

Answer on Question 65305, Physics, Other

Question:

Assuming the train travels along a straight track at 80 m/s for 1000 m and then travels at 50 m/s for the next 1000 m . What is the average velocity of the train?

Solution:

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

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

It is obvious that the total distance is equal to

$$d_{tot} = d_1 + d_2 = 1000 \text{ m} + 1000 \text{ m} = 2000 \text{ m}.$$

Let's first find the time that the train needs to travel 1000 m at 80 m/s :

$$t_1 = \frac{d_1}{v_1} = \frac{1000 \text{ m}}{80 \frac{\text{m}}{\text{s}}} = 12.5 \text{ s}.$$

Similarly, we can find the time that the train needs to travel the next 1000 m at 50 m/s :

$$t_2 = \frac{d_2}{v_2} = \frac{1000 \text{ m}}{50 \frac{\text{m}}{\text{s}}} = 20 \text{ s}.$$

Then, we can find the total time for the train's trip:

$$t_{tot} = t_1 + t_2 = 12.5 \text{ s} + 20 \text{ s} = 32.5 \text{ s}.$$

Finally, we can find the average velocity of the train:

$$v_{avg} = \frac{d_{tot}}{t_{tot}} = \frac{2000 \text{ m}}{32.5 \text{ s}} = 61.5 \frac{\text{m}}{\text{s}}.$$

Answer: $v_{avg} = 61.5 \frac{\text{m}}{\text{s}}$.