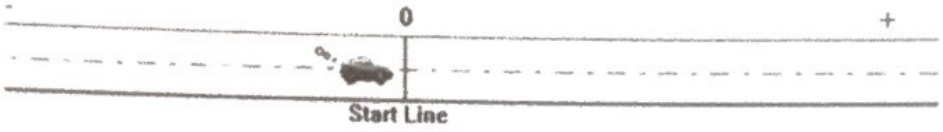
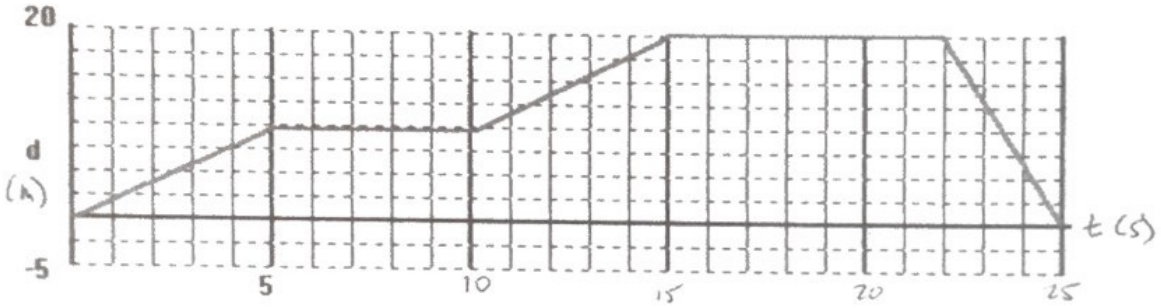
Sdns

Understanding One-Dimensional Motion

The following graphs refer to a toy car which can move to the right or left along a horizontal line. The positive direction is to the right.

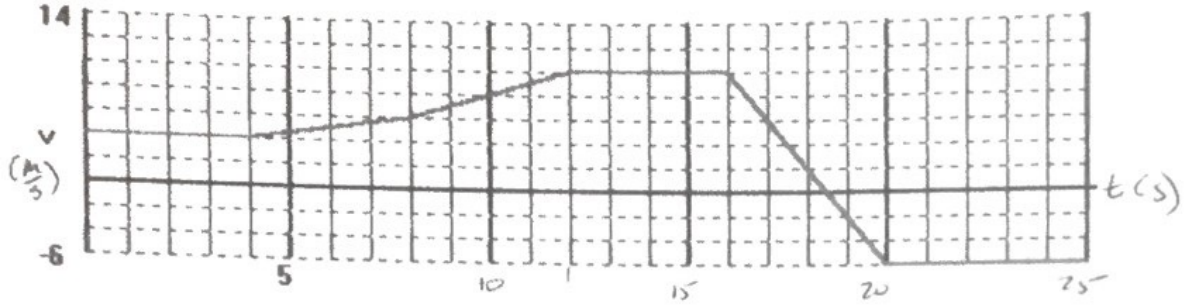


Exercise 1: The following graph shows the position of a toy car versus the time. Answer the following questions based on this graph. Show all calculations.



1. How many stops were made? 2 (not including final stop)
2. What was the maximum displacement from the start line? 20 m
3. What was the velocity of the toy car in the first 5 seconds? +2 m/s
4. What was the maximum velocity of the toy car? -6.7 m/s
5. What was the total distance driven? 40 m
6. What was the average speed of the entire trip? 40m/25s = 1.6 m/s
7. What was the average velocity of the entire trip? 0 m/s

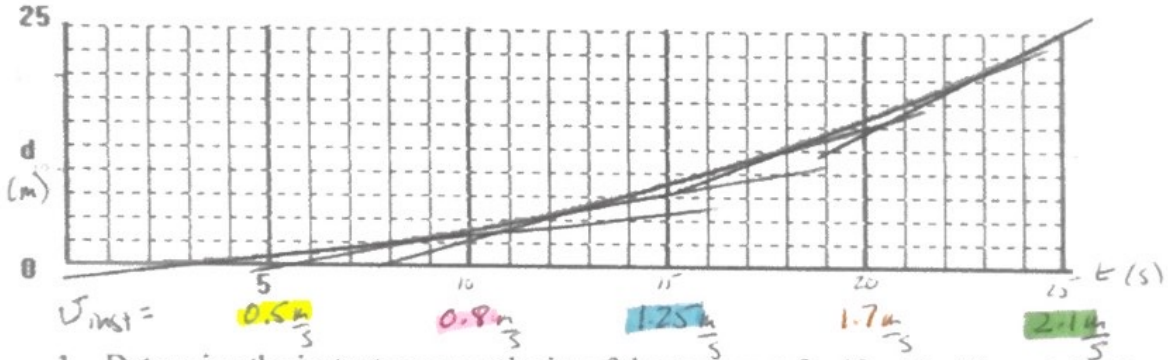
Exercise 2: The following graph shows the velocity of a toy car versus the time. Answer the following questions based on this graph. Assume that the object starts from a position of d = 0 m. Show all calculations.



+40 + 12.5 - 4.5 - 39

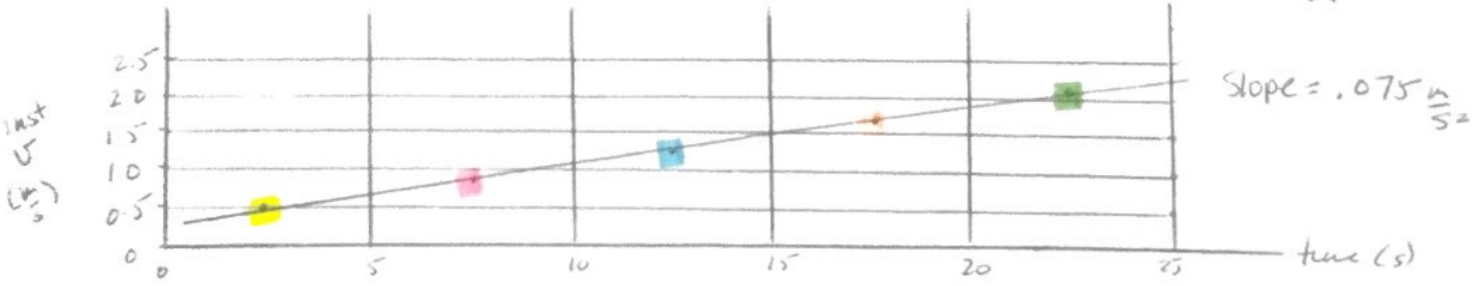
1. How far did the toy car travel from 0 to 4s? 16 m
2. How far did the toy car travel from 12 to 25s? 18 m
3. How far was the whole trip? distance = 81.5 m displacement = +52.5 - 39 = 13.5 m
4. What was the average velocity for the whole trip? 13.5 m / 25 s = +.54 m/s
5. In which section was the acceleration the greatest? 16s - 20s

Exercise 3: The following graph shows the position of a toy car versus the time. Answer the following questions based on this graph. Show all calculations.

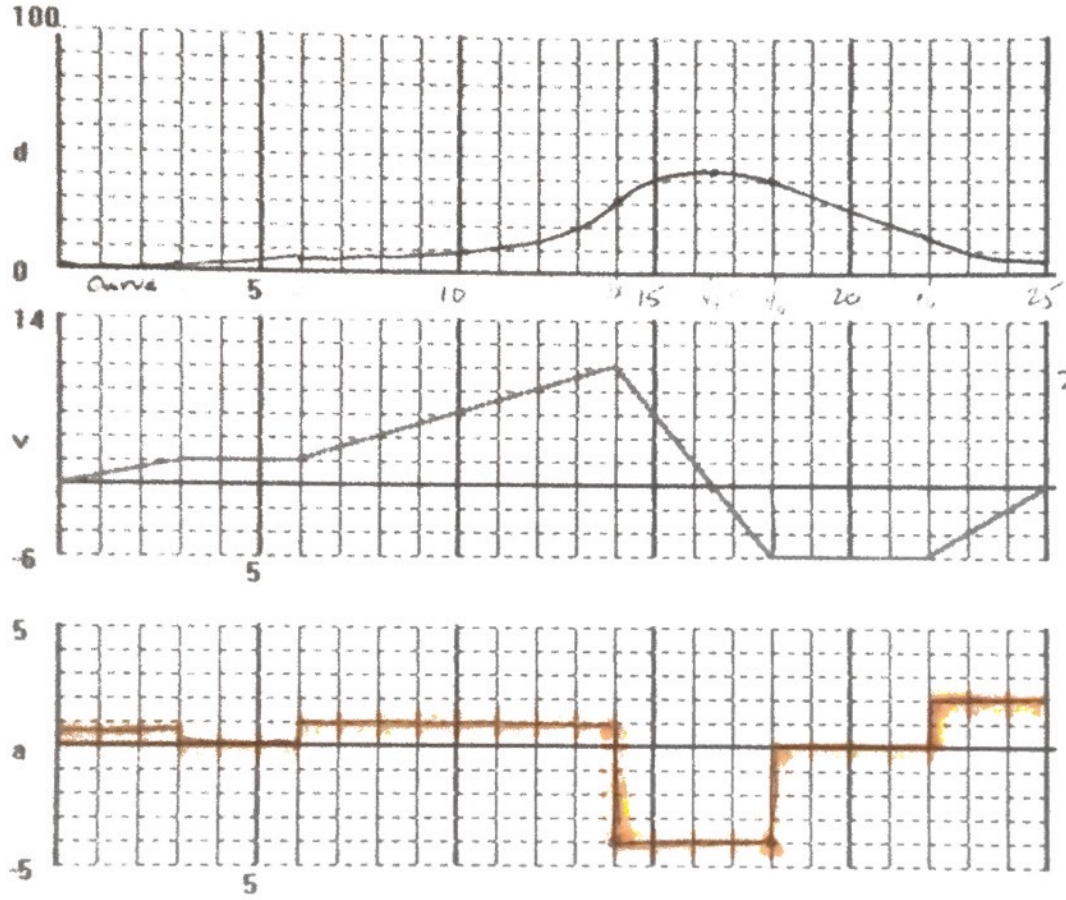


v_{inst} = 0.5 m/s, 0.8 m/s, 1.25 m/s, 1.7 m/s, 2.1 m/s

1. Determine the instantaneous velocity of the toy car at 5s, 10s, 15s, 20s and 25s?
2. Plot a graph of the instantaneous velocity versus the mid-interval time? See below
3. Determine the slope of the graph? What does this slope value represent? acceleration



Exercise 4: The following graph shows the velocity of a toy car versus the time. Answer the following questions based on this graph. Show all calculations.



★ I used area under v-t graph to estimate displacement

★★ I used slope of v-t graph to find acceleration

1. Apply the rules for interpreting and plotting graphs to draw the position-time and acceleration- time graphs from the velocity –time graph provided. Assume that the object starts from a position of **d** = 0 m. Show all your calculations.

Exercise 5: The following graph shows the velocity of a toy car versus the time. Answer the following questions based on this graph. Show all calculations.

1. Apply the rules for interpreting and plotting graphs to draw the position-time and acceleration- time graphs from the velocity –time graph provided. Assume that the object starts from a position of **d** = 0 m. Show all your calculations.