Position, Velocity, Acceleration vs. Time Plots (1-D)

Questions to ask:

Starting from v vs. t

For velocity graph:

1. Which way is the object moving?
    - Forward => $v > 0$
    - Backward => $v < 0$
2. Is it speeding up, slowing down, or moving at constant speed?
    - speeding up => line getting further from 0
    - slowing down => line getting closer to 0
    - constant speed => horizontal line

For acceleration graph:

1. What is the slope of the velocity time graph?
    - Remember that this is piecewise constant in Physics 1 (a simplifying assumption)

For the position graph:

1. What is my starting (s_0) value? (Must be given)
2. Which way is the object moving?
    - forward => s should be getting more positive (s values increasing)
    - backward => s should be getting more negative (s values decreasing)
    - no => s is constant (horizontal line)
3. Should the line be curved or straight?
    - Is v constant? => straight
    - Is |v| decreasing? (slowing down) => curved towards horizontal
    - Is |v| increasing? (speeding up) => curved away from horizontal
    - Remember that the s vs. t plot will always produce a smooth curve

Starting from s vs. t

For the velocity graph:

1. What is the slope of the position graph?
    - Remember that our simplifying assumption for the course that all accelerations are constant means that v vs. t will consist of one or more straight lines

For the acceleration graph:

1. What is the slope of the velocity time graph?
    - Remember that this is piecewise constant in Physics 1 (a simplifying assumption)

Starting from a vs. t

For the velocity graph:

1. What is my starting (v_0) value? (Must be given)
2. Given this starting v, is the object speeding up or slowing down?
    - Remember that if v and a have the same direction (sign) then the object is speeding up and if they have opposite direction (sign), then it is slowing down.
    - Remember that acceleration gives the slope of the velocity vs. time graph.
        - A positively sloped line looks like /
        - A negatively sloped line looks like \
    - Remember that our simplifying assumption for the course that all accelerations are constant means that v vs. t will consist of one or more straight lines

For the position graph:

1. What is my starting (s_0) value? (Must be given)
2. Which way is the object moving?
    - forward => s should be getting more positive (s values increasing)
    - backward => s should be getting more negative (s values decreasing)
    - no => s is constant (horizontal line)
3. Should the line be curved or straight?
    - Is v constant? => straight
    - Is |v| decreasing? (slowing down) => curved towards horizontal
    - Is |v| increasing? (speeding up) => curved away from horizontal
    - Remember that the s vs. t plot will always produce a smooth curve