Answer on Question 63178, Physics, Other

Question:

A common unit for speed used in sailing is the knot (nautical miles per hour). A nautical mile is about 1.15 regular miles. Calculate how much further (in feet) a boat moving at 24 knots will travel in 5 minutes compared to a car moving at 24 mi/h during the same time.

Solution:

Let's first convert knots to miles per hour:

$$24 \cdot 1.15 \frac{mi}{h} = 27.6 \frac{mi}{h}.$$

Then, we can convert the speeds of boat and car from miles per hour to miles per minute:

$$v_{boat} = \left(27.6 \frac{mi}{h}\right) \cdot \left(\frac{1\ h}{60\ min}\right) = 0.46 \frac{mi}{min},$$

$$v_{car} = \left(24 \frac{mi}{h}\right) \cdot \left(\frac{1\ h}{60\ min}\right) = 0.4 \frac{mi}{min}.$$

Let's find the distance that boat and car travel in 5 minutes:

$$s_{boat} = 0.46 \frac{mi}{min} \cdot 5\ min = 2.3\ mi,$$

$$s_{car} = 0.4 \frac{mi}{min} \cdot 5\ min = 2\ mi.$$

To answer the question we need to convert miles to feets (1 mile is equal to 5280 feets):

$$s_{boat} = 2.3 \cdot 5280\ ft = 12144\ ft,$$

$$s_{car} = 2 \cdot 5280\ ft = 10560\ ft.$$

Finally, we can calculate how much further (in feet) a boat moving at 24 knots will travel in 5 minutes compared to a car moving at 24 mi/h during the same time:

$$s_{boat} - s_{car} = 1584\ ft.$$

Answer:

A boat moving at 24 knots will travel in 5 minutes 1584 feets further compared to a car moving at 24 mi/h during the same time.