# C.E.M.TUITION

Name :_____

**Review Topic : Displacement, velocity & acceleration**

**Time Graphs**

**(HSC - PAPER 3)**

Year 12 - Mathematics

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**For corrections refer to pages:**

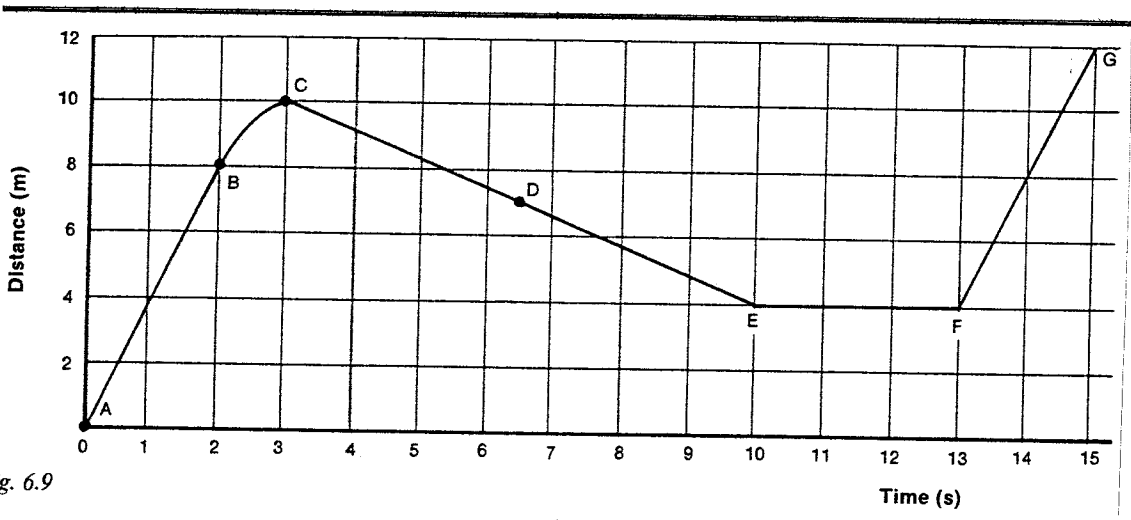


*Fig. 6.9*

**8** The distance–time graph for a moving body is shown in Figure 6.9.

(*a*) During which parts of the motion did the body have a speed of 4 m $s^{-1}$?
(*b*) When was the body stationary?
(*c*) What was its speed at C?
(*d*) What was its velocity at D? Give two significant figures.

**8** (*a*) A to B and F to G (*b*) Between E and F
(*c*) Zero (*d*) $-0.86$ m $s^{-1}$

**9** An object moves along a straight line. Its displacement from the starting point is shown as a function of time in Figure 6.10.

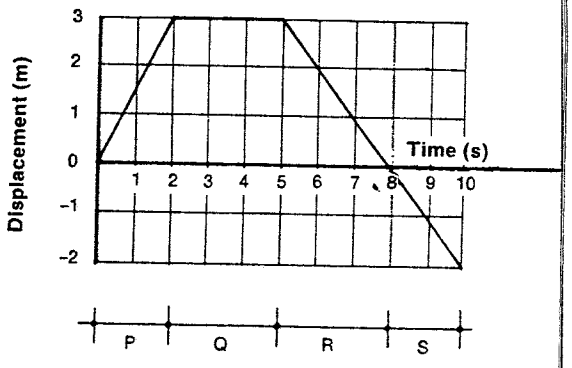


*Fig. 6.10*

(*a*) What is the displacement of the object after 5 s?
(*b*) Which section of the graph represents a constant velocity of 1.5 m $s^{-1}$?
(*c*) Which section of the graph represents the object at rest?
(*d*) What was the instantaneous velocity of the object after 7 s?
(*e*) What time elapsed before the object returned to its starting point?

**9** (*a*) 3 m (*b*) P (*c*) Q (*d*) $-1$ m $s^{-1}$ (*e*) 8 s

**10** Figure 6.11 represents part of a short trip in a car. AB and CD are two straight sections of the graph and section BC is slightly curved in a parabolic shape.

(*a*) What is the speed in the section AB?
(*b*) What is the speed in the section CD?
(*c*) What are the average speeds between B and C and between A and D respectively?
(*d*) What is the instantaneous speed 60 s after the start of the trip?
(*e*) What is the acceleration in the section BC?

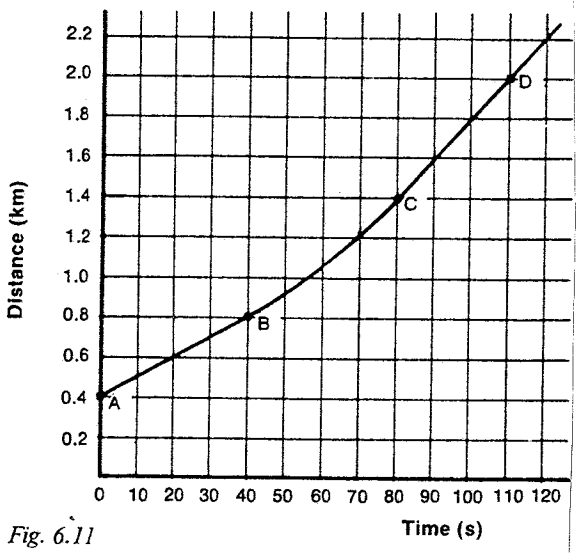


*Fig. 6.11*

**10** (*a*) $1.0 \times 10^{-2}$ km s$^{-1}$ (*b*) $2.0 \times 10^{-2}$ km s$^{-1}$
(*c*) $1.5 \times 10^{-2}$ km s$^{-1}$; $1.6 \times 10^{-2}$ km s$^{-1}$
(*d*) $1.5 \times 10^{-2}$ km s$^{-1}$ (*e*) $2.5 \times 10^{-4}$ km s$^{-2}$

**11** In a machine a certain part A moves to and fro horizontally with a period of 0.9 s. The displacement of A to the right of its initial position is shown in Figure 6.12 as a function of time from the beginning of a cycle.

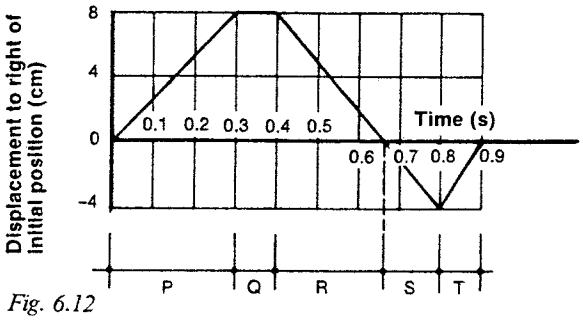


*Fig. 6.12*

(*a*) During which section(s) of its motion is A moving with constant velocity?
(*b*) During which section is A moving with the greatest speed?
(*c*) During which section is A at rest?
(*d*) What is the displacement of A from its initial position 0.8 s after the beginning of a cycle?
(*e*) What distance does A travel between 0.4 s and 0.9 s?
(*f*) What velocity does A reach 0.6 s after the beginning of each cycle?
(*g*) Calculate the average speed of A during one cycle. Give the answer to two significant figures.

**11** (*a*) P, R, S, T (*b*) T (*c*) Q (*d*) 4 cm to the left (*e*) 16 cm (*f*) $-30$ cm s$^{-1}$ (*g*) 27 cm s$^{-1}$

**12** The velocity–time graphs for the motions of a train and a car travelling along a road parallel to the railway line are shown in Figure 6.13. Initially the car, travelling at a speed of 30 km $h^{-1}$, is passing a station where the train has stopped. The graphs illustrate the subsequent motions.

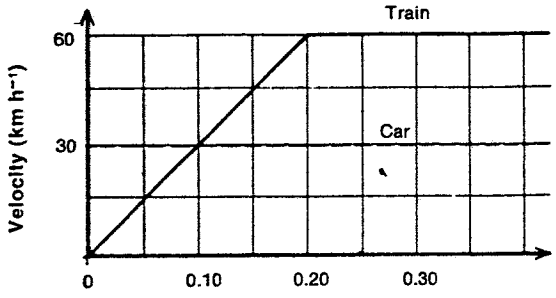


*Fig. 6.13*

(*a*) Find the acceleration of the train as it pulls out of the station.
(*b*) How far does the train travel during the first 0.30 h?
(*c*) At what time does the train meet the car again?

**12** (*a*) 300 km $h^{-2}$ (*b*) 12 km (*c*) 0.20 h

**13** Figure 6.14 is the velocity–time graph for a motor car which crossed an amphometer at an excessive speed. The driver failed to notice the policeman's signal to stop, and his car was chased by another policeman on a motor-cycle for which the graph is also given. At what time, on the time scale given, does the motor-cycle overtake the car? The zero of time is the instant when the car passes the motor-cycle.

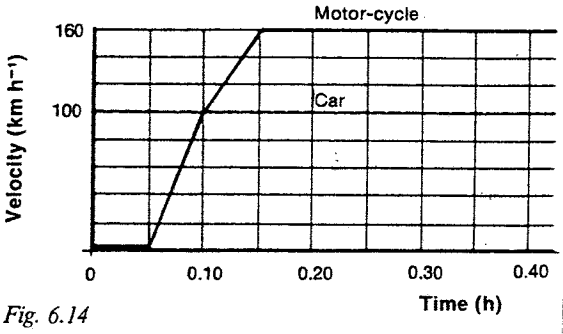


*Fig. 6.14*

**14** Figure 6.15 is the velocity–time graph for a train travelling on a straight track.

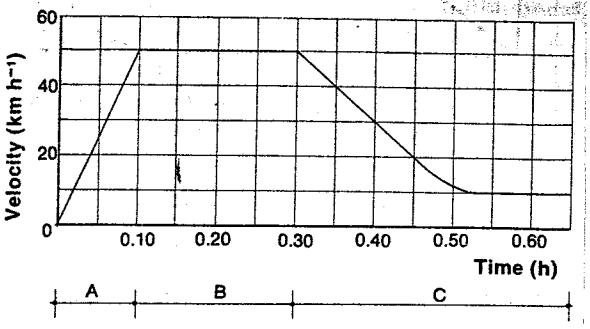


*Fig. 6.15*

(*a*) In which section of the motion (A, B, C) is
(*i*) the velocity a maximum?
(*ii*) the acceleration a maximum?
(*b*) How far does the train travel in section A?
(*c*) Estimate the distance travelled by the train in section C.
(*d*) What is the average velocity of the train in section C?
(*e*) What is the acceleration of the train after 0.50 h has elapsed?

**13** 0.25 h
**14** (*a*) (*i*) B (*ii*) A (*b*) 2.5 km (*c*) 7.6 km (*d*) 22 km $h^{-1}$
(*e*) $-1.2 \times 10^2$ km $h^{-2}$