Answer on Question #74250, Math / Calculus

The cost of fuel is running an engine is proportional to the square of the speed in km/h and is Rs.48 per hour when the speed is 16 km/h. Other costs amount to Rs. 300 per hour. Find the most economical speed.

Solution

We have that the cost of fuel is running an engine is proportional to the square of the speed in km/h: $Cost \sim v^2$

Suppose

$$Cost = Kv^2, K = const$$

Then

$$\begin{cases} 48 = K(16)^2 \\ 300 = K(v_{ec})^2 \end{cases} => \frac{300}{48} = \frac{(v_{ec})^2}{(16)^2} => v_{ec} = \sqrt{(16)^2 \left(\frac{300}{48}\right)}$$

$v_{ec} = 40 \ km/h$

If we need to find K

$$48 = K(16)^2 => K = \frac{48}{256} = \frac{3}{16}$$