

Answer on Question #53487, Physics / Other

Task: An 800 kg police boat slows down uniformly from 50 km/h [E] to 20 km/h [E] as it enters a harbor. If the boat slows down over a 30 m distance, what is the force of friction on the boat? (Hint: You will need to convert the velocities into m/s.)

Answer:

The acceleration of the boat is found from the equation:

$v^2 = v_0^2 + 2(a*s)$, where v – the final velocity, v_0 – the initial velocity and s – the distance.

After converting the velocities into m/s:

$$v_0 = 50 \text{ km/h} = 50000/3600 \text{ m/s} = 13.89 \text{ m/s}$$

and

$$v = 20 \text{ km/h} = 20000/3600 \text{ m/s} = 5.56 \text{ m/s},$$

the acceleration equals: $a = (v^2 - v_0^2) / (2s) = (30.86 - 192.93) / 60 \text{ m s}^{-2} = -2.701 \text{ m s}^{-2}$.

The force of friction is defined:

$$F = m*a = 800 \text{ kg} \times (-2.7 \text{ m s}^{-2}) = -2160.96 \text{ N}$$

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