



PHYSICS

VELOCITY-TIME GRAPHS

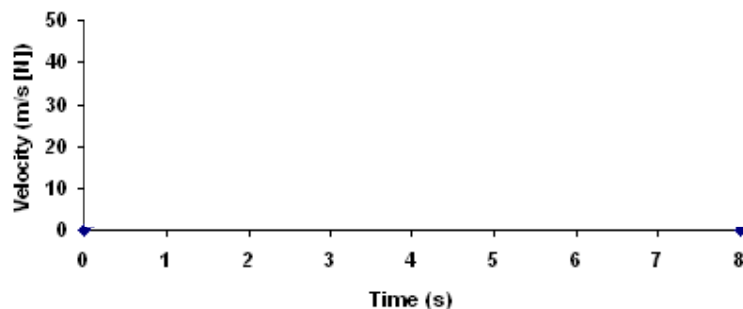
VELOCITY-TIME GRAPHS AND ACCELERATION

Recall: A position-time graph, or a distance-time graph, plots an object's displacement verses the time it takes that object to achieve that displacement.

In the same way, a velocity-time graph plots an object's velocity verses time, with the velocity on the y-axis and the time on the x-axis.

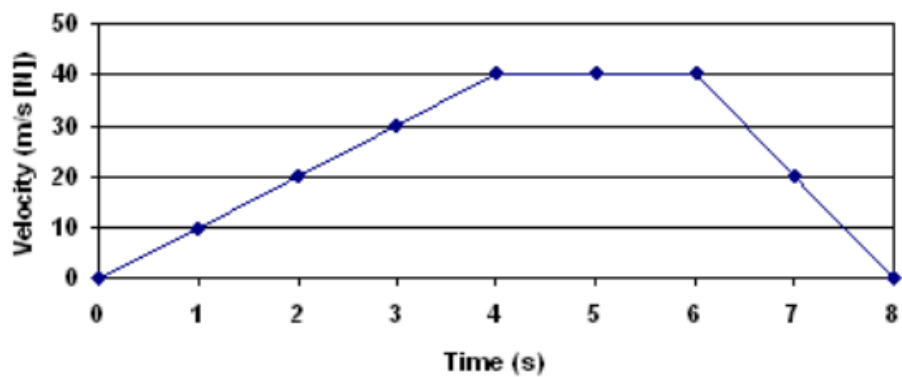
Ex: An object starting from rest is moving at the following velocities

Velocity (m/s [N])	0	10	20	30	40	40	40	20	0
Time (s)	0	1	2	3	4	5	6	7	8



**PHYSICS****VELOCITY-TIME GRAPHS**

We can use this v-t graph to find the acceleration and displacement



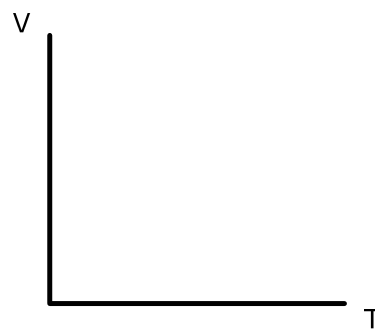
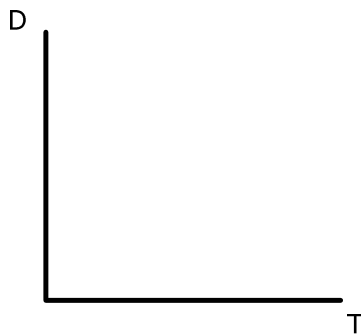


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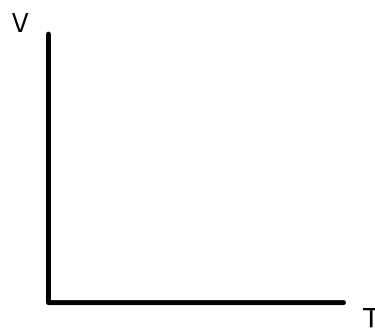
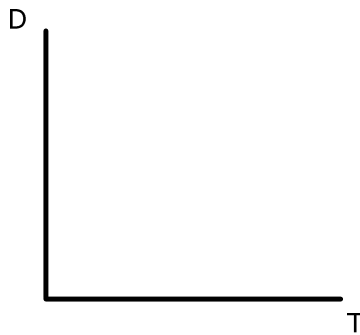
VELOCITY-TIME GRAPHS

Difference between DT Graphs and VT Graphs

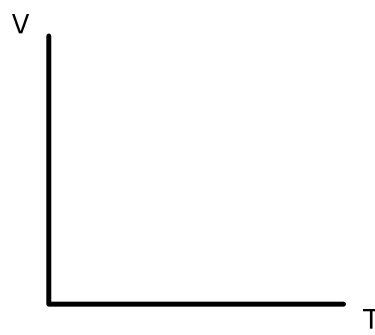
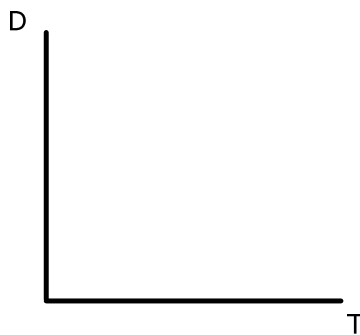
Constant Speed



Stopped



Acceleration

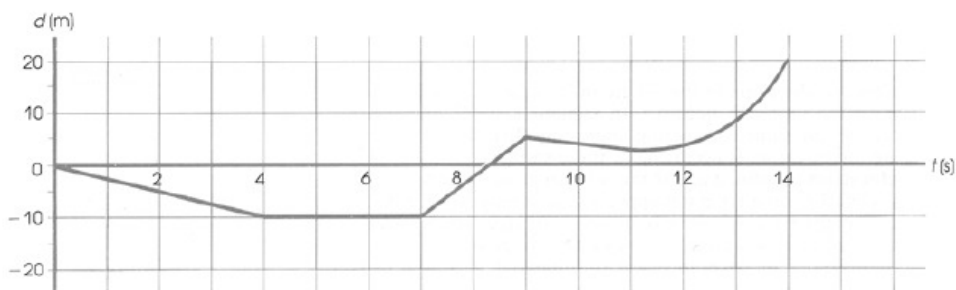




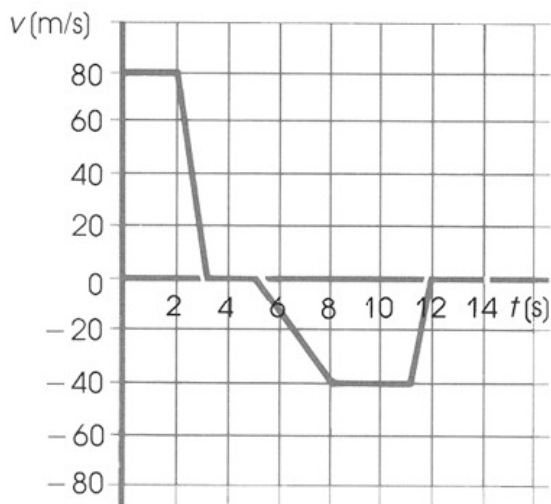
PHYSICS

HOMWORK

4. The following graph is that of an object moving in a straight line. East is considered as the positive direction.
- Determine the position of the object after 7.0 s . (-10 m)
 - The graph shows five distinct sections. Briefly, and in general terms, describe the motion of the object in each of these sections.
 - Considering the whole journey, calculate the average velocity. (1.4 m/s)
 - Find the instantaneous velocity at $t = 13\text{ s}$. (8 m/s)
 - Using an appropriate scale, draw a velocity-time graph from the position-time graph.



5. This graph below describes the motion of an object moving in a straight line. At the beginning it is going east. From the graph determine each of the following.
- the object's displacement in the first 3.0 s (200 m [E])
 - the object's displacement between $t = 3.0\text{ s}$ and $t = 5.0\text{ s}$ (0)
 - the total displacement of the object in 14 s (0)
 - the average velocity of the object from $t = 0$ to $t = 8.0\text{ s}$ (17.5 m/s [E])



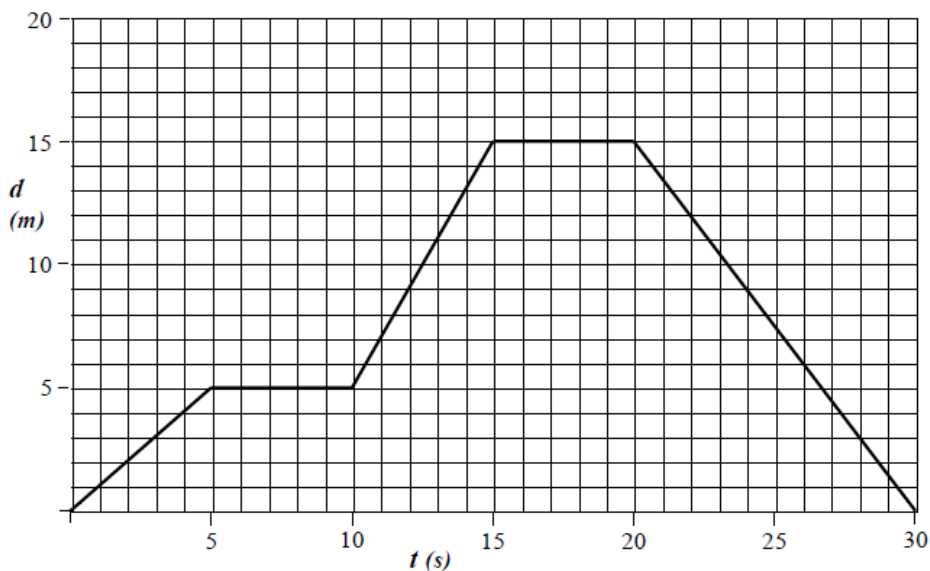


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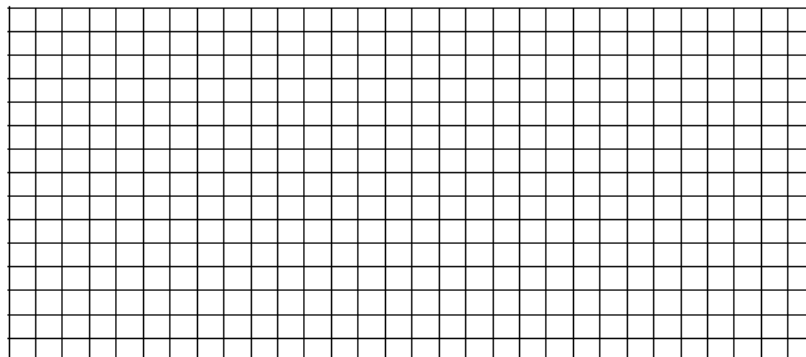
HOMEWORK

- 7. The **slope** of the **displacement-time** graph is _____.
- 8. The **slope** of the **velocity-time** graph is _____.
- 9. The **area under** the **acceleration-time** graph is _____.
- 10. The **area under** the **velocity-time** graph is _____.

Answer the next series of questions using the following **displacement-time** graph.



- 11. How far does the object travel during the first 5 seconds (1 to 5 s)? _____
- 12. How far does the object travel during the second 5 seconds (5 to 10 s)? _____
- 13. How far does the object travel during the third 5 seconds (10 to 15 s)? _____
- 14. How far does the object travel during the fourth 5 seconds (15 to 20 s)? _____
- 15. How far does the object travel during the last 10 seconds (20 to 30 s)? _____
- 16. During which time interval(s) is the object standing still?
- 17. Does the car ever accelerate in this scenario?
- 18. Draw the velocity time graph for the above scenario.

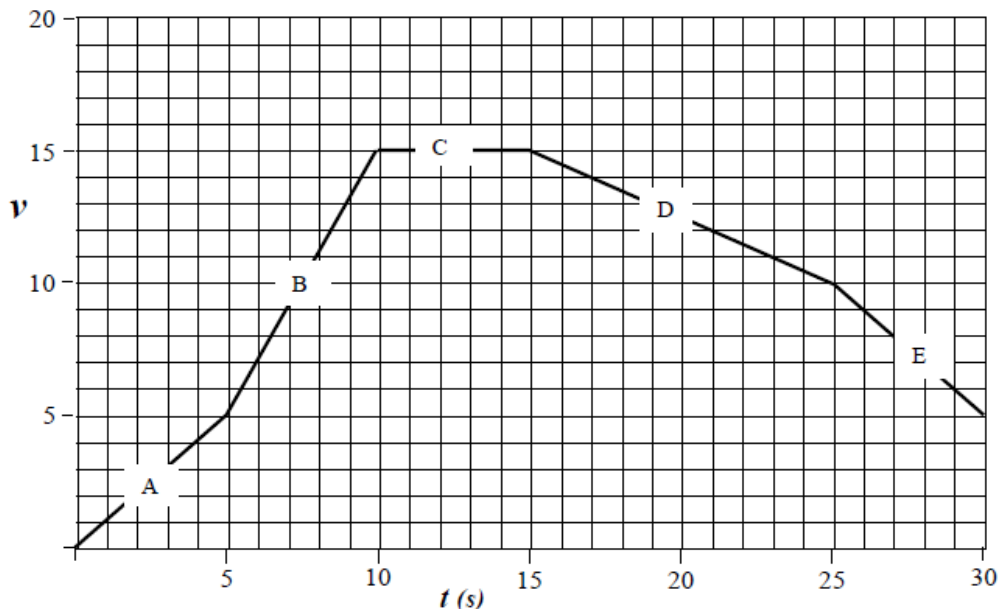




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HOMEWORK

Answer the next series of questions using the following **velocity-time** graph.



- 19. During which interval(s) is the object accelerating? _____
- 20. During which interval(s) is the acceleration the greatest? _____
- 21. During which interval(s) is the object standing still? _____
- 22. During which intervals does the object have the same speed? _____
- 23. What is the displacement during interval **A**? _____
- 24. What is the displacement during interval **B**? _____
- 25. What is the displacement during interval **C**? _____
- 26. What is the displacement during interval **D**? _____
- 27. What is the displacement during interval **E**? _____