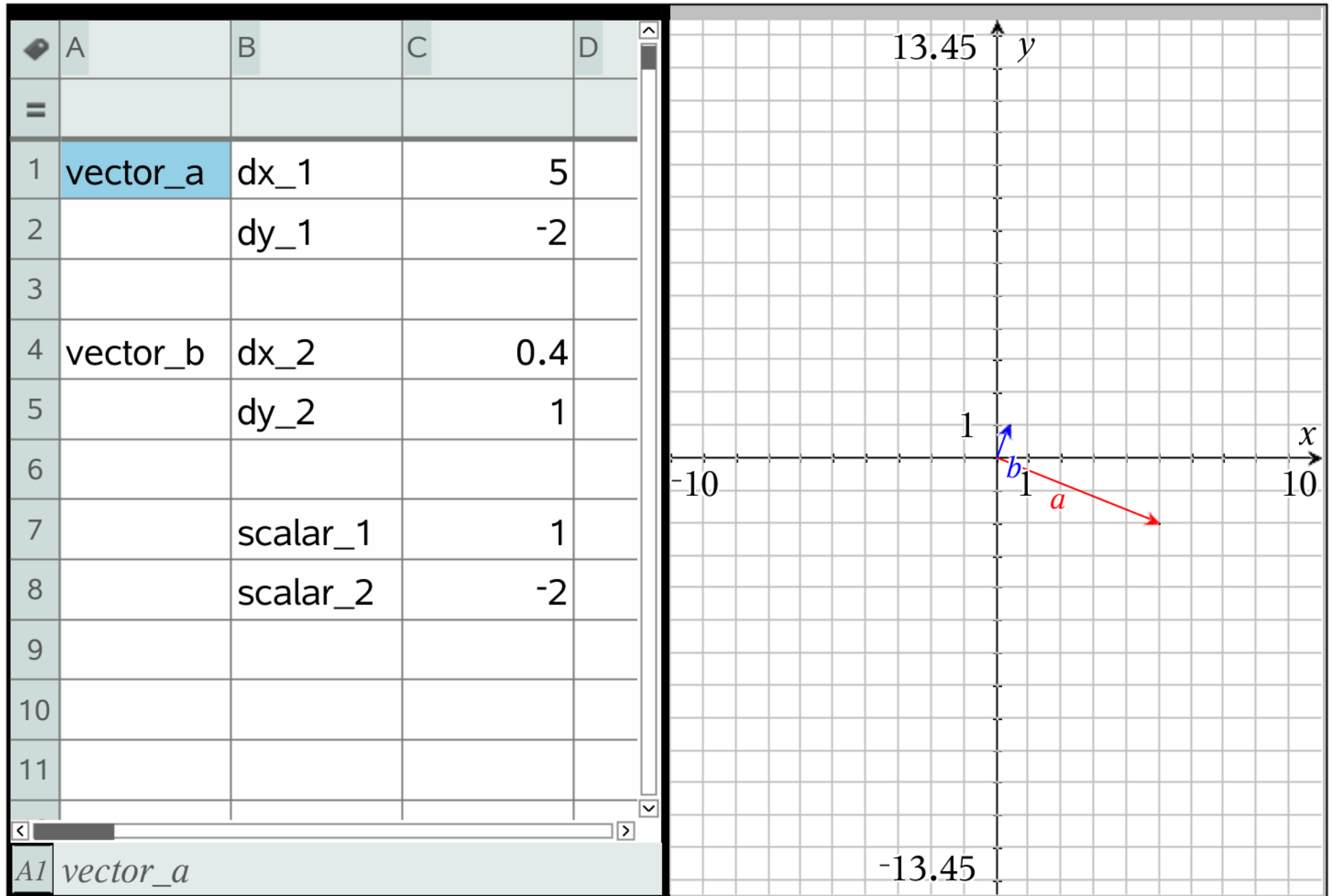
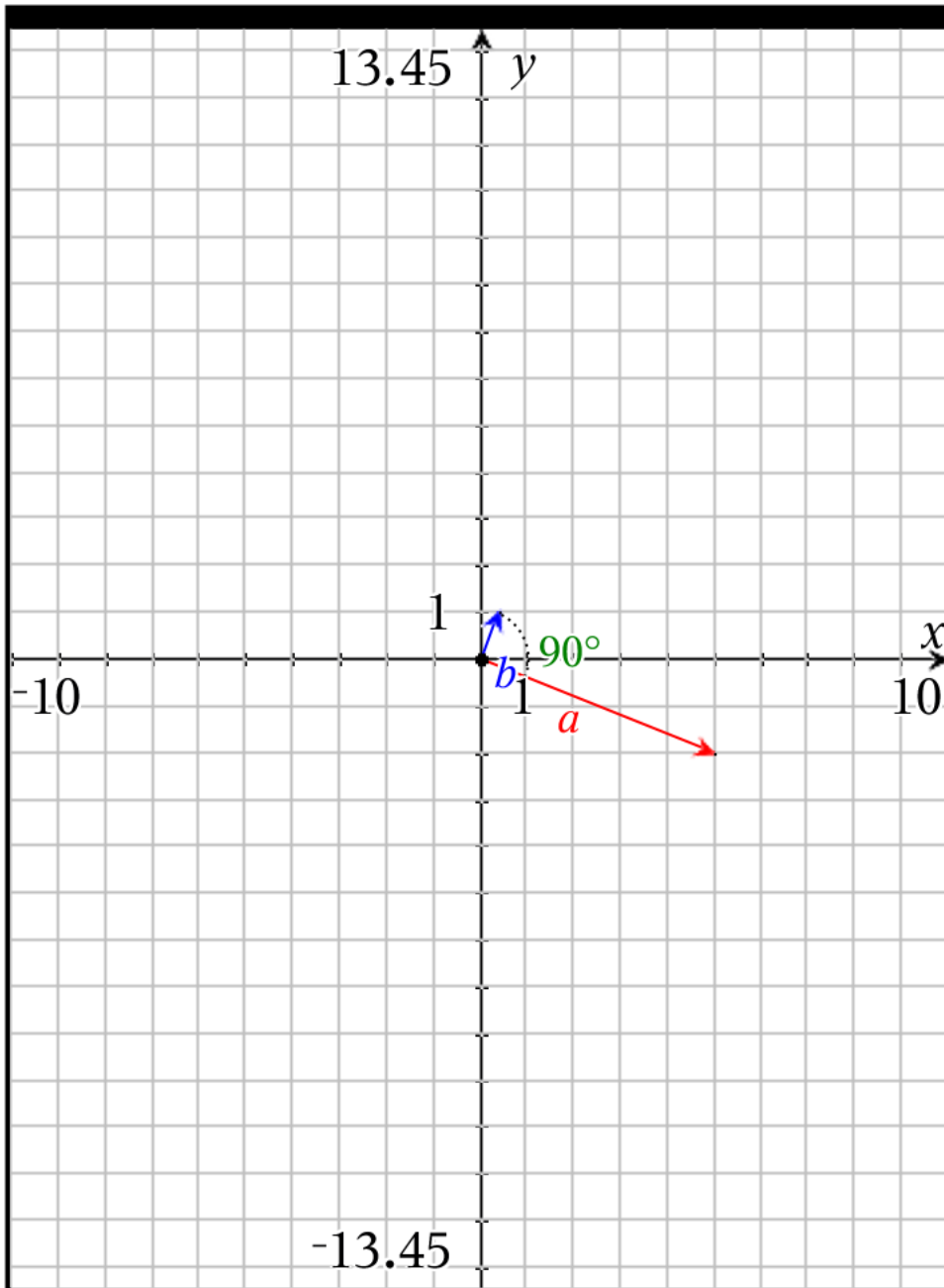


Problem 1





To find angle between vectors

1) Find magnitudes of vectors

$$a = \begin{bmatrix} 5 \\ -2 \end{bmatrix} \quad |a| = \sqrt{(29)} = \sqrt{29}$$

$$b = \begin{bmatrix} 0.4 \\ 1 \end{bmatrix} \quad |b| = \sqrt{(1.16)} = 1.07703$$

2) Find dot product of vectors

$$a \cdot b = (5)(0.4) + (-2)(1) = 0.$$

3) Apply  $\cos(\theta) = \frac{a \cdot b}{|a| \cdot |b|}$

so  $\cos \theta$  has ratios

$$= 0. / (\sqrt{29} \sqrt{1.16}) = 0. / (\sqrt{33.64}) = 0.$$

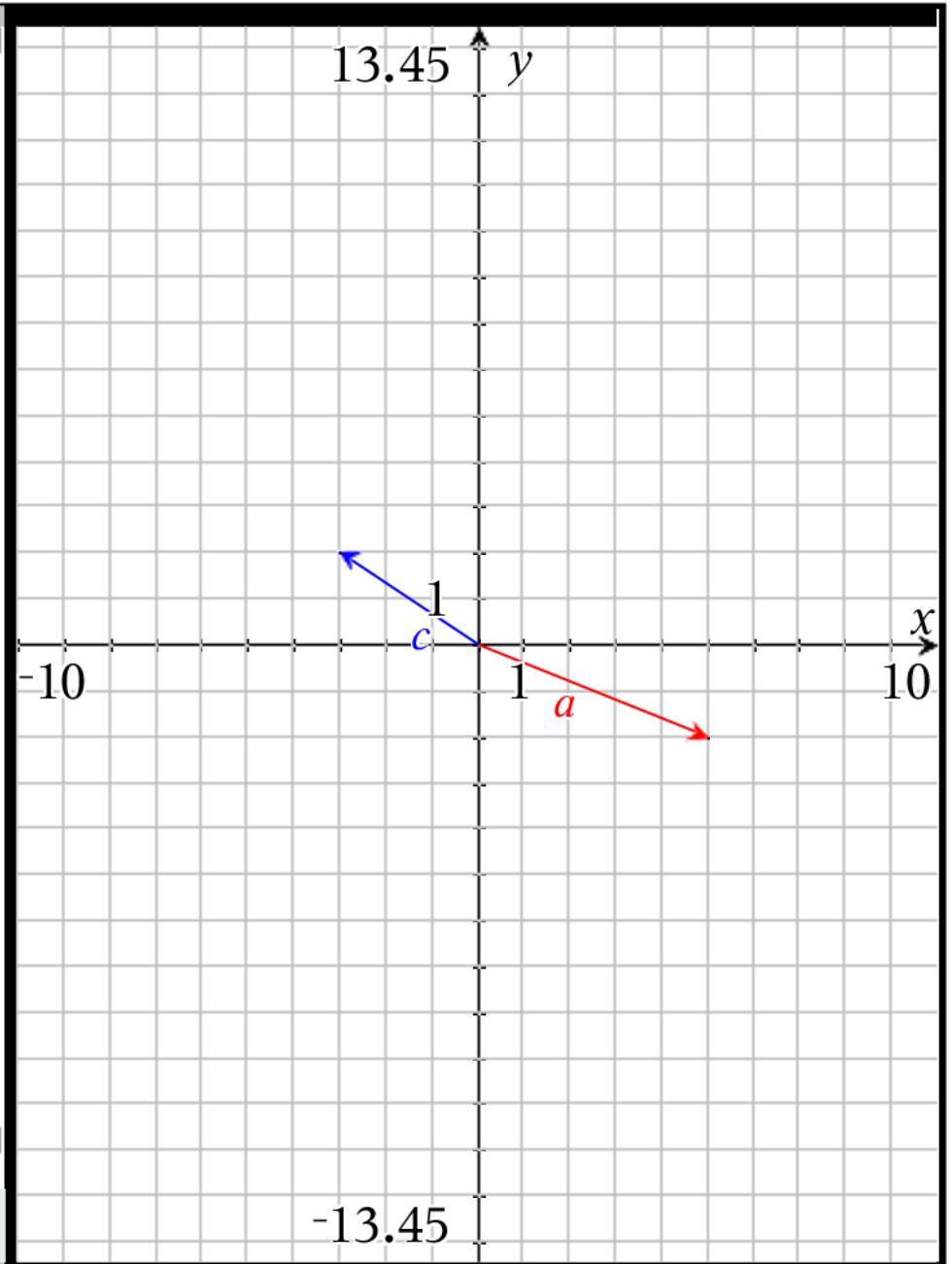
4) Use inverse cos to find  $\theta$

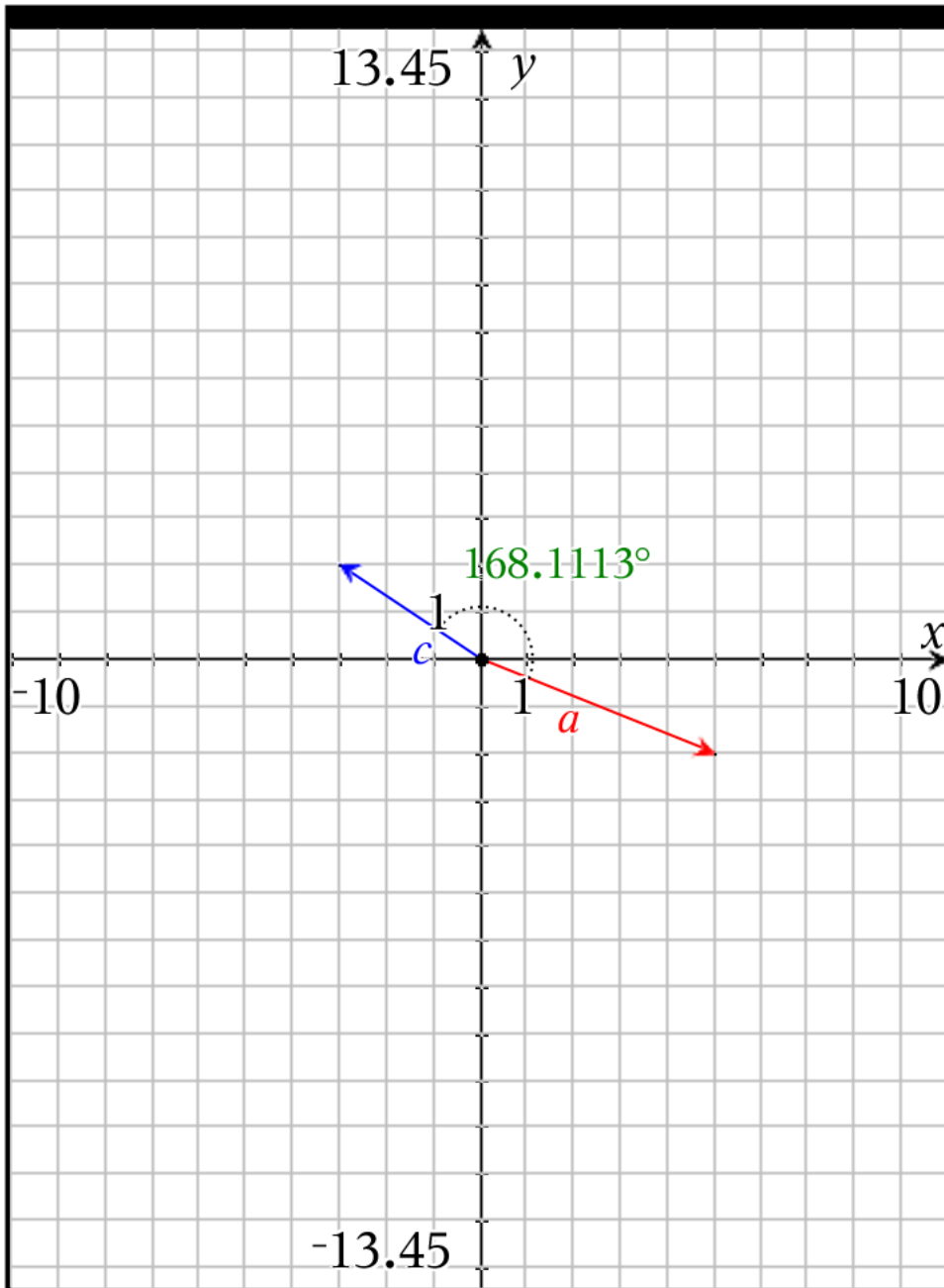
$$\theta = \cos^{-1}(0. / (\sqrt{33.64})) = 90.^\circ$$

Problem 2

	A	B	C	D
	=			
1	vector_a	dx_1		5
2		dy_1		-2
3				
4	vector_c	dx_2		-3
5		dy_2		2
6				
7		scalar_1		1
8		scalar_2		-2
9				
10				
11				

A1 vector\_a





To find angle between vectors

1) Find magnitudes of vectors

$$a = \begin{bmatrix} 5 \\ -2 \end{bmatrix} \quad |a| = \sqrt{(29)} = \sqrt{29}$$

$$c = \begin{bmatrix} -3 \\ 2 \end{bmatrix} \quad |c| = \sqrt{(13)} = \sqrt{13}$$

2) Find dot product of vectors

$$a \cdot c = (5)(-3) + (-2)(2) = -19$$

3) Apply  $\cos(\theta) = \frac{a \cdot b}{|a| \cdot |b|}$

so  $\cos \theta$  has ratios

$$= -19 / (\sqrt{29} \sqrt{13}) = -19 / (\sqrt{377}) = \frac{-19 \cdot \sqrt{377}}{377}$$

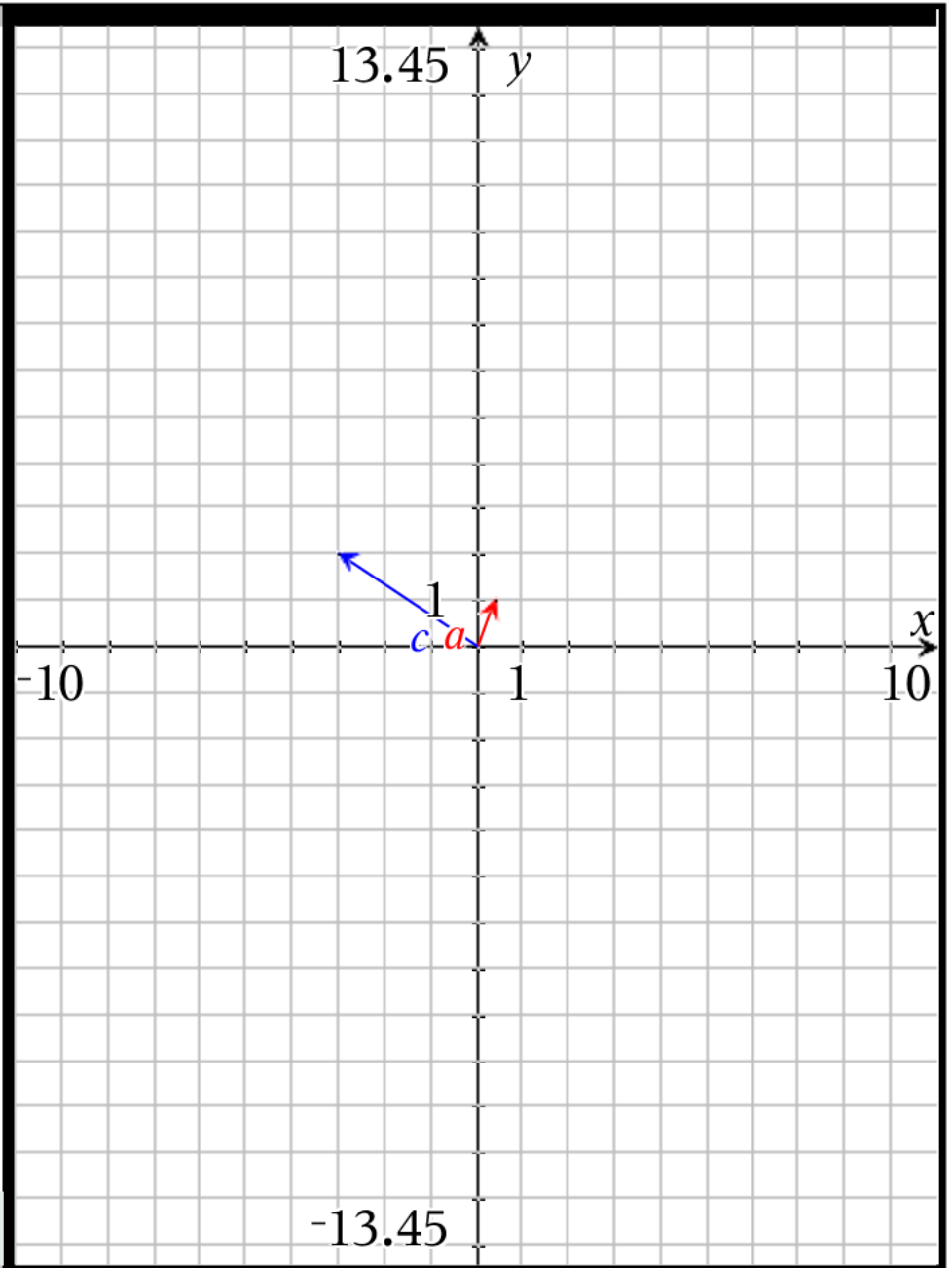
4) Use inverse cos to find  $\theta$

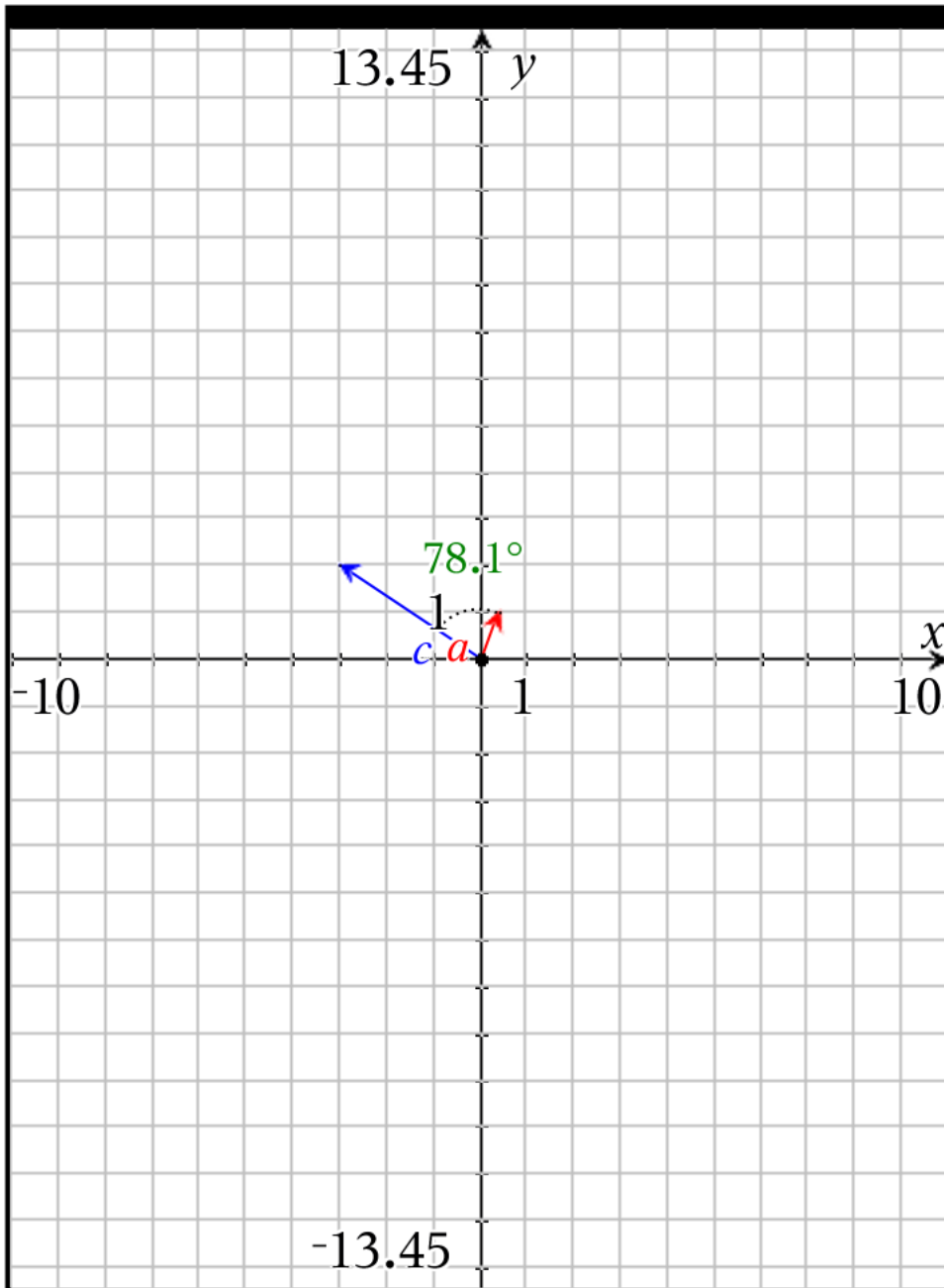
$$\theta = \cos^{-1}(-19 / (\sqrt{377})) = 168.111^\circ$$

Problem 3

	A	B	C	D
	=			
1	vector_b	dx_1	0.4	
2		dy_1	1	
3				
4	vector_c	dx_2	-3	
5		dy_2	2	
6				
7		scalar_1	1	
8		scalar_2	-2	
9				
10				
11				

A1 vector\_b





To find angle between vectors

1) Find magnitudes of vectors

$$b = \begin{bmatrix} 0.4 \\ 1 \end{bmatrix} \quad |b| = \sqrt{(1.16)} = 1.07703$$

$$c = \begin{bmatrix} -3 \\ 2 \end{bmatrix} \quad |c| = \sqrt{(13)} = \sqrt{13}$$

2) Find dot product of vectors

$$a \cdot b = (0.4)(-3) + (1)(2) = 0.8$$

3) Apply  $\cos(\theta) = \frac{a \cdot b}{|a| \cdot |b|}$

so  $\cos \theta$  has ratios

$$= 0.8 / (\sqrt{1.16} \sqrt{13}) = 0.8 / (\sqrt{15.08}) = 0.20601$$

4) Use inverse cos to find  $\theta$

$$\theta = \cos^{-1}(0.8 / (\sqrt{15.08})) = 78.1113^\circ$$