**Velocity Time Graphs**

The following table represents the movement of a car:-

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Velocity (m/s) | 0 | 5 | 10 | 15 | 15 | 15 | 12 | 9 | 6 | 3 | 0 |
| Time (seconds) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Draw a Velocity time graph (with time on the x-axis)

Answer the questions below:

1. What is the acceleration of the car between 0 and 3 seconds?

[Remember acceleration is equal to the change in velocity ÷ time]

1. Between 3 and 5 seconds the car is still accelerating – true or false? Explain your answer.
2. How would you describe the movement of the car between 5 and 10 seconds?
3. What distance does the car travel in the first 3 seconds?
4. What distance does the car travel in the total journey?

More difficult

A racing car (at rest) accelerates uniformly from the starting grid on the race track and reaches a top velocity of 30 meters/second/second after 5 seconds. For the next 4 seconds the acceleration is 0 and finally the car decelerates (brakes) at 4meters/second/second for 5 seconds.

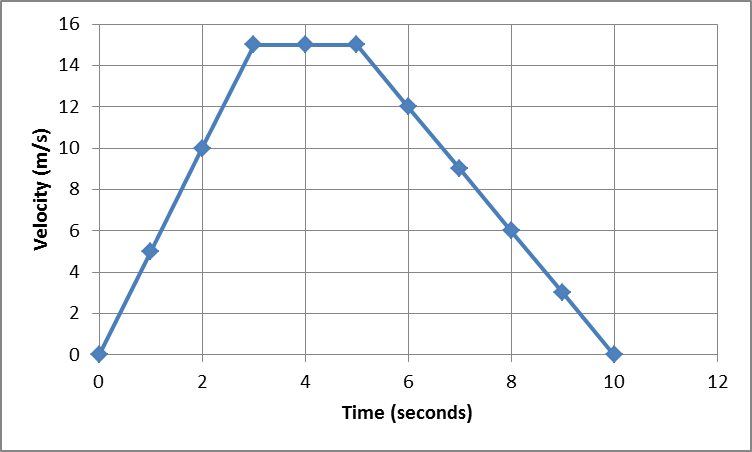
Draw a Velocity time graph (with time on the x-axis). If you are stuck, try marking what the velocity would be after each second!

Answer the questions below:

1. What distance does the car travel in the first 5 seconds?
2. What is the velocity of the car after 7 seconds?
3. What is the velocity of the car after 14 seconds?
4. If the car carried on decelerating at 4m/s2, how many more seconds would it take before it came to a stop?
5. What is the acceleration in the first 5 seconds?

**Answers!! Velocity Time Graphs**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Velocity (m/s) | 0 | 5 | 10 | 15 | 15 | 15 | 12 | 9 | 6 | 3 | 0 |
| Time (seconds) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |



1. What is the acceleration of the car between 0 and 3 seconds?

[Remember acceleration is equal to the change in velocity ÷ time]  
Acceleration = 15 ÷ 3 = 5 m/s2

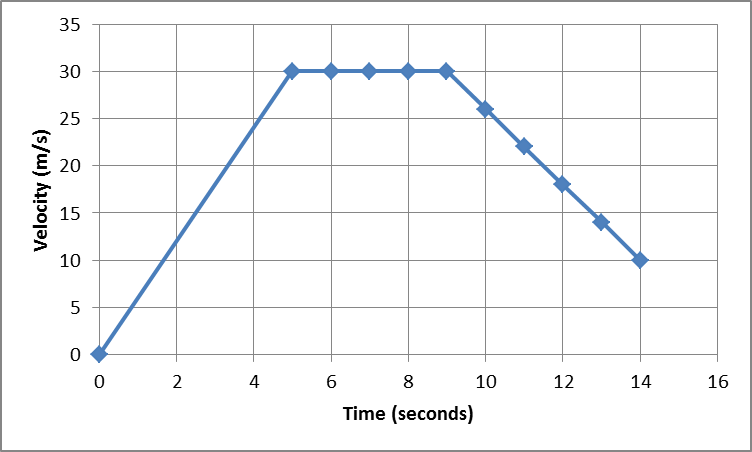
1. Between 3 and 5 seconds the car is still accelerating – true or false? Explain your answer. False – constant speed of 15m/s
2. How would you describe the movement of the car between 5 and 10 seconds?   
   Constant deceleration (of 3m/s2)
3. What distance does the car travel in the first 3 seconds?  
   Area of triangle = (bxh)÷2 = 3 x 15 ÷ 2 = 45÷2 = 22.5m
4. What distance does the car travel in the total journey?

Area of first triangle = 22.5m  
Area of rectangle = 2x15 = 30m

Area of second triangle = 15x5÷2 = 37.5m Total=90m

Answers!! More difficult

A racing car (at rest) accelerates uniformly from the starting grid on the race track and reaches a top velocity of 30 meters/second/second after 5 seconds. For the next 4 seconds the acceleration is 0 and finally the car decelerates (brakes) at 4meters/second/second for 5 seconds.



1. What distance does the car travel in the first 5 seconds?  
   Area of triangle = 5x30÷2 = 75m
2. What is the velocity of the car after 7 seconds? 30m/s
3. What is the velocity of the car after 14 seconds? 10m/s
4. If the car carried on decelerating at 4m/s2, how many more seconds would it take before it came to a stop? 2.5 seconds   
   (decreasing at a pace of 4m/s2, after 1 more second the speed would be 6m/s, after 2 more it would be 2m/s etc)
5. What is the acceleration in the first 5 seconds?  
   Gradient = change in velocity÷time = 30÷5 = 6m/s2