

Arc Length

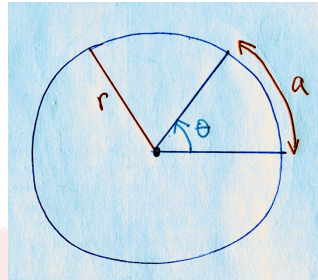
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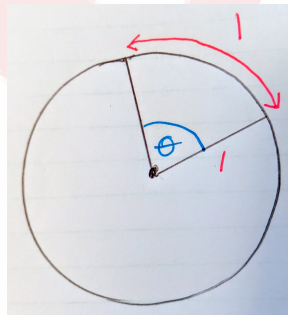
2021

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There are two units used when measuring angles, degrees and radians. Degrees are more commonly known and used. But what is a radian? In order to define a radian let's consider some terms related to a circle.

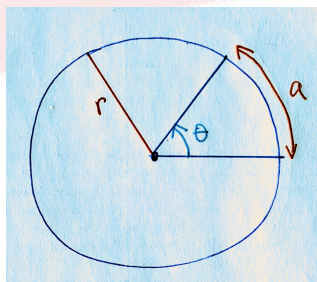


From the circle, the area described by the pie shaped piece created by the two radii intersecting at the centre and the arc a joining them is called a *sector*. The angle θ formed at the centre by the two radii is the *central angle*. The arc a *subtends* or is opposite to the angle θ . One *radian* is the measure of the angle subtended at the centre by an arc that has the same length as the radius of the circle.



The relationship between the angle θ subtended by an arc a on a circle of radius r is given by,

$$\theta = \frac{a}{r}.$$



Exercises

Find the arc length travelled throughout the angle θ along a circle with the radius r given below.

(a) $\theta = \frac{7\pi}{6}$, $r = 3$

(b) $\theta = \frac{3\pi}{4}$, $r = 4$

(c) $\theta = \frac{\pi}{4}$, $r = 2$

(d) $\theta = \frac{\pi}{2}$, $r = 5$

(e) $\theta = \frac{\pi}{5}$, $r = 6$

(f) $\theta = \frac{4\pi}{3}$, $r = 2$

(g) $\theta = 2\pi$, $r = 5$

(h) $\theta = \frac{6\pi}{11}$, $r = 3$

(i) $\theta = \pi$, $r = 8$

(j) $\theta = \frac{5\pi}{7}$, $r = 9$