LESSON MAKER PRO

Arc Length Angles

Use unit-circle arcs to measure angles in radians.

HIGH SCHOOL · HSF-TF.A.1

CCSS.Math.Content.HSF-TF.A.1 "Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle."

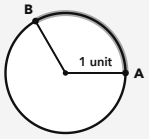
NAME _____ DATE _____

THE BIG IDEA

On a unit circle, an angle's radian measure equals the length of its intercepted arc. A full circle has arc length 2π, so a fraction of a full turn has the same fraction of 2π radians.

WORKED EXAMPLE

Look at the highlighted counterclockwise arc. Find the angle measure in radians.



1. The arc is 120/360 of the full circle.
2. s = (120/360)(2π) = 2π/3.
3. On a unit circle, θ = s.

Answer: 2π/3 radians

PRACTICE 4 problems

1 A unit-circle arc is 5π/6 units long. What is the angle measure in radians?

ANSWER _____

2 An angle measures 7π/4 radians on a unit circle. What is the intercepted arc length?

ANSWER _____

3 A counterclockwise turn covers 1/5 of a unit circle. What is its angle measure in radians?

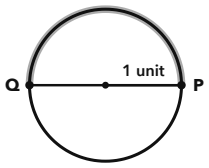
ANSWER _____

4 A unit-circle arc subtends an angle of 11π/6 radians. What is the arc length?

ANSWER _____

APPLY IT Show your work

1 A game designer uses the unit-circle turn shown for a character animation. How many radians is the highlighted turn?



ANSWER _____

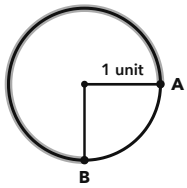
2 A fitness app's unit-circle dial turns counterclockwise 5π/12 radians, then π/3 radians. What total arc length does the dial travel?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Jordan says the highlighted arc measures π/2 because that is the shorter path. Casey says it measures 3π/2. In two sentences, state who is correct and explain why.



WORK SPACE AND ANSWER

ANSWER KEY

Arc Length Angles

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A unit-circle arc is 5π/6 units long. What is the angle measure in radians?	**5π/6 radians**
2	An angle measures 7π/4 radians on a unit circle. What is the intercepted arc length?	**7π/4 units**
3	A counterclockwise turn covers 1/5 of a unit circle. What is its angle measure in radians?	**2π/5 radians**
4	A unit-circle arc subtends an angle of 11π/6 radians. What is the arc length?	**11π/6 units**

PART 2 · APPLY IT

1. **π radians** The highlighted arc is half of a unit circle. Half of 2π is π.
2. **3π/4 units** On a unit circle, arc length equals radian measure. Add 5π/12 + π/3 = 5π/12 + 4π/12 = 3π/4.

CHALLENGE

Casey is correct. The highlighted counterclockwise arc is 3/4 of the unit circle, so its length and radian measure are 3π/2.

Accept equivalent exact forms, such as π/1 for π. For the challenge, accept any two-sentence explanation that identifies the highlighted counterclockwise arc as 3/4 of the circle and gives 3π/2.