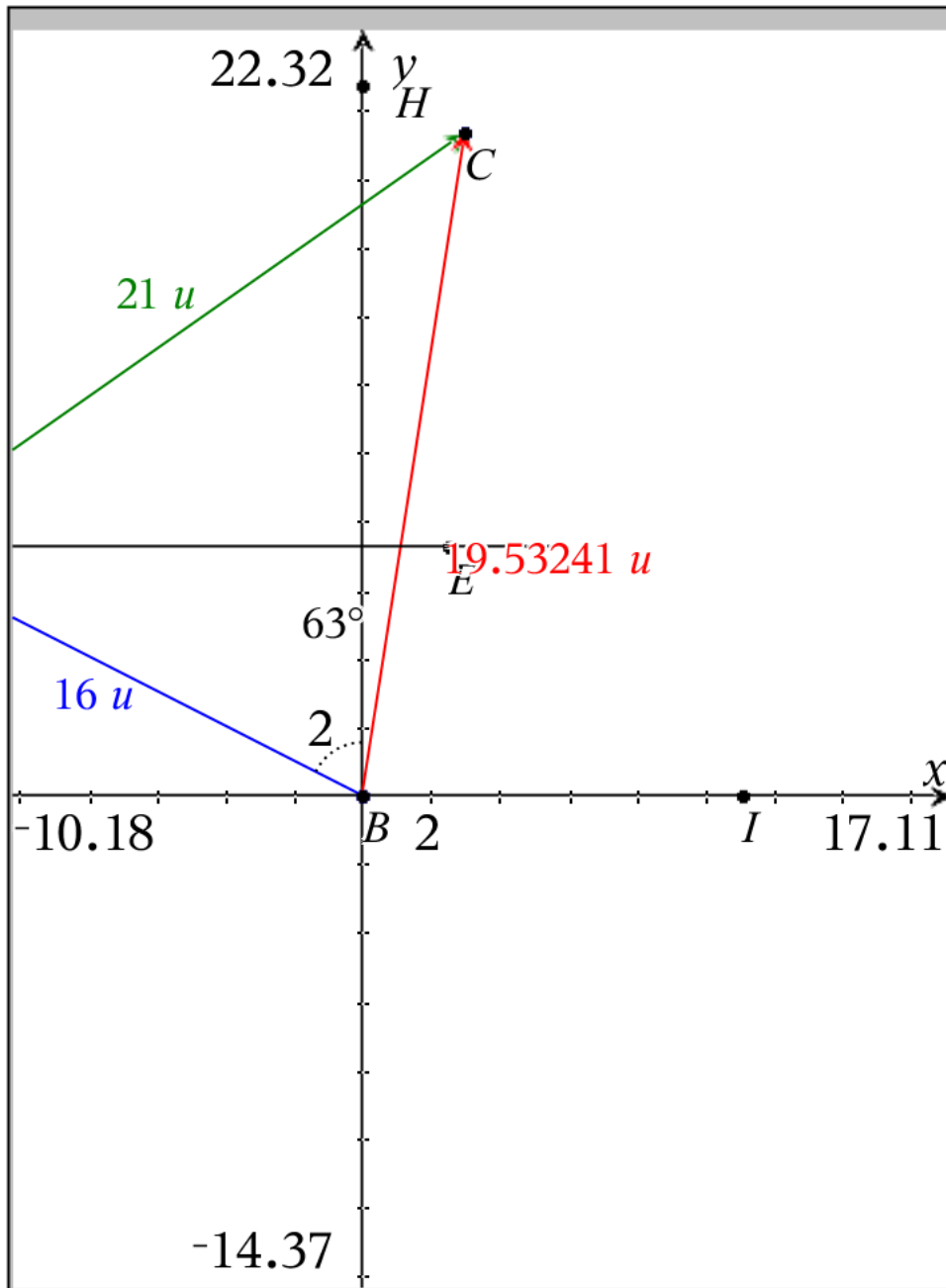
Note: $m\angle HBA = 63^\circ$ from given

We can find $m\angle BAE = 27^\circ$

$$90 - 63$$

We can now find $m\angle BAC = 62^\circ$

$$35 + 27$$

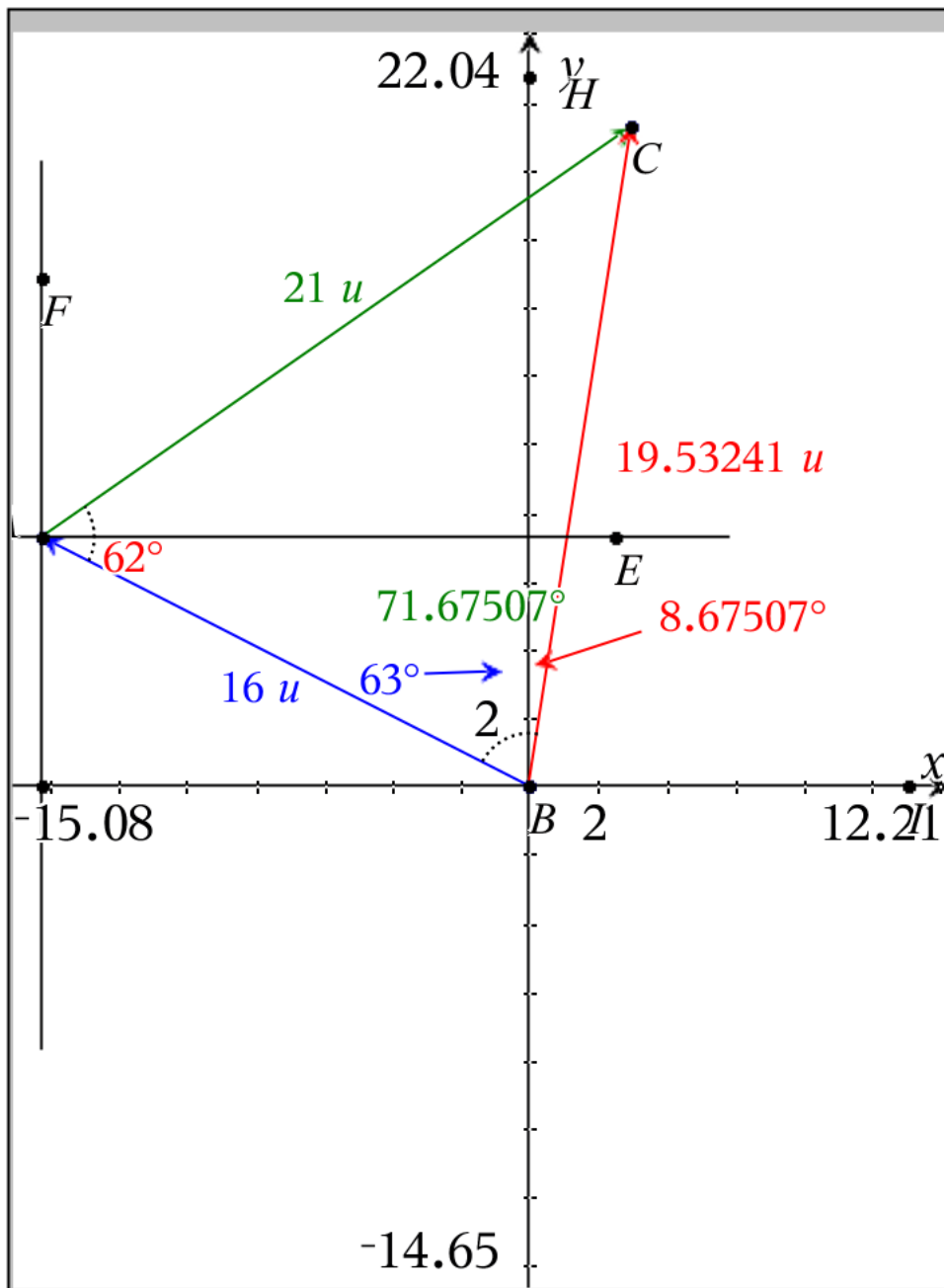


now that we know the angle opposite of the BC we can find its distance using law of cosines

$$BC = \sqrt{[16^2 + 21^2 - 2(16)(21)\cos(62)]}$$

$$BC = \sqrt{[697 - 672)\cos(62)]}$$

$$BC = 19.5324$$



Now have enough information to find $m\angle ABC$ which leads us to direction from Bob's House to Cindy's House

$$\cos ABC = \frac{(16^2 + 19.5324^2 - 21^2)}{[2(16)(19.5324)]}$$

$$= 0.314405$$

$$m\angle ABC = 71.6751$$

This can be used to find

$$m\angle HBC = 71.6751 - 63 = 8.67507^\circ$$

This is BEARING which leads to many other forms of direction or heading

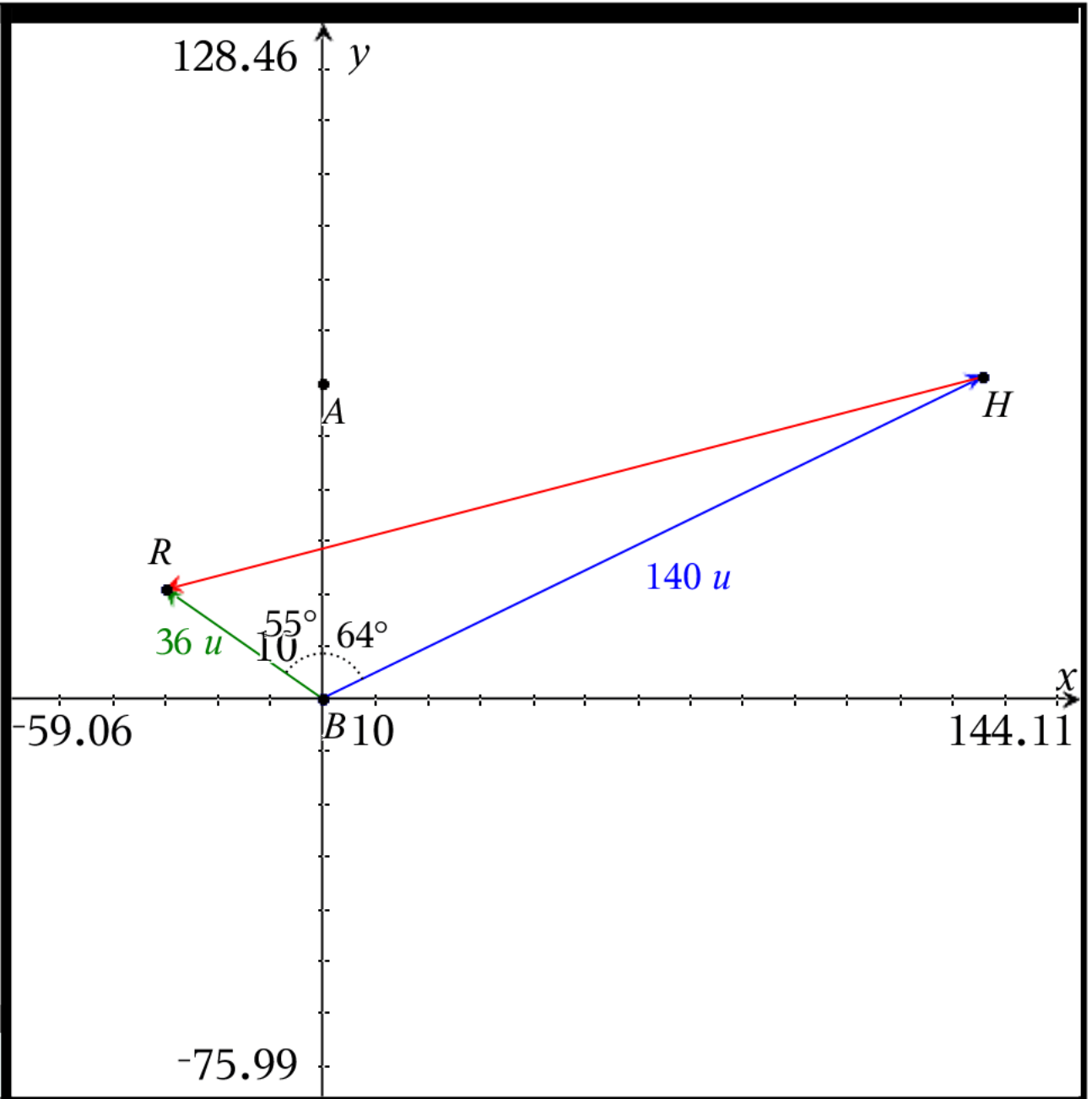
81.3249° North of East

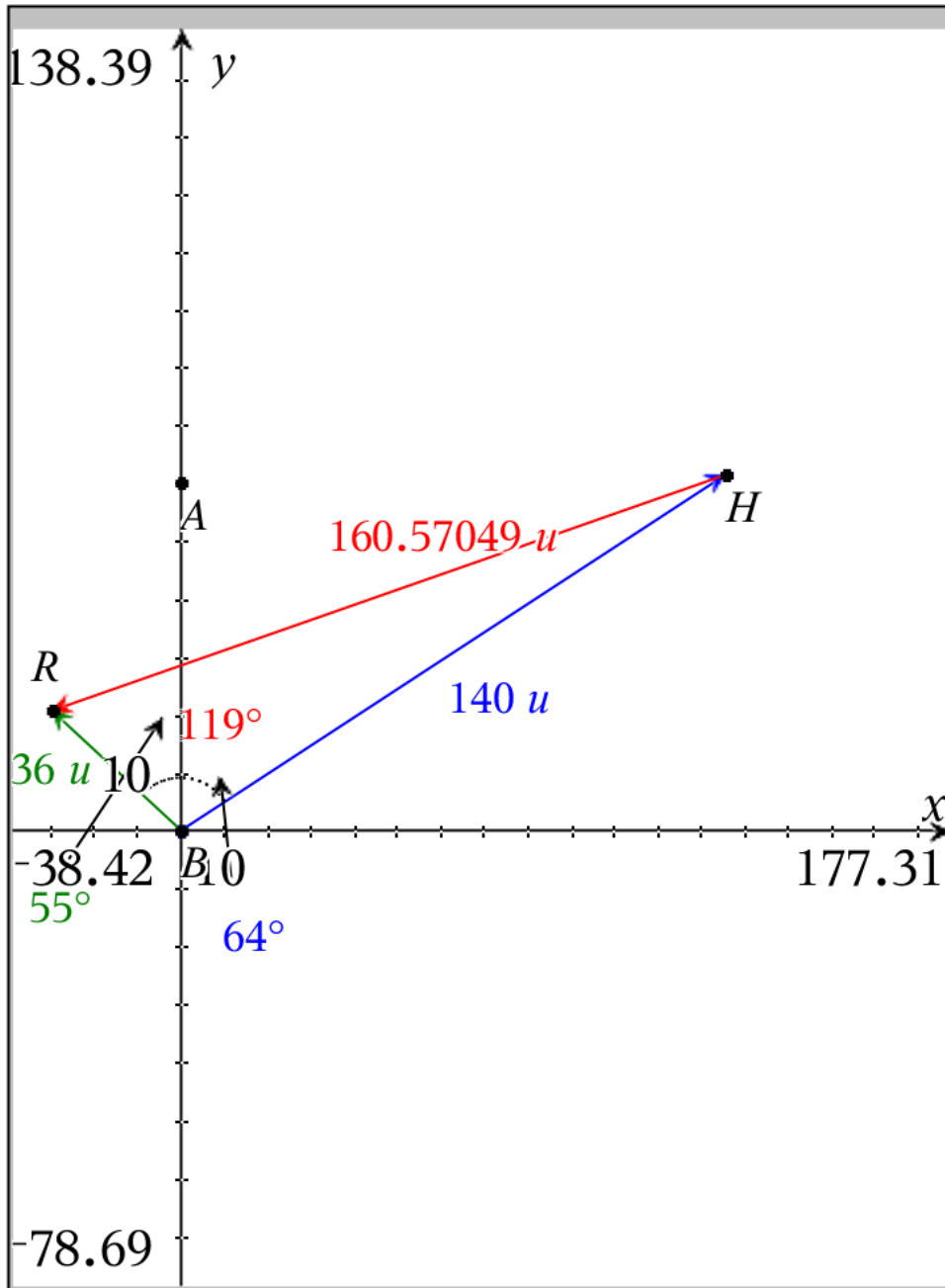
$$\arcsin\left(\frac{21 \cdot \sin(62.)}{19.532}\right) \rightarrow 71.6787$$

Problem 6

	A	B	C
1	bearing		64
2	rate_1		35
3	angle_1		55
4	rate_2		9
5	time		4
6			
7			
8			
9			
10			
11			

A1 bearing





Why is BH 140 ?

$$BH = 35(4) = 140$$

Why is BR 36 ?

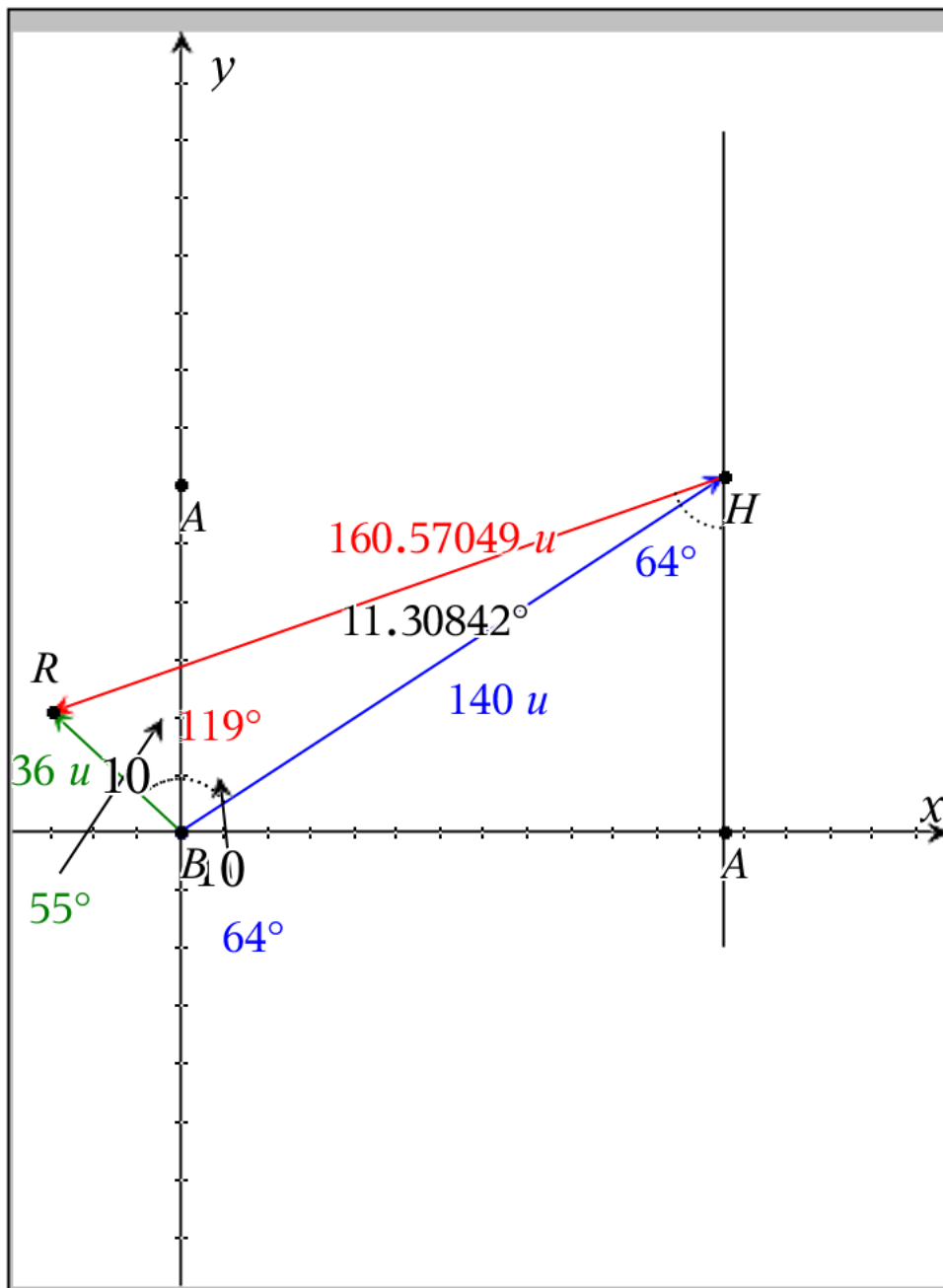
$$BR = 9(4) = 36$$

Since we were given the angles that actually form angle RBH it is a relatively easy task to find RH

$$RH = \sqrt{[140^2 + 36^2 - 2(140)(36)\cos(119)]}$$

$$RH = \sqrt{[20896 - 10080)\cos(119)]}$$

$$RH = 160.57$$



To describe the direction of of vector HR we need $m\angle RHB$, since we now know all three sides, I would use law of cosines

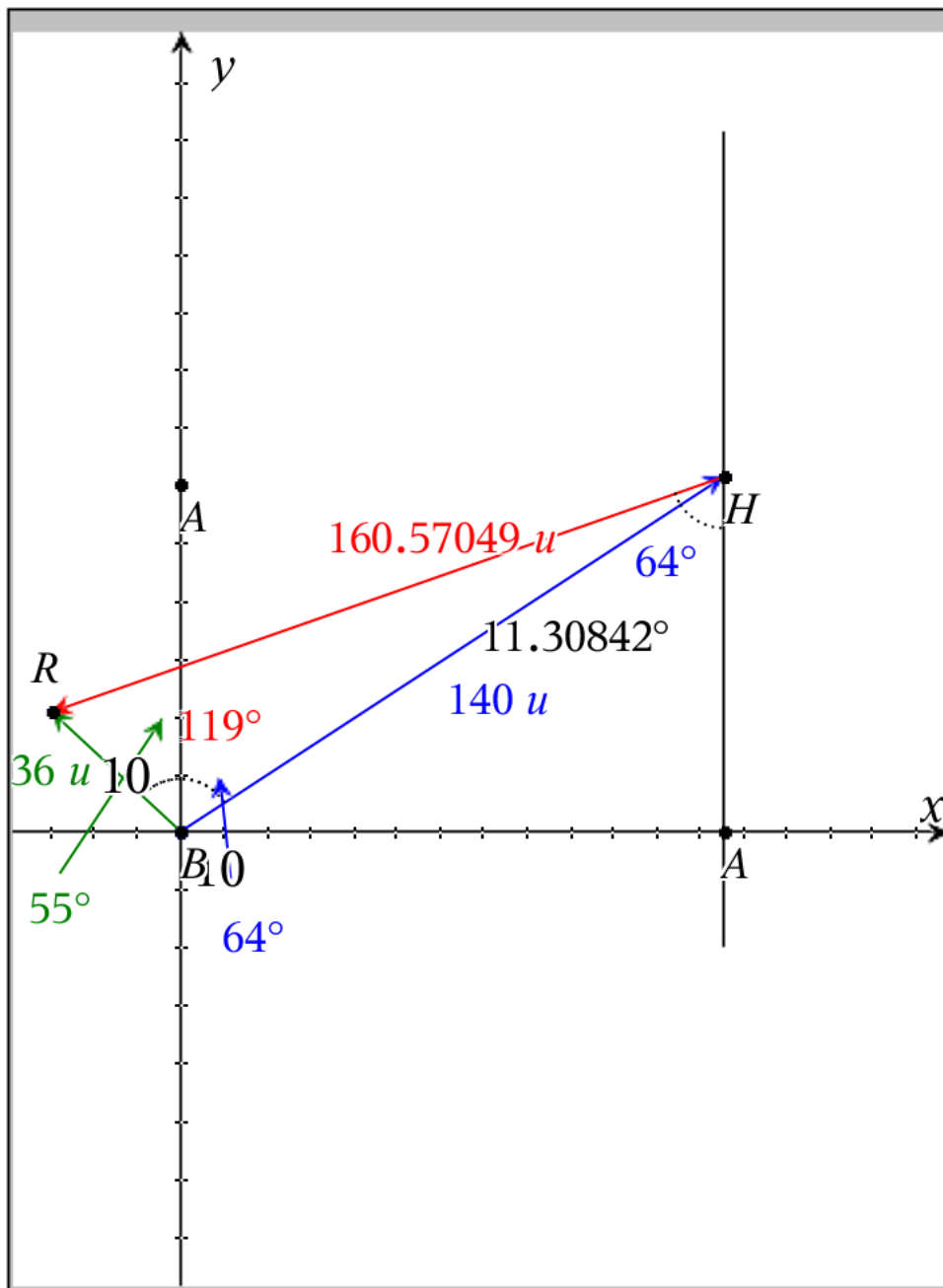
to find $m\angle RHB$

$\cos RHB =$

$$(140^2 + 160.57^2 - 36^2) / [2(140)(160.57)]$$

$$= 0.980586$$

$$m\angle RHB = 11.3084$$



$$m\angle RHA = m\angle AHB + m\angle RHB$$

$$= 64 + 11.3084$$

$$= 75.3084^\circ$$

This is the direction $S 75.3084^\circ W$

Which means the bearing is 255.308°

You can also state the direction is

$N 104.692^\circ W$

You can also state the direction is

14.6916° South of West

You can also state the direction is

165.308° South of East

$$360 - 75.3084 \blacktriangleright 284.692$$



$$CB = \sqrt{(35 \cdot x)^2 + (9 \cdot x)^2 - 2 \cdot 35 \cdot x \cdot 9 \cdot x \cdot \cos(119)}$$

$$(35 \cdot x)^2 + (9 \cdot x)^2 \blacktriangleright 1306 \cdot x^2$$

$$-2 \cdot 35 \cdot x \cdot 9 \cdot x \blacktriangleright -630 \cdot x^2$$

$$CB = \sqrt{1306x^2 - 630x^2 \cdot \cos(119)}$$

$$200^2 = 1306 \cdot x^2 - 630 \cdot x^2 \cdot \cos(119)$$

$$40000 = 1306 \cdot x^2 - 630 \cdot x^2 \cdot \cos(119)$$

$$\frac{40000}{(1306 - 630 \cdot \cos(119))} = \frac{x^2(1306 - 630 \cdot \cos(119))}{(1306 - 630 \cdot \cos(119))}$$

$$x^2 = \frac{40000}{(1306 - 630 \cdot \cos(119))}$$

$$x = \sqrt{\frac{40000}{1306 - 630 \cdot \cos(119)}} \blacktriangleright 4.98224$$

$$CB =$$

$$\sqrt{\left(35 \cdot \sqrt{\frac{40000}{1306 - 630 \cdot \cos(119)}}\right)^2 + \left(9 \cdot \sqrt{\frac{40000}{1306 - 630 \cdot \cos(119)}}\right)^2 - 2 \cdot 35 \cdot \sqrt{\frac{40000}{1306 - 630 \cdot \cos(119)}} \cdot 9 \cdot \sqrt{\frac{40000}{1306 - 630 \cdot \cos(119)}} \cdot \cos(119)}$$

$\blacktriangleright 200.$

$$CB = \sqrt{(35 \cdot 4.982)^2 + (9 \cdot 4.982)^2 - 2 \cdot 35 \cdot 4.982 \cdot 9 \cdot 4.982 \cdot \cos(119)} \blacktriangleright 199.991$$