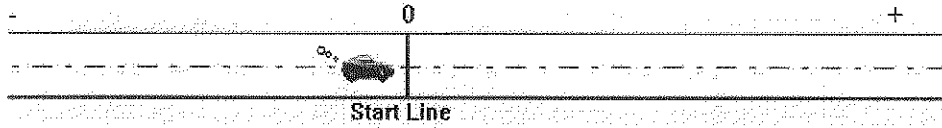
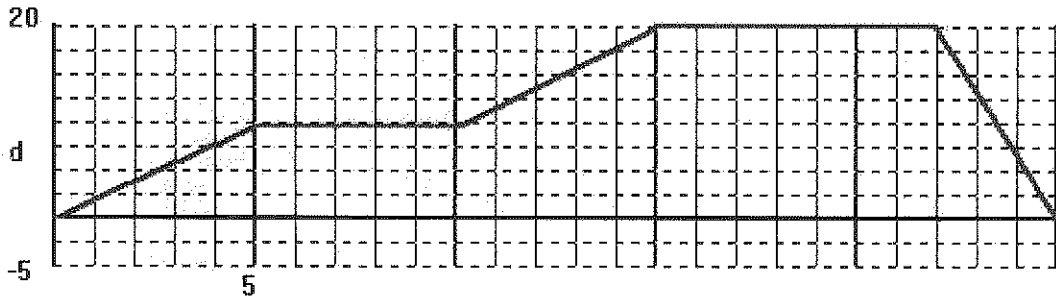


Understanding One-Dimensional Motion

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.

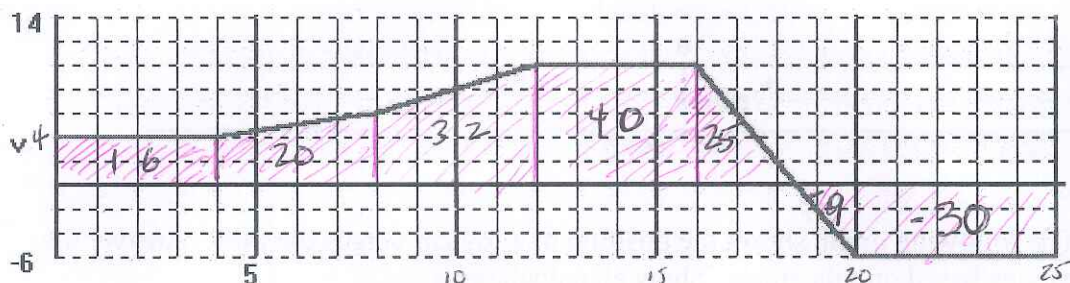


Exercise 1: The following graph shows the position of a toy car versus the time. Answer the following questions based on this graph. Show all calculations.



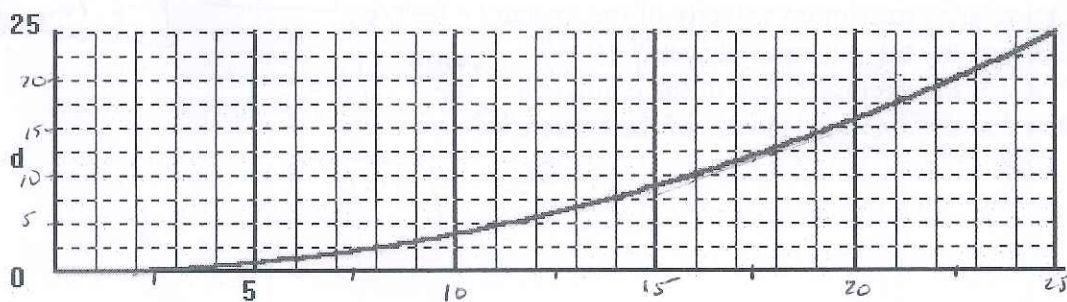
1. How many stops were made? 2
2. What was the maximum displacement from the start line? 20 m
3. What was the velocity of the toy car in the first 5 seconds? +2 m/s
4. What was the maximum velocity of the toy car? -20 m/s -6.7 m/s
5. What was the total distance driven? 40 m
6. What was the average speed of the entire trip? $\frac{40 \text{ m}}{25 \text{ s}} = \frac{1.6 \text{ m}}{\text{s}}$ 1.6 m/s
7. What was the average velocity of the entire trip? $\frac{0 \text{ m}}{25 \text{ s}} = \frac{0 \text{ m}}{\text{s}}$ 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.



- How far did the toy car travel from 0 to 4s? 16m
- How far did the toy car travel from 12 to 25s? $+65 - 39 = 26\text{m}$ disp (104 m distance)
- How far was the whole trip? $+133 - 39 = 94\text{m}$ or 172m distance
- What was the average velocity for the whole trip? $94\text{m}/25\text{s} = 3.8\text{m/s}$
- In which section was the acceleration the greatest?
16-20s

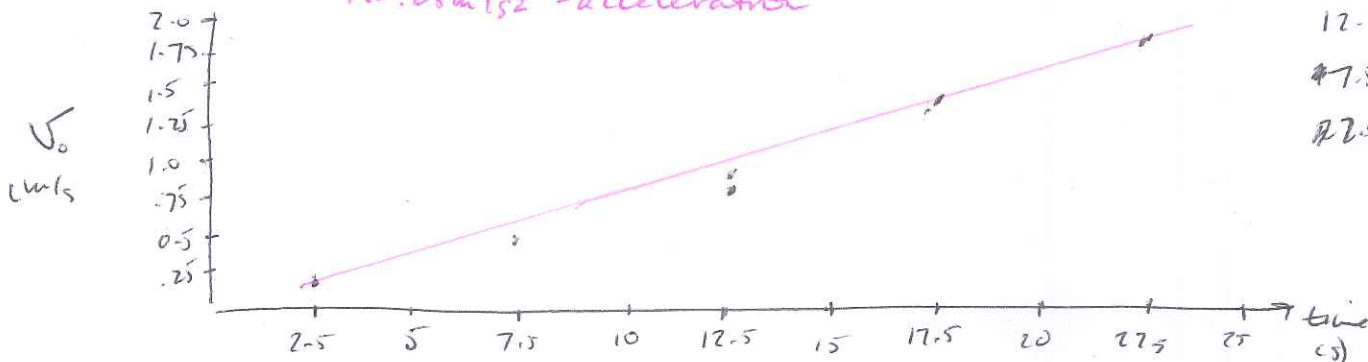
Exercise 3: The following graph shows the position of a toy car versus the time. Answer the following questions based on this graph. Show all calculations.



t (s)	V_0 (m/s)
5	0.3
10	0.8
15	1.3
20	1.7
25	1.9

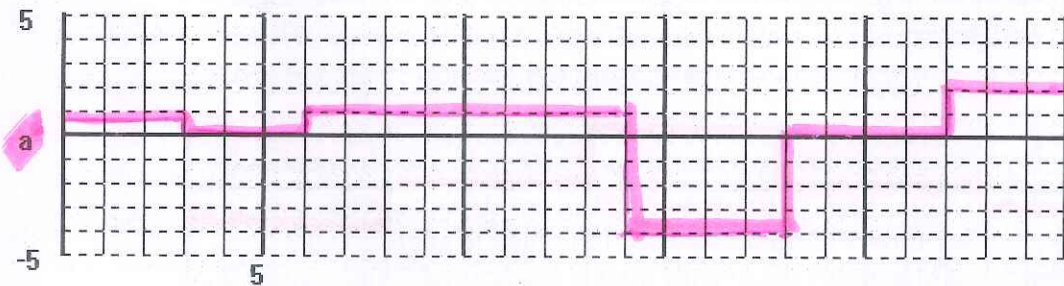
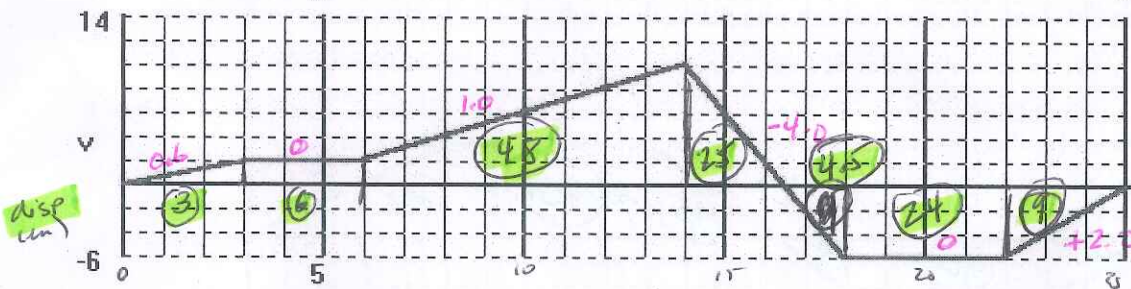
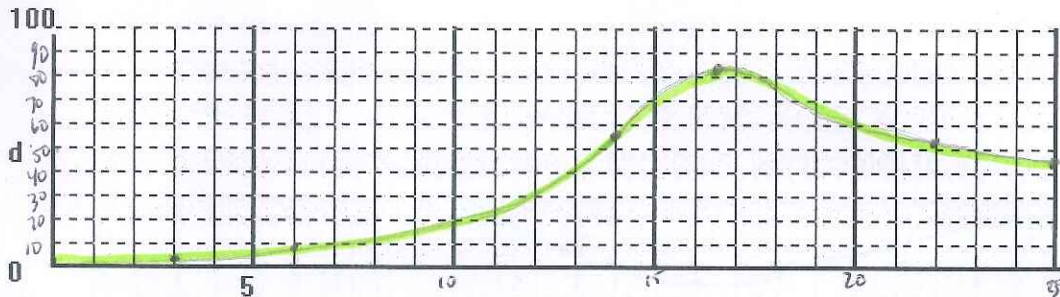
- Determine the instantaneous velocity of the toy car at 5s, 10s, 15s, 20s and 25s?
- Plot a graph of the instantaneous velocity versus the mid-interval time?
- Determine the slope of the graph? What does this slope value represent?

$m = 0.08\text{m/s}^2 = \text{acceleration}$



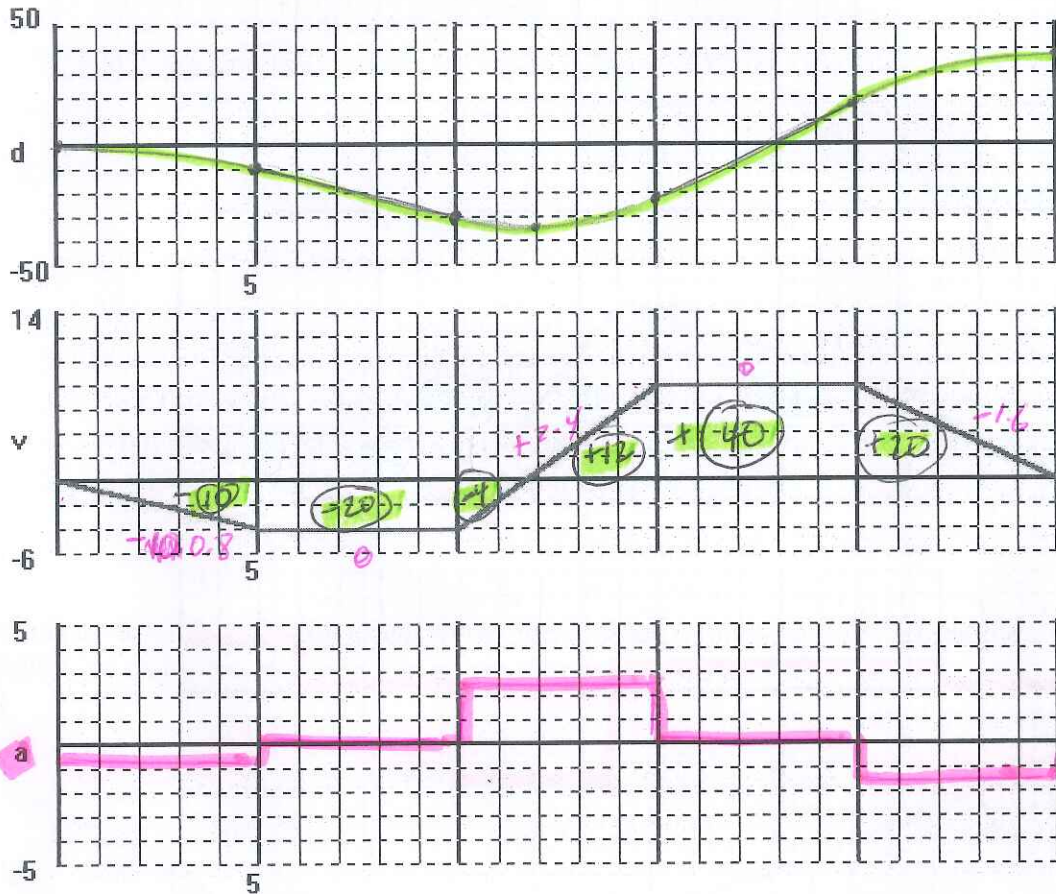
t	V_0
22.5	1.9
17.5	1.7
12.5	0.8
7.5	0.6
2.5	0.2

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.



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.