

Answer on Question 68433, Physics, Mechanics, Relativity

Question:

A car is running from A to B of the speed 20 km/hours and return come back of the speed 30 km/hours. During the whole journey what will be the average speed of the car?

Solution:

By the definition, the average speed is the total distance traveled divided by the total time:

$$v_{avg} = \frac{d_{tot}}{t_{tot}}.$$

Let the distance between A and B is d . Then, the total distance traveled by the car during the whole journey is equal to

$$d_{tot} = d_1 + d_2 = d + d = 2d.$$

Let's first find the time that the car needs to travel from A to B at 20 km/h:

$$t_1 = \frac{d_1}{v_1} = \frac{d}{20 \frac{km}{h}}$$

Similarly, we can find the time that the car needs to return come back at 30 km/h:

$$t_2 = \frac{d_2}{v_2} = \frac{d}{30 \frac{km}{h}}$$

Then, we can find the total time for the whole journey:

$$t_{tot} = t_1 + t_2 = \frac{d}{20 \frac{km}{h}} + \frac{d}{30 \frac{km}{h}} = \frac{3d + 2d}{60 \frac{km}{h}} = \frac{5d}{60 \frac{km}{h}} = \frac{d}{12 \frac{km}{h}}$$

Finally, we can find the average speed of the car during the whole journey:

$$v_{avg} = \frac{d_{tot}}{t_{tot}} = \frac{2d}{\frac{d}{12 \frac{km}{h}}} = 2 \cdot 12 \frac{km}{h} = 24 \frac{km}{h}.$$

Answer:

$$v_{avg} = 24 \frac{km}{h}.$$