

1. If a track has the shape of a circle with radius of 5 miles. How many miles is the entire track?

Solution: There would be exactly 2π radii on the track, each radii is 5 miles so .. total is $C = 2\pi \cdot 5$ miles, which is ≈ 31.416 miles

2. If a track has the shape of a circle with radius of 5 miles. How many miles is half of the track?

Solution: There would exactly 2π radii on the entire track, each radii is 5 miles so .. total is $C = 2\pi \cdot 5$ miles, which is ≈ 31.416 miles, BUT if only half of the track is being measured then there total number of miles would be given by

$$\begin{aligned} \frac{1}{2}C &= \frac{1}{2}(2\pi \cdot 5) \\ &\text{(sub, } C \text{ calculated previously)} \\ &\approx \frac{1}{2}(31.416) \quad \text{(sub)} \\ &\approx 15.708 \quad \text{(calculator)} \end{aligned}$$

3. If a track has the shape of a circle with radius of 5 miles. How many miles is one third of the track?

Solution: There would exactly 2π radii on the entire track, each radii is 5 miles so .. total is $C = 2\pi \cdot 5$ miles, which is ≈ 31.416 miles, BUT if only a third of the track is being measured then there total number of miles would be given by

$$\begin{aligned} \frac{1}{3}C &= \frac{1}{3}(2\pi \cdot 5) \\ &\text{(sub, } C \text{ calculated previously)} \\ &\approx \frac{1}{3}(31.416) \quad \text{(sub)} \\ &\approx 10.472 \quad \text{(calculator)} \end{aligned}$$

4. If a track has the shape of a circle with radius of 5 miles. How many miles is a portion of 65° of the track?

Solution: There would exactly 2π radii on the entire track, each radii is 5 miles so .. total is $C = 2\pi \cdot 5$ miles, which is ≈ 31.416 miles, BUT if only a 65° (out of a total of 360 degrees) of the track is being measured then there total number of miles would be given by

$$\begin{aligned} \frac{65}{360}C &= \frac{65}{360}(2\pi \cdot 5) \\ &\text{(sub, } C \text{ calculated previously)} \\ &\approx \frac{65}{360}(31.416) \quad \text{(sub)} \\ &\approx 5.672 \quad \text{(calculator)} \end{aligned}$$

5. If a track has the shape of a circle with radius of 5 miles. How many miles is a portion of 253° of the track?

Solution: There would exactly 2π radii on the entire track, each radii is 5 miles so .. total is $C = 2\pi \cdot 5$ miles, which is ≈ 31.416 miles, BUT if only a 253° (out of a total of 360 degrees) of the track is being measured then there total number of miles would be given by

$$\begin{aligned} \frac{253}{360}C &= \frac{253}{360}(2\pi \cdot 5) \\ &\text{(sub, } C \text{ calculated previously)} \\ &\approx \frac{253}{360}(31.416) \quad \text{(sub)} \\ &\approx 22.078 \quad \text{(calculator)} \end{aligned}$$

6. (super famous!!) If a track has the shape of a circle with radius of 5 miles. How many miles is a portion of x° of the track?

Solution: There would exactly 2π radii on the entire track, each radii is 5 miles so .. total is $C = 2\pi \cdot 5$ miles, which is ≈ 31.416 miles, BUT if only a x° (out of a total of 360 degrees) of the track is being measured then there total number of miles would be given by

$$\begin{aligned} \frac{x}{360}C &= \frac{x}{360}(2\pi \cdot 5) \\ &\text{(sub, } C \text{ calculated previously)} \\ &\approx \frac{x}{360}(31.416) \quad \text{(sub)} \end{aligned}$$

7. If a track has the shape of a circle with radius of 5 miles. How many miles is a portion of 1 radian of the track?

Solution:

one radian would amount to same distance as one radius, thus it would be exactly 5 miles

8. If a large pizza has a radius of 10 inches. How many 1-inch square can one make from a 39 deg portion of one pizza?

9. If a track has the shape of a circle with radius of 5 miles. How many miles is a portion of 1.5 radians of the track?

Solution:

1.5 radians would amount to same distance as 1.5 radii, thus it would be exactly 7.5 miles

10. If a track has the shape of a circle with radius of 5 miles. How many miles is a portion of 10 radians of the track?



Solution:

10 radians would amount to same distance as 10 radii, thus it would be exactly 50 miles

11. (super famous!!) If a track has the shape of a circle with radius of 5 miles. How many miles is a portion of θ radians of the track?

Solution: θ radians would amount to same distance as θ radii, thus it would be exactly θ miles. This yields the super famous formula for arc-length, s , for any circle, with radius, r . The arc-length of an arc measuring θ radians is given by,

$$s = \theta r$$

12. If a large pizza has a radius of 10 inches. How many 1-inch square can one make from one pizza?

Solution: $A = \pi r^2$ thus.. $A = 16\pi 10^2$ square inches, or approximately, 314.159square inches.

13. If a large pizza has a radius of 10 inches. How many 1-inch square can one make from half of one pizza?

Solution:

$A = \pi r^2$ so...

$$\begin{aligned} \frac{1}{2}A &= \frac{1}{2} \cdot (\pi r^2) \\ &= \frac{1}{2} \cdot (\pi(10)^2) \\ &\approx \frac{1}{2} \cdot (314.159) \\ &\approx 157.08 \text{square inches} \end{aligned}$$

14. If a large pizza has a radius of 10 inches. How many 1-inch square can one make from $\frac{4}{5}$ of one pizza?

Solution:

$A = \pi r^2$ so...

$$\begin{aligned} \frac{4}{5}A &= \frac{4}{5} \cdot (\pi r^2) \\ &= \frac{4}{5} \cdot (\pi(10)^2) \\ &\approx \frac{4}{5} \cdot (314.159) \\ &\approx 251.327 \text{square inches} \end{aligned}$$

(this is the formula for the area of a sector of x degrees)

15. If a track has the shape of a circle with radius of 5 miles. How many miles is a portion of 2 radians of the track?

Solution:

18. two radians would amount to same distance as two radii, thus it would be exactly 10 miles

Solution: This is one of the most important problems on this hw assignment. What it's really asking is for some sort of formula for the area of a sector of a circle. The reasoning is the same as above...

note: half the circle measures 180° , thus the entire circle has 360° radians... if the sector measures x degrees, then the portion of the circle corresponding to the sector is $\frac{x}{360}$

$$\begin{aligned} A &= \pi r^2 && \text{(proven!)} \\ \frac{x}{360}A &= \frac{x}{360}\pi r^2 && \text{(CLM)} \\ \frac{x}{360}A &= \frac{x}{360}\pi r^2 \end{aligned}$$

18. If a large pizza has a radius of 10 inches. How many 1-inch square can one make from a 2 radian portion of one pizza?

Solution:

$A = \pi r^2$ so...

$$\begin{aligned} \frac{2}{2\pi}A &= \frac{2}{2\pi} \cdot (\pi r^2) \\ &= \frac{2}{2\pi} \cdot (\pi(10)^2) \\ &\approx \frac{2}{2\pi} \cdot (314.159) \\ &\approx 100 \text{square inches} \end{aligned}$$

16. If a large pizza has a radius of 10 inches. How many 1-inch square can one make from a 100 deg portion of one pizza?

Solution:

$A = \pi r^2$ so...

$$\begin{aligned} \frac{100}{360}A &= \frac{100}{360} \cdot (\pi r^2) \\ &= \frac{100}{360} \cdot (\pi(10)^2) \\ &\approx \frac{100}{360} \cdot (314.159) \\ &\approx 87.266 \text{square inches} \end{aligned}$$

19. If a large pizza has a radius of 10 inches. How many 1-inch square can one make from a 3 radian portion of one pizza?

17. (super famous!!) If a large pizza has a radius of r inches. How many 1-inch square can one make from a x deg portion of one pizza?
20. (super famous) If a large pizza has a radius of r inches. How many 1-inch square can one make from a θ radian portion of one pizza?

Solution: This is one of the most important problems on this hw assignment. What it's really asking is for some sort of formula for the area of a sector of a circle, when the angle is given in *radians*. The reasoning is the same as above... the result is timeless....

note: half the circle measures π radians, thus the entire circle has 2π radians... if the sector measures θ radians, then the portion of the circle corresponding to the sector is $\frac{\theta}{2\pi}$

$$A = \pi r^2 \quad (\text{proven!})$$

$$\frac{\theta}{2\pi} A = \frac{\theta}{2\pi} \pi r^2 \quad (\text{CLM})$$

$$\frac{\theta}{2\pi} A = \frac{\theta \pi r^2}{2\pi} \quad (\text{BI})$$

$$\frac{\theta}{2\pi} A = \frac{\theta}{2} \cdot r^2 \quad (\text{BI})$$

$$\frac{\theta}{2\pi} A = \frac{\theta}{2} \cdot r^2$$

(this is a super famous result)