

QUESTION:

A car is moving with a constant velocity of 30m per second. If the car has to overcome a frictional force of 700N, what is the power of its engine?

SOLUTION:

The power of the engine is rate at which work is done:

$$P = \frac{W}{t}$$

The work done by the engine is

$$W = F \cdot s$$

And

$F_{engine} = F_{friction}$, because car moves with a constant velocity (the acceleration is equal to zero),

and according to the Newton's second law $F_{engine} - F_{friction} = 0$

s is the distance, traveled by car.

So

$$P = \frac{W}{t} = \frac{F_{engine} \cdot s}{t} = F_{engine} \cdot \frac{s}{t} = F_{engine} \cdot v$$

Here $\frac{s}{t} = v$ - is the velocity of the car.

$$P = 700 \cdot 30 = 21 \text{ kW}$$

ANSWER:

21 kW