

Topic: Oriented arc for a real number

Question: Which of the following most closely approximates the number of turns in a rotation about the center of the unit circle as the oriented arc (of the unit circle) is traced out?

$$t = -85.12$$

Answer choices:

- A 13 full turns and 94 % of an additional turn
- B 14 full turns and 36 % of an additional turn
- C 13 full turns and 55 % of an additional turn
- D 12 full turns and 67 % of an additional turn



Solution: C

A rotation of one full turn about the center of the unit circle corresponds to an arc length of absolute value 2π , so the number of turns in a rotation about the center of the unit circle as an oriented arc (of the unit circle) of length -85.12 is traced out is

$$\frac{|-85.12|}{2\pi} = \frac{85.12}{2\pi} \approx 13.55$$

That is, a rotation of 13 full turns, and about 55 % of an additional turn, would be made about the center of the unit circle as an oriented arc of length -85.12 is traced out.



Topic: Oriented arc for a real number

Question: Which of the following most closely approximates the measure (in degrees) of the angle in standard position that corresponds to the oriented arc of the unit circle?

$$t = 71.4$$

Answer choices:

- A $4,091^\circ$
- B $3,826^\circ$
- C $2,046^\circ$
- D $4,331^\circ$



Solution: A

Let θ be the angle in standard position that corresponds to an oriented arc of the unit circle which is of length 71.4. Recall that the length of an oriented arc of the unit circle is numerically equal to the measure of θ (in radians), so $\theta = 71.4$ (radians). What remains to be done is to convert the measure of this angle in radians to its measure in degrees. To do this, we multiply 71.4 by the conversion factor $(180^\circ)/\pi$:

$$\theta = 71.4$$

$$\theta = 71.4(1)$$

$$\theta = 71.4 \left(\frac{180^\circ}{\pi} \right)$$

$$\theta = \left[\frac{71.4(180)}{\pi} \right]^\circ$$

$$\theta = \left(\frac{12,852}{\pi} \right)^\circ$$

$$\theta \approx 4,091^\circ$$

