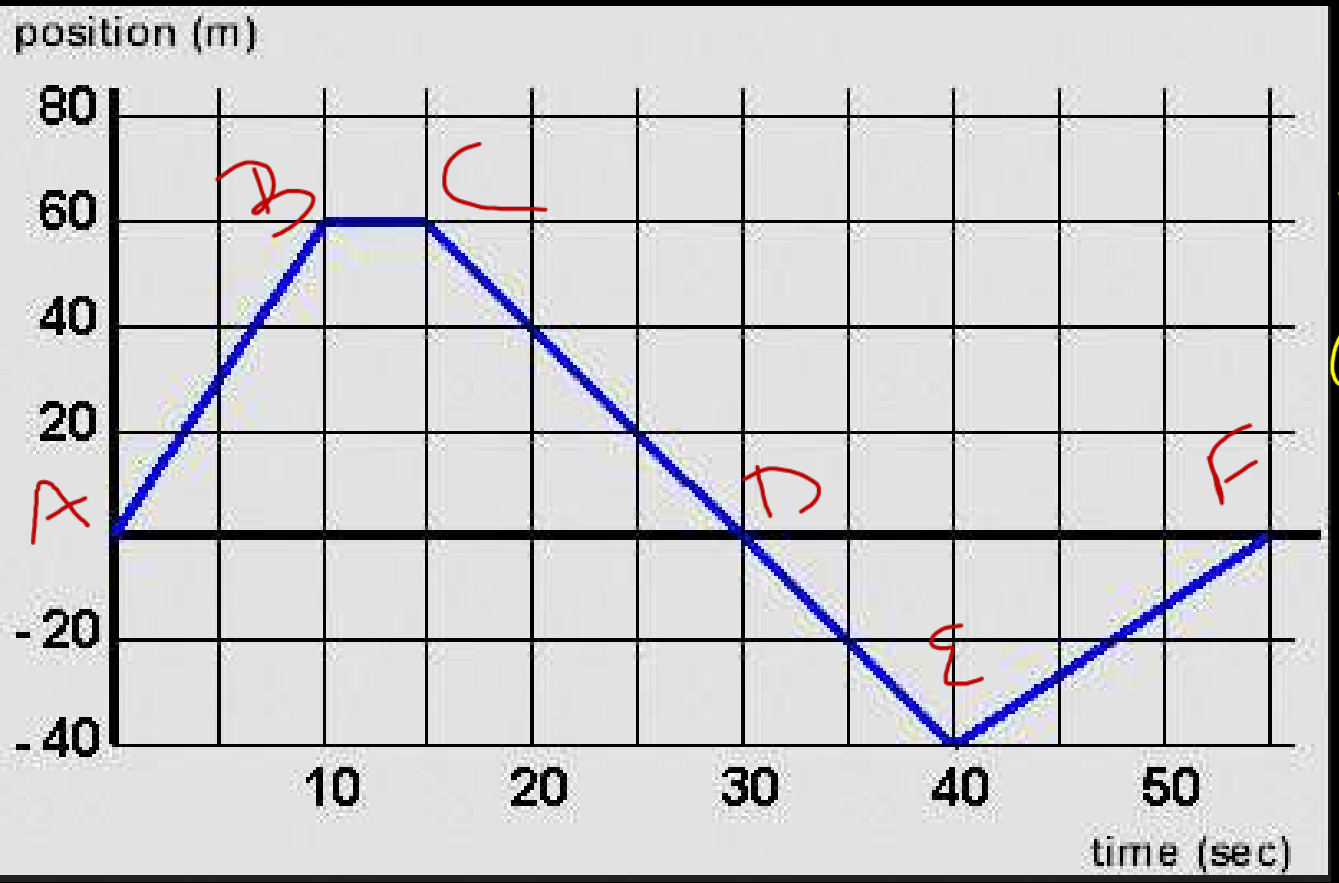
Motion Graphs

Position-Time Graphs

- Time goes on the x-axis, usually measured in s
- Position goes on the y-axis, usually measured in m
- Data is taken continuously over time, so it is a line graph, which means that the dots are connected
- Slope = Rise / Run = Change in Position / Time = Velocity
- The number of directions comes from the velocity
  - If all positive or all negative, then one direction
  - If both positive and negative, then two directions

Position-Time Graphs

- Horizontal Line = Object Standing Still, Not Moving
- Straight = Constant Velocity
  - Positive Slope = Positive Direction
  - Negative Slope = Negative Direction
  - Toward the X-Axis = Toward the Observer
  - Away from the X-Axis = Away from the Observer



A - B: $\frac{60\text{m} - 0\text{m}}{10\text{s} - 0\text{s}} = 6\text{m/s}$

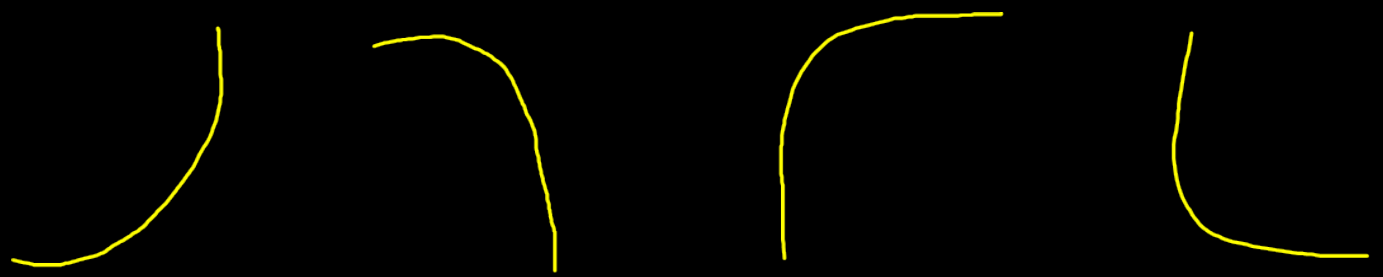
B - C: 0m/s b/c horizontal

C - E: $\frac{-40\text{m} - 60\text{m}}{40\text{s} - 15\text{s}} = -4\text{m/s}$

E - F: $\frac{0\text{m} - -40\text{m}}{55\text{s} - 40\text{s}} = 2.7\text{m/s}$

Position-Time Graphs

- Curved Line = Acceleration, Changing Velocity
  - Getting Steeper = Speeding Up
  - Getting Flatter = Slowing Down
  - Curved Up = Positive Acceleration
  - Curved Down = Negative Acceleration

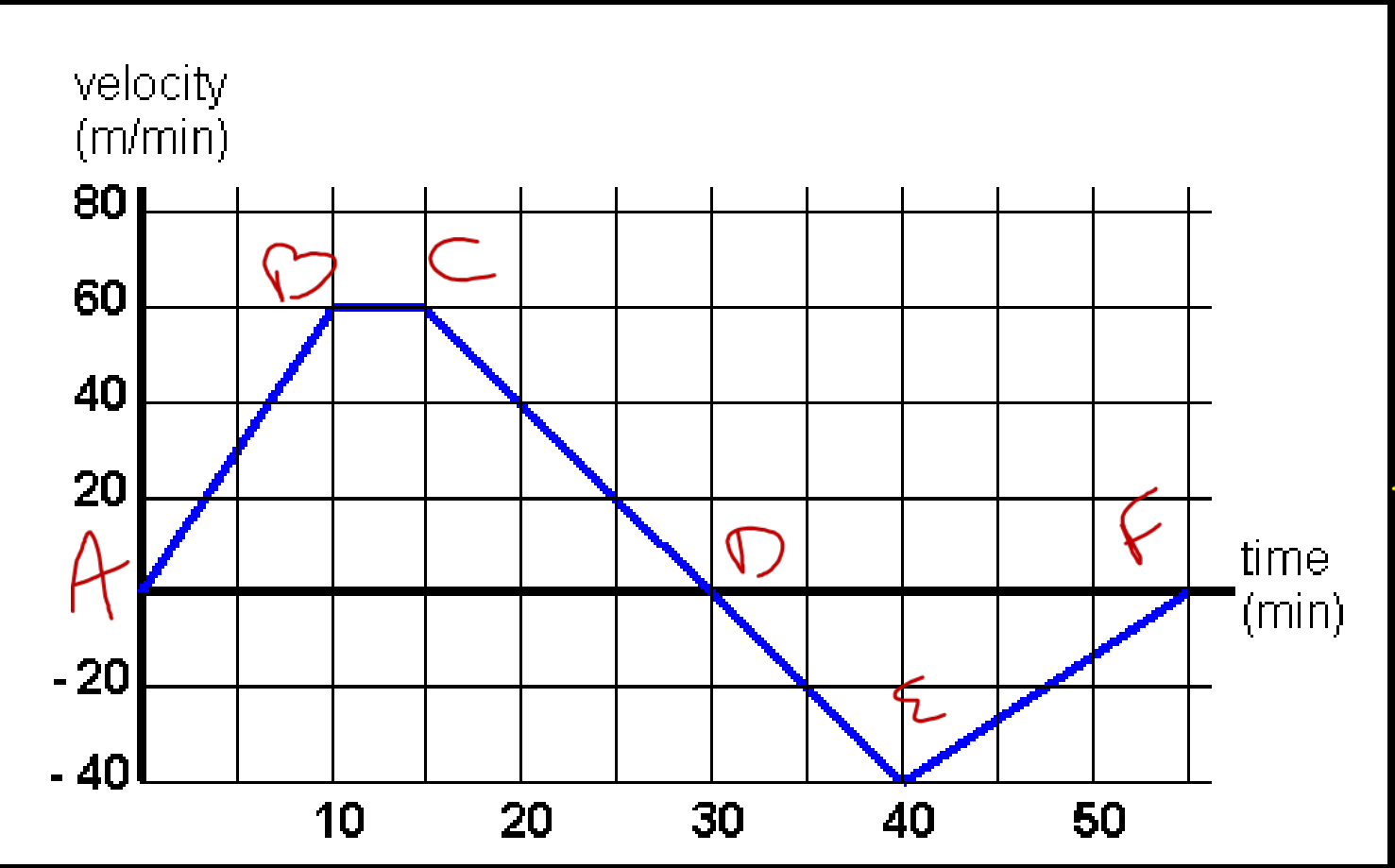


Velocity-Time Graphs

- Time goes on the x-axis, usually measured in s
- Velocity goes on the y-axis, usually measured in m/s
- Data is taken continuously over time, so it is a line graph, which means that the dots are connected
- Slope = Rise / Run = Change in Velocity / Time = Acceleration

Velocity-Time Graphs

- Horizontal Line = Constant Velocity
  - If on the x-axis, then the velocity is zero
- Straight, Not Horizontal = Acceleration
  - Toward the X-Axis = Slowing Down
  - Away from the X-Axis = Speeding Up
- The number of directions is provided by the velocity
  - If all of the velocities are positive OR all of the velocities are negative, then only one direction of motion occurred
  - If both positive and negative velocities are present, then two directions of motion occurred



A-B + acceleration
speeding up

B-C constant, + v

C-D - acceleration
slowing down

D-E - acceleration
speeding up

E-F + acceleration
slowing down