Integration Applications:
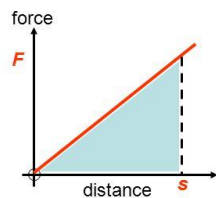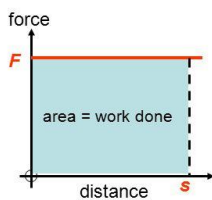
Why Find the AREA under a function?

Physics/Engineering:
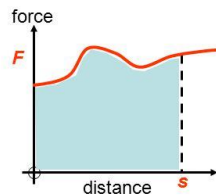
Calculating Work/Energy

Force-distance graphs
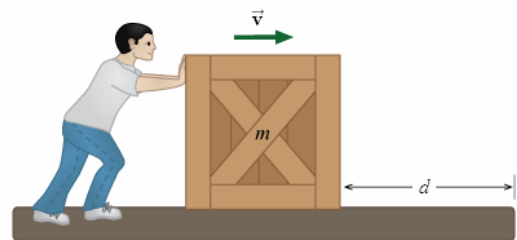
The area under the curve is equal to the work done.

force

F

area = work done

distance s

force

F

area = work
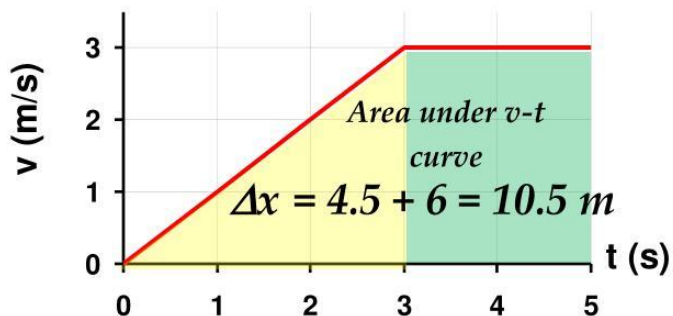= ½ F s

distance s

force

F

area = work

found by counting squares on the graph

distance s

Displacement:

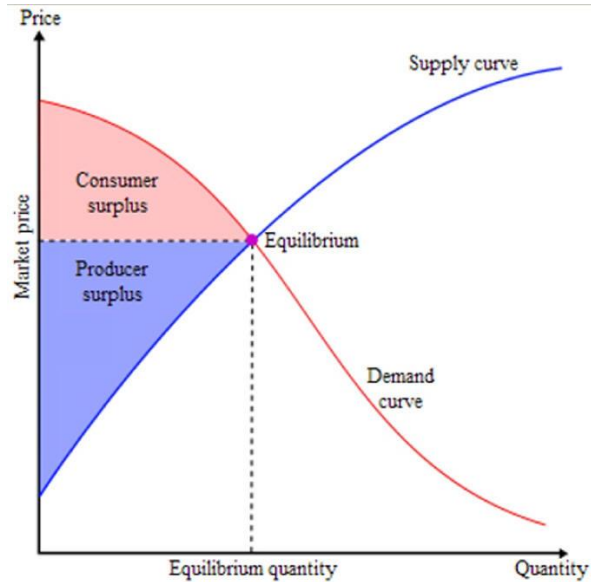You can find out how far something goes by calculating the area under a velocity vs. time graph

Estimate the net displacement from 0 s to 5.0 s

v (m/s)

Area under v-t curve

$\Delta x = 4.5 + 6 = 10.5\ m$

t (s)

Economics:

Suppy/Demand curves:

Consumer/producer surplus

Biology:

Cardiac Output

▸ The **cardiac output** of the heart is the volume of blood pumped by the heart per unit of time, that is, the rate of flow into the aorta. The cardiac output is given by

$$F = \frac{A}{\int_0^T c(t)dt}$$

Note: F is the flow rate, A is the amount of dye known, and $c(t)$ is the concentration of the dye at time t.