

NAME
SCHOOL

INDEX NUMBER
DATE

LINEAR MOTION

1. 1995 Q1 P2

The data in the table below represents the motion of vehicle over a period of 7 seconds

Time (sec)	0	1	2	3	4	5	6	7
Displacement	0	20	40	60	80	95	105	110

(a) Plot on the grid provided, a graph of displacement (y- axis) against time (5 marks)

(b) Describe the motion of the vehicle for the first 4s (1 mark)

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(c) Determine the velocities at 4.5s and 6.5s. Hence or otherwise determine the average acceleration of the vehicle over this time interval

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2. 1996 Q1 P2

(a) A accelerates uniformly from its initial velocity, u , to the final velocity, v in time t . The distance traveled during this time is S . If the acceleration is denoted by the letter, a show that;

(i) $V = u + at$ (2 marks)

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(ii) $S = ut + at^2$ (3 marks)

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(iii) $V^2 = u^2 + as$ (2 marks)

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(b) A body moving initially at 50m/s decelerates uniformly at two 2ms^{-2} until it comes to rest. What distance does it cover from the time it started to decelerate (3 marks)

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3. 1997 Q20 P1

An object dropped from a height h attains a velocity of 6ms^{-1} just before hitting the ground. Find the value of h .

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4. 1997 Q28

A trolley is moving at constant speed in a friction compensated track. Some plasticine is dropped on the trolley and sticks on it. State with a reason what is observed about the motion of the trolley.

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5. 1997 Q3 P2

(a) A stone is thrown vertically upwards from the edges of a platform. Eventually the stone lands without bouncing on the ground below the platform. Taking the upward velocity to be positive, sketch on the axis provided, the velocity time graph of the motion of the stone.

Velocity

Time

(b) A car can be brought to rest from a speed of 20 ms^{-1} in a time of 2s

(i) Calculate the average deceleration

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(ii) If the driver's reaction time is 0.2s, determine the shortest stopping distance

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6. 1998 Q3a P2

a) A gun is fired vertically upwards from the top of 2 open truck moving horizontally at a uniform velocity of 50ms^{-1} . The bullet achieves a maximum height of 45m. State with reason whether or not the bullet will land on the truck.

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(i) Calculate the distance covered by the truck just before the bullet reaches the level from which it was fired. (Use $g = 10\text{ ms}^{-2}$)

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7. 1999 Q3 P2

A tape attached to a moving trolley is run through a ticker timer. Figure 3 shows a section of the tape after running.

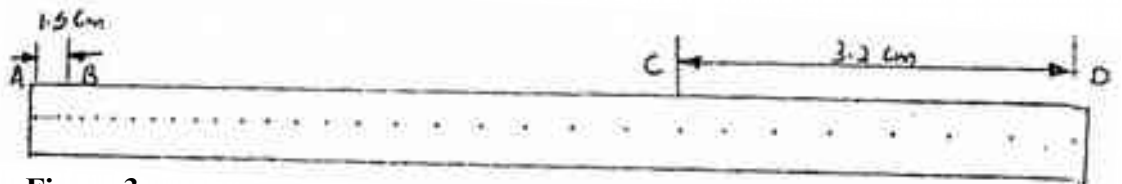


Figure 3.

If the frequency of the ticker – timer is 50Hz, determine the:

i) Average velocity at intervals AB and CD.

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ii) Average acceleration of the trolley.

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b) A stone is released from a height, h . if the acceleration due to gravity is g , derive an expression of the velocity of the stone just before hitting the ground.

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c) Figure 4 (a) shows a velocity – time graph of an object in motion.

Velocity

Displacement

Fig 4(a)

Time

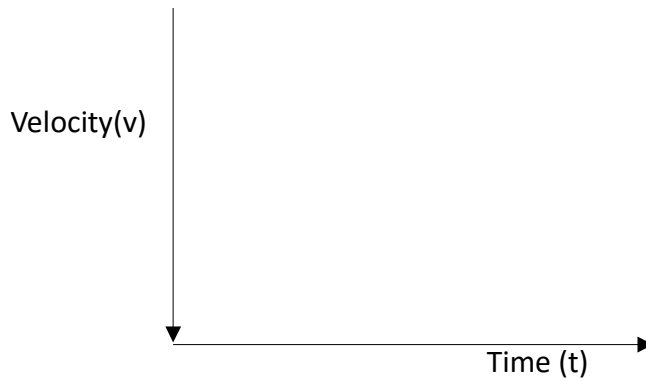
fig 4(b)

Time

Sketch on the axes provided in figure 4(b), the displacement – time graph of the Motion
(Motion upwards is taken as positive.)

8. 2000 Q20 P1

A body initially resting on horizontal surface is accelerated by a constant force. It passes over a small region where it experiences a force of friction equal to the accelerating force before returning to the frictionless horizontal surface. On the axes provided, sketch the velocity time graph for the motion of the body.



9. 2002 Q14 P1

Fig. 9 shows a speed – time graph for the journey of a motorcar.

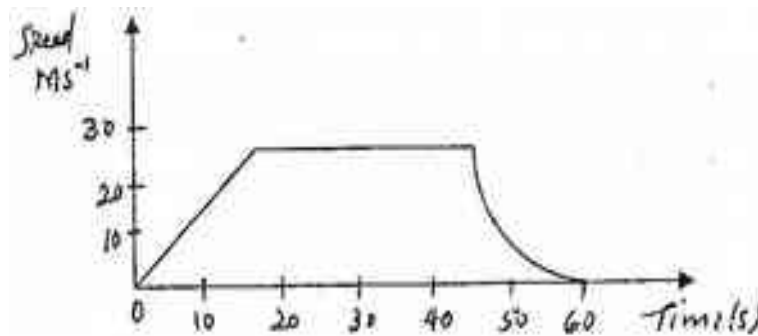


Fig 9

Determine the distance the car travels in the first 40 seconds.

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10. 2002 Q15 P1

Fig. 10 shows how the potential energy, (P.E) of a ball thrown vertically upwards, varies with height.

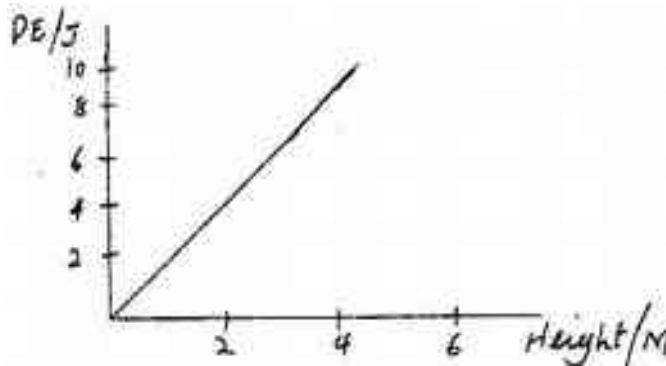
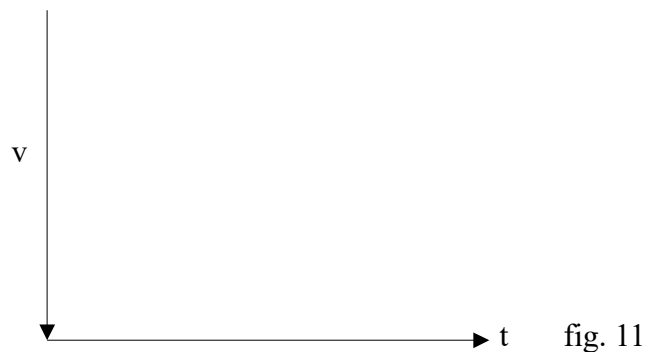


Fig. 10

On the same axes, plot a graph of the kinetic energy of the ball.

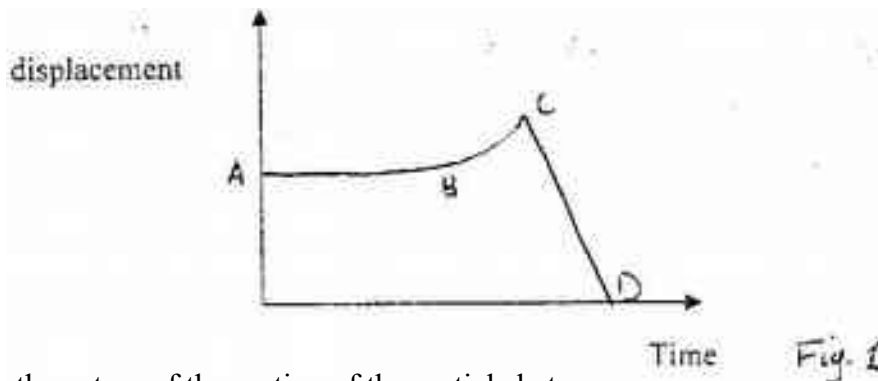
11. 2003 Q22 P1

On the axes provided in Figure 11, sketch a graph of velocity (V) versus time (t) for uniformly accelerated motion given that when $t = 0$, v is greater than zero



12. 2003 Q1 P2

a) Fig 1 shows the displacement time graph of the motion of a particle.



State the nature of the motion of the particle between:

(i) A and B

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iii) Vertical velocity of the ball just before striking the ground. (Take acceleration due to gravity g as 10ms^{-2}) Total 13 marks

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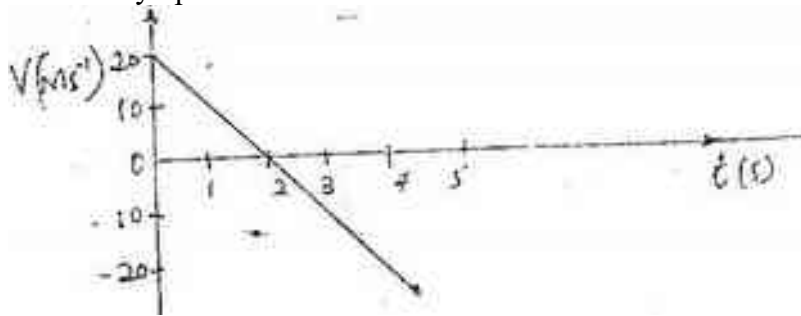
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13. 2004 Q17 P1

The graph below shows how the velocity varies with time for a body thrown vertically upwards.



Determine the total distance moved by the body.

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14. 2005 Q14 P1

A bullet is fired horizontally from a platform 15m high. If the initial speed is 300ms^{-1} . Determine the maximum horizontal distance covered by the bullet.

(3marks)

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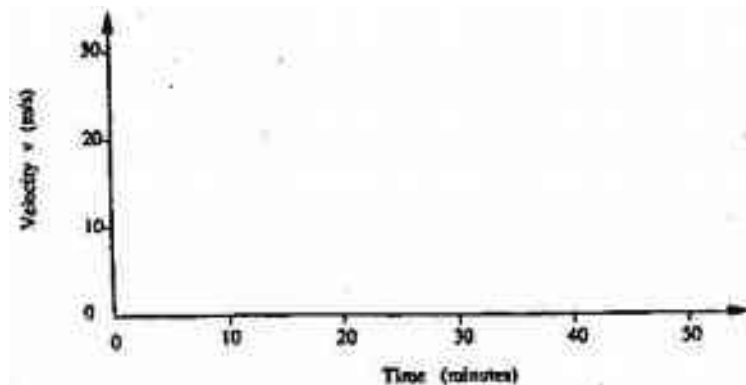
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15. 2006 Q6 P1

A car starting from rest accelerates uniformly for 5 minutes to reach 30m/s. It continues at this speed for the next 20 minutes and then decelerates uniformly to come to stop in 10 minutes.

On the axes provided, sketch the graph of velocity against time for the motion of the car. (1 mark)



16. 2007 Q9 P1

The graph in figure 6 shows the velocity of a car in the first 8 seconds as it accelerates from rest along a straight line. Use the graph to answer questions 16 and 17.

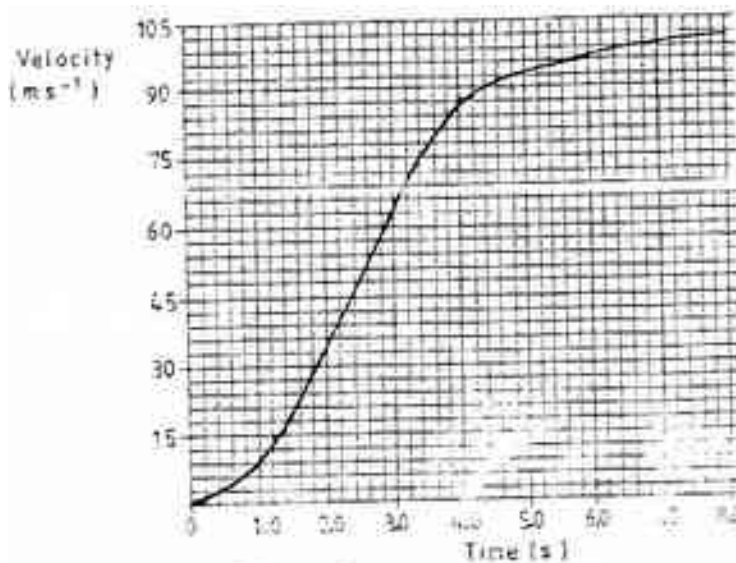


Figure 6

Determine the distance travelled 3.0 seconds after the start

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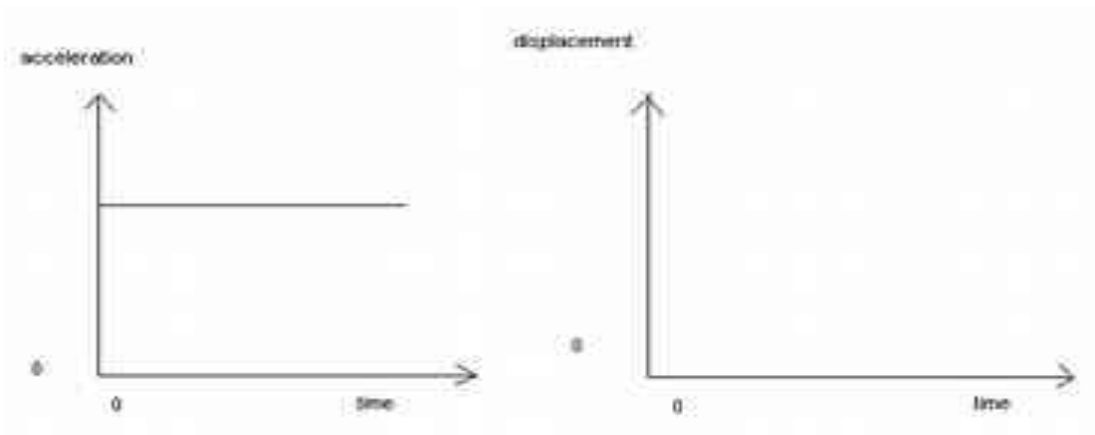
17. **2007 Q10 P1**
 Determine the acceleration of the car at 4.0 seconds (2 marks)

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18. **2009 Q2 P1**
 In an experiment to determine the acceleration due to gravity, g , a student measured the period, T , and length, L , of a simple pendulum. For a length $L=70.5\text{cm}$, the period T obtained was 1.7s. Given That $T=2\pi\sqrt{L/g}$, determine the value of g correct to two significant figures. (2 marks)

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19. **2009 Q12 P1**
 Figure 7 (a) shows the acceleration-time graph for a certain motion



On the axes provided in figure 7 (b), sketch the displacement-time graph for the same motion. (1 mark)

20. 2010 Q8 P1

A cart of mass 30kg is pushed along a horizontal path by a horizontal force of 8N and moves with a constant velocity. The force is then increased to 14N.

Determine:

i) The resistance to the motion of the cart.

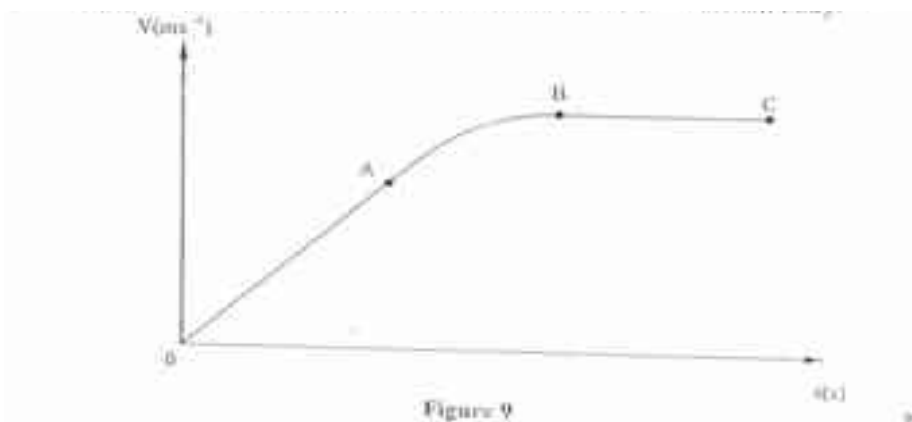
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ii) The acceleration of the cart.

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21. 2010 Q19 P1

a) Figure 9 shows a velocity-time graph for the motion of a certain body.



Describe the motion of the body in the region.

i) **OA** (1 mark)

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ii) **AB** (1 mark)

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iii) **BC** (1 mark)

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b) A car moving initially at 10ms^{-1} decelerates at 2.5ms^{-2}

i) Determine

i) its velocity after 1.5s:

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ii) the distance travelled in 1.5s (2 marks)

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iii) the time taken for the car to stop (2 marks)

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ii) Sketch the velocity-time graph for the motion of the car up to the time the car stopped. (1 mark)

iii) From the graph, determine the distance the car travelled before stopping. (2 marks)

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22. 2011 Q13 P1

A particle starts from rest and accelerates uniformly in a straight line. After 3 seconds it is 9m from the starting point. Determine the acceleration of the particle. (3

marks)

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21. 2012 Q8 P1

In verifying the pressure law of gases, the temperature and pressure of a gas are varied at constant volume. State the condition necessary for the law to hold.

(1 mark)

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