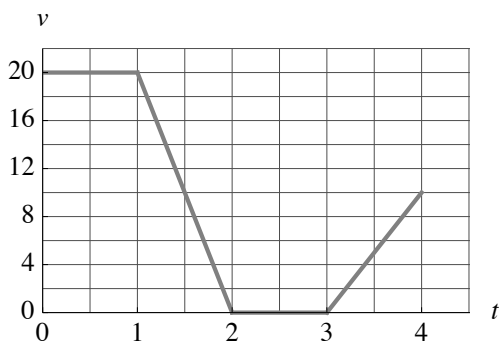


Average Velocity on a Velocity Graph

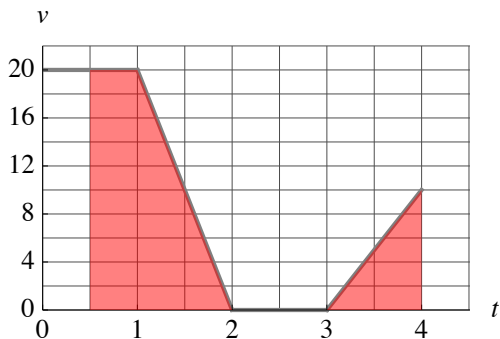
To find the average velocity between two points in time on a velocity graph, we still must use the definition of average velocity:

$$v_{\text{avg}} = \frac{\Delta d}{\Delta t}$$

But to find the displacement, we must find the area under the velocity graph. Let's use this graph as an example (where velocity is in meters per second and time is in seconds):



If we want to find the average velocity between $t = 0.5$ and $t = 4$, we have to use geometry to find the following shaded area, which is the change in the object's displacement:



The area of the trapezoid is

$$d_1 = \frac{1}{2} (a + b) h = \frac{1}{2} (0.5 + 1.5) \cdot 20 = 20$$

The area of the triangle is

$$d_2 = \frac{1}{2} b h = \frac{1}{2} (1) (10) = 5$$

The change in distance (displacement) is therefore:

$$\Delta d = 20 + 5 = 25$$

The average velocity is therefore:

$$v_{\text{avg}} = \frac{\Delta d}{\Delta t} = \frac{25}{3.5} = \frac{25}{7/2} = \frac{50}{7} = 7.14286 \text{ m/s}$$