Bicycle Trip

A family goes on a bicycle ride to a museum. The trip starts out by going 4 km/h for 1 hour, then reaches a hill and only makes 2 km/h for the next hour. They then rest for ½ hour and finally proceed to the museum at 8 km/h for 2 hours.

After 3 hours at the museum, they return going 8 km/h for 2 hours, 4 km/h for ½ hour going back down the hill, and finishing at 8 km/h for 1 hour.

The graph below summarizes this trip which is assumed to be in a straight line so that the return velocity is negative. The area between the graph and the zero velocity line gives the distance traveled because it is a speed (km/h) vertically multiplied by a time (h) horizontally. The outgoing trip distance can be seen to be

$$d=(4\,\mathrm{km/h})\cdot(1\,\mathrm{h})+(2\,\mathrm{km/h})\cdot(1\,\mathrm{h})+(0\,\mathrm{km/h})\cdot(1/2\,\mathrm{h})+(8\,\mathrm{km/h})\cdot(2\,\mathrm{h})=22\,\mathrm{km}$$

This can be done by counting squares in the graph after noting that each square has an area of 1 km.