

**Solution.**

A body starts with a speed of 50 km/h and after travelling for 30 minutes it attained the speed of 100 km/h now calculates average speed of the body.

$$v_0 = 50 \frac{\text{km}}{\text{h}}$$

$$v = 100 \frac{\text{km}}{\text{h}}$$

$$t = 30 \text{ min} = \frac{1}{2} \text{ hour}$$

Obviously, the body is moving with some acceleration. Let's find it:

$$v = v_0 + at$$

$$a = \frac{v - v_0}{t} = \frac{100 \frac{\text{km}}{\text{h}} - 50 \frac{\text{km}}{\text{h}}}{\frac{1}{2} \text{h}} = 50 * 2 = 100 \frac{\text{km}}{\text{h}^2}$$

Secondly, to find average speed we need to find the distance:

$$S = v_0 t + \frac{at^2}{2}$$

$$S = 50 * \frac{1}{2} + \frac{100 * \frac{1}{4}}{2} = 25 + 12.5 = 37.5 \text{ km}$$

The total distance, that body had travelled is 37.5 km.

And now to find the average speed:

$$v_{AV} = \frac{S_{total}}{t} = \frac{37.5 \text{ km}}{\frac{1}{2} \text{h}} = 75 \frac{\text{km}}{\text{h}}$$

**Answer:**  $75 \frac{\text{km}}{\text{h}}$