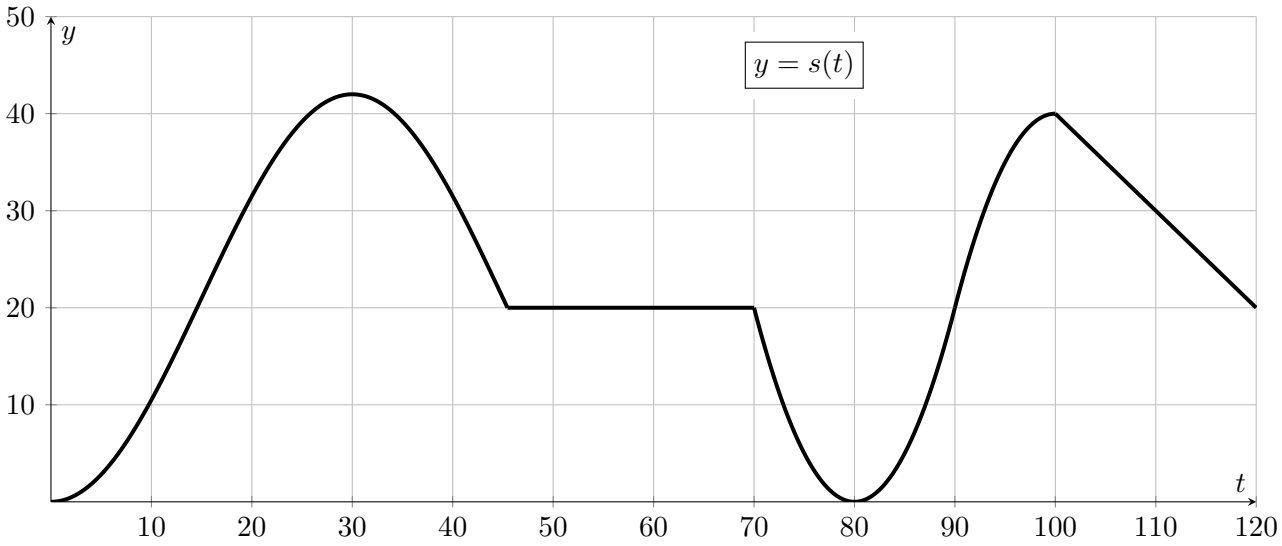
2. [9 points] You are flying your new drone over Gallup Park. On this first test flight, you just practice flying straight up and down, directly above the launch point. Suppose $s(t)$ gives the drone's vertical height above the ground, in meters, t seconds after being launched. A graph of $s(t)$ is given below. Note that $s(t)$ is linear on the intervals $[45, 70]$ and $[100, 120]$.



a. [2 points] During which of the following time intervals is the rate of change of the drone's height constant? Circle all correct choices.

$(0, 20)$ $(20, 40)$ $\boxed{(50, 70)}$ $\boxed{(110, 120)}$ NONE OF THESE

b. [1 point] At which of the following times did the drone have the greatest instantaneous veclocity? Circle the one correct answer.

$t = 10$ $t = 30$ $t = 75$ $t = 80$ $\boxed{t = 90}$

c. [1 point] At which time t in the interval $[0, 70]$ was the drone's instantaneous velocity closest to its average velocity over the time interval $[0, 70]$? *Circle the one best answer.*

$t = 10$ $t = 20$ $\boxed{t = 29}$ $t = 31$ $t = 40$

d. [2 points] Find the drone's *instantaneous velocity* 110 seconds after being launched. *Include units.*

Solution: The drone's instantaneous velocity at $t = 110$ is the slope of the graph of $s(t)$ at $t = 110$, which is -1. And since y is in meters and t is in seconds, the units are meters per second.

Answer: **-1 meter per second**

e. [3 points] Find the drone's *average speed* over the time interval $[50, 80]$. *Include units.*

Solution: The drone's average speed over the time interval $[50, 80]$ is the absolute value of

$$\frac{s(80) - s(50)}{80 - 50} = \frac{0 - 20}{30} = -\frac{2}{3} \text{ m/s.}$$

Answer: **2/3 meters per second**