Answer on Question #55264, Physics / Mechanics | Kinematics | Dynamics

A string of wood is wound around a wheel of radius 20cm. How large is the angle through which the wheel must turn to unwind 30cm of the string?

Solution:

In given problem, we have the following data: the radius of the wheel = 20 cm, the length of the string = 30 cm.

In order to determine the angle, through which the wheel must turn to unwind 30 cm of the string, we apply the following formula:

$$\theta = \frac{L}{R}$$

Where L is the length of the string, R is the radius of the wheel. Thus, we can substitute the given values into the formula noted above:

$$\theta = \frac{L}{R} = \frac{30\ cm}{20\ cm} = 1.5\ rad$$

We also can convert the radians to degrees:

$$1.5\ \text{rad} = \frac{1.5\ \text{rad}\ \cdot 180°}{\pi} = \frac{1.5\ \text{rad}\ \cdot 180°}{3.14} = 85.99°$$

Finally, we can conclude that the angle through which the wheel must turn to unwind 30 cm of the string must be equal to 1.5 rad or $85.99°$.