O Level Physics Tutorial 2: Kinematics

Syllabus :
(a) state what is meant by speed and velocity

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1. (a) State the meaning of distance and displacement.

(b) State the meaning of speed and velocity.

(b) calculate average speed = distance travelled / time taken

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2. A girl runs 4 m in 4 s, then 4 m in 5 s, and finally 3 m in 2 s.

Find her average speed.

(c) state what is meant by uniform acceleration and calculate the value of acceleration using change in velocity / time taken

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3. (i) State what is meant by uniform acceleration.

(ii) A car is driving at 10 km/h in a straight line. Over the next 60 s, it accelerates uniformly to 20 km/h. Calculate its acceleration in units of $m\ s^{-2}$.

(d) interpret given examples of non-uniform acceleration

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4. In each of the following case, state and explain whether it is uniform or non-uniform acceleration.

(i) falling stone,

(ii) falling feather,

(iii) stone thrown at 45^{o}.

(e) plot and interpret a displacement-time graph and a velocity-time graph for motion in one dimension

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(f) deduce from the shape of a displacement-time graph when a body is:
(i) at rest
(ii) moving with uniform velocity
(iii) moving with non-uniform velocity

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5. State if each of the following graph is at rest, moving with uniform velocity, or moving with non-uniform velocity.

(i)

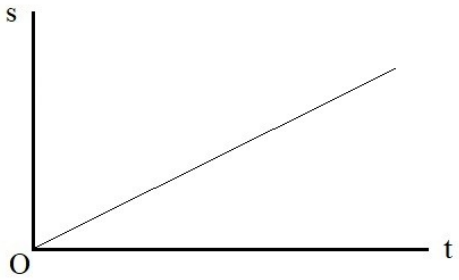

Figure 2-1(a)

(ii)

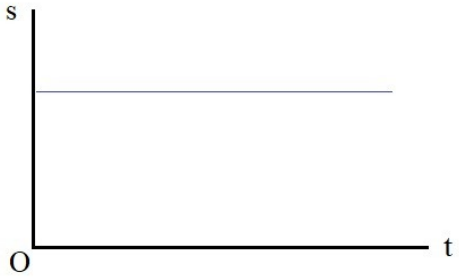

Figure 2-1(b)

(iii)

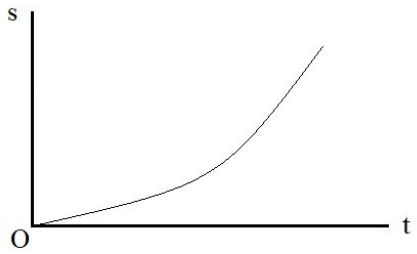

Figure 2-1(c)

(g) deduce from the shape of a velocity-time graph when a body is:
(i) at rest
(ii) moving with uniform velocity
(iii) moving with uniform acceleration
(iv) moving with non-uniform acceleration

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6. Sketch the shape of a velocity-time graph when a body is:

(i) at rest,
(ii) moving with uniform velocity,
(iii) moving with uniform acceleration,
(iv) moving with non-uniform acceleration.

(h) calculate the area under a velocity-time graph to determine the displacement for motion with uniform velocity or uniform acceleration

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7. Find the displacement from 0 to 10 s in each of the following graphs.

(a)

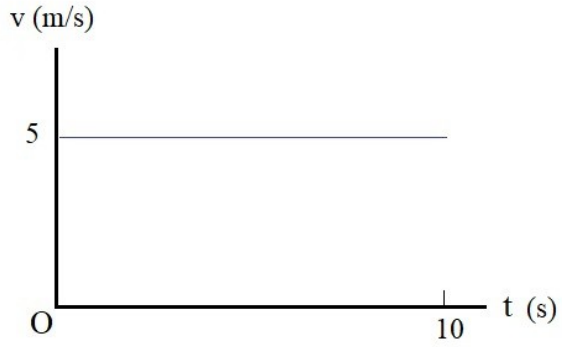

Figure 2-2a

(b)

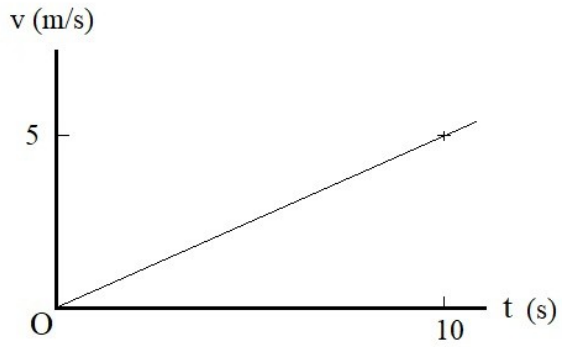

Figure 2-2b

(i) state that the acceleration of free fall for a body near to the Earth is constant and is approximately 10 m/s^2.

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8. (a) State the acceleration of free fall near Earth's surface.

   (b) A s tone is dropped from a height of 1 m. Use a graphical method to find :

      (i) the time it takes to hit the ground, and

      (ii) the velocity with which it hits the ground.