Sangam SKM College Nadi

Year 11

Physics

Worksheet 4 – Detailed solutions

Questions

1. A 6g feather on Earth is dropped on the moon from a height of 1.40 meters. The acceleration of gravity on the moon is $1.67\mathrm{m/s^2}$.

   a. What physical quantity of the feather would change on the moon?
   The physical quantity that will vary on the moon is weight due to the gravitational acceleration of the moon.

   b. Determine the feathers weight and mass on the moon.
      - *Since the mass would remain the same irrespective of gravitational acceleration, the mass of the feather would be 6g.*
      - *Weight of the feather can be found using $w = mg$, where m is 0.006 and g is 1.67m/s^2*

$$w = mg$$
$$w = (0.006)(1.67)$$
$$\underline{\boldsymbol{w = 0.01N}}$$

   c. Determine the time for the feather to fall to the surface of the moon.
   It is important to list down the data given in the question so that we can find final velocity first to determine time.
   $v_i = 0m/s \;\; d = 1.40m \;\; a = \; 1.67m/s \quad v_f =?$

   Using the 3rd equation of motion

$$(v_f)^2 = (v_i)^2 + 2ad$$
$$(v_f)^2 = (0)^2 + 2(1.67)(1.40)$$
$$(v_f)^2 = 4.676$$
$$v_f = 4.676$$
$$v_f = 2.16m/s$$

Since we know our final velocity we can use 1st or 2nd equation of motion to find time elapsed.

$$v_f = v_i + at$$

$$2.16 = 0 + 1.67t$$

$$t = \left(\frac{2.16}{1.67}\right)$$

$$\underline{\boldsymbol{t = 1.30\ seconds}}$$

2. Position-time information for a giant sea turtle, a cheetah, and the continent of North America are shown in the data tables below. Assume that the motion is **uniform** for these three objects.

   a. Record the position of these three objects.

Giant Sea Turtle

Time (hr)	Position (mi)
0	0
1	0.23
2	0.46
3	0.69
4	0.92
5	1.15
6	1.38

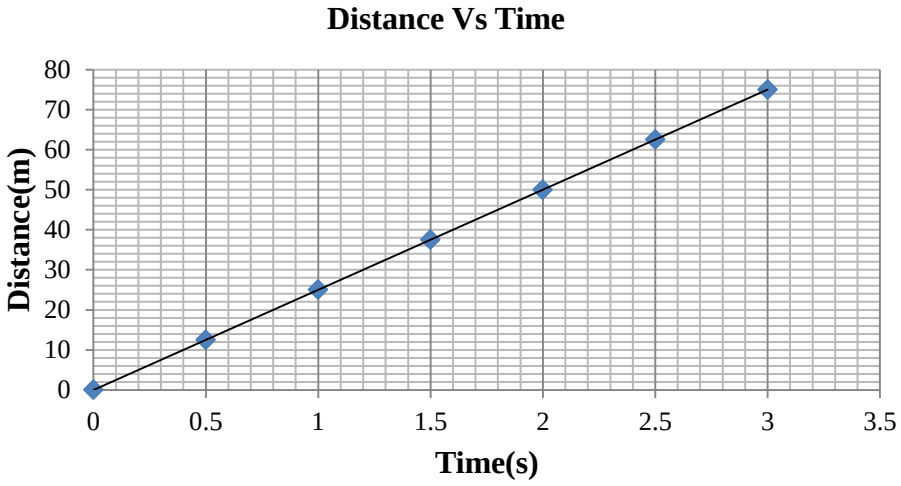
Cheetah

Time (s)	Position (m)
0	0
0.5	12.5
1	25
1.5	37.5
2	50
2.5	62.5
3	75.0

North America

Time (yr)	Position (cm)
0	0
0.25	0.25
0.50	0.50
0.75	0.75
1.0	1.00
1.25	1.25
1.50	1.50

   b. Sketch a suitable graph for the motion of the Cheetah.



c. Determine the speed of the Cheetah.

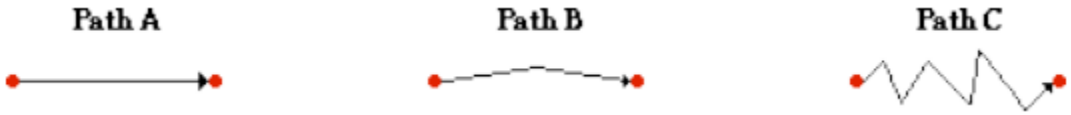
The speed may be interpreted by finding the gradient of the graph.

$$m = \frac{rise}{run}$$

$$m = \frac{12.5}{0.5}$$

$$\underline{= \mathbf{25m/s}}$$

3. Suppose you are considering three different paths (A, B and C) between the same two locations



Along which path would you have to move with the greatest speed to arrive at the destination in the same amount of time? _____ Explain?

We know the fundamental equation which is speed =distance/time. This tells us that speed is directly proportional to distance. If the path taken between the two points increases then the speed should also increase provided time is kept constant.