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(a)

From the definition of work done, show that power = force \times velocity.

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.....

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..... [2]

(b)

A car of mass 850 kg travelling at a constant speed of 12.0 m s^{-1} has a power output of 1800 W.

Determine,

(i)

the driving force,

driving force = N [1]

(ii)

the total resistive force on the car.

resistive force = N [1]

(c)

The car in **(b)** accelerates from 12.0 m s^{-1} with an initial acceleration of 2.50 m s^{-2} .

Calculate the new driving force.

driving force = N [1]

(d)

After accelerating, the car in **(c)** reaches a constant speed of 36.0 m s^{-1} and the new power output is $48\,600 \text{ W}$.

When travelling at constant speed, the mathematical relationship between power output P and speed v is

$$P \propto v^n.$$

Show that $n = 3$.

[2]

[Total: 7]

