**Activity 5.3.2 Radians and Arc Length**

The length of an arc can be calculated using radians.

1. Open the file ctcoregeomACT532.ggb. Notice that $α$ = m$∠BAC$ = 1 radian. The radius of the circle, *r* = 3.

 a. In the input window type “arcBC/r” The result of this calculation will appear in the algebra window as “*d*”. Record this number in the chart in the row for $α$ = 1 rad.

|  |  |  |  |
| --- | --- | --- | --- |
| Angle measure ($α)$ in radians | Length of the intercepted arc *BC*. | Radius circle (*r*) | Ratio of arc length/radius |
| 1 rad | 3 | 3 | 1 |
| 2 rad |  |  |  |
| 3 rad |  |  |  |
| 4 rad |  |  |  |
| 5 rad |  |  |  |
| 6 rad |  |  |  |
| 7 rad |  |  |  |

b. Move point *C* so that angle m$∠BAC$ = 2 radians. Fill in the next row in the chart.

c. Continue moving point *C* to produce angles of 3, 4, 5 radians, etc. Fill in the chart.

d. What happened when you tried to find 7 rad?

2. Now adjust the size of the circle by typing *r* = 5 in the input window. Again move *C* to find the effect of different angle measures on the length of the arc and the ratio of arc length/radius. Record the results in the chart below.

|  |  |  |  |
| --- | --- | --- | --- |
| Angle measure ($α)$ in radians | Length of the intercepted arc *BC*. | Radius circle (*r*) | Ratio of arc length/radius |
| 1 rad |  |  |  |
| 2 rad |  |  |  |
| 3 rad |  |  |  |
| 4 rad |  |  |  |
| 5 rad |  |  |  |
| 6 rad |  |  |  |

1. Figure out a way to find the length of an arc of a circle when you know the length of the radius and the radian measure of the central angle.

1. In a circle with a radius of 10 cm, a central angle of 1.57 rad is drawn.

a. What is the length of its intercepted arc?

 b. What is the measure of the central angle in degrees?

1. How could we find a radian measure of the central angle when we know the length of its intercepted arc and the radius of the circle?
2. In a circle with a radius of 8 feet an arc measures 20 feet.

a. What is the measure of the central angle in radians?

b. What is the measure of the central angle in degrees?

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1. We have used radian measure to measure our angles, if we had used degree measure for our angles how could we find the length of our arcs?