Answer on Question #45693, Physics, Mechanics | Kinematics | Dynamics

A car accelerates from rest and reaches a speed of 25m/s in 7.6s. If the diameter of a tire is 0.680 m , find the revolutions the tire makes during the motion?

Solution:

The kinematic equation that describes an object's motion is:

$$d = \frac{v_f^2 - v_i^2}{2a}$$

The symbol *d* stands for the displacement of the object. The symbol *a* stands for the acceleration of the object. And the symbol v stands for the velocity of the object; a subscript of i after the v indicates that the velocity value is the initial velocity value and a subscript of f indicates that the velocity value is the final velocity value.

The acceleration is

$$a = \frac{v_f - v_i}{t}$$

In our case:

$v_i = 0$ m/s,

$v_f = 25$ m/s,

$t = 7.6$ s,

Thus,

$$d = \frac{v_f t}{2} = \frac{25 \cdot 7.6}{2} = 95 \text{ m}$$

The circumference of a tire is

$$C = \pi D = 3.1415 \cdot 0.680 = 2.1363 \text{ m}$$

The number of revolutions the tire makes during the motion is

$$N = \frac{d}{C} = \frac{95}{2.1363} = 44.47$$

Answer: $N = 44.5$