

## Mathematical Problems

1. A deer is running with a uniform 72 km/h velocity. In the meantime a tiger started chasing the deer from 72m behind with uniform acceleration  $1.5\text{ms}^{-2}$  for 30s. Is it possible for the tiger to catch the deer? Give your opinion with a mathematical analysis.
2. A truck moves from rest with a uniform acceleration of  $2\text{ms}^{-2}$  for 40 s. Determine the distance.
3. An object from rest travels a distance of 50 m in 5 seconds with uniform acceleration. Determine the acceleration and final velocity.
4. A motorcycle driver starts to move with a uniform acceleration of  $2\text{ms}^{-2}$  when he sees a bi-cycle moving with a uniform velocity of  $18\text{ms}^{-1}$ , at that time the cycle is 81 m behind the motorcycle. The initial velocity of the motorcycle is zero.
  - i) When does the velocity of the motorcycle and by-cycle become equal after starting?
  - ii) In their way motor-cycle and by-cycle will meet with each other only once. Explain.
5. A boy dropped a ball from the rooftop of a building a height of 19.6 m, The ball took 2s to touch the ground from the rooftop. Determine the acceleration of a freely falling body.
6. An object was dropped from the top of a building the height of which was 180 m, At the same time another body B was thrown up straight with a velocity of  $60\text{ms}^{-1}$ .
  - i) What will be the height of B object after 5s?
  - ii) Where will A and B meet? Show it mathematically?
7. When a rat was 15m ahead of a cat. The cat started running to catch the rat with a uniform acceleration of  $2\text{ms}^{-2}$ . The rat was running with a uniform velocity of  $14\text{ms}^{-1}$ .
  - i) Find out the time when the velocity of the cat will be equal to that of the rat.
  - ii) Will the cat be able to catch the rat? Explain mathematically.
8. An object is thrown upward from the earth at a speed of  $100\text{ms}^{-1}$ , How much height will it attain at how much time? Explain.
9. A bus driver sees a pedestrian at a 46 m distance when the bus is at 54 km/h of velocity. The driver holds the break instantly to save the pedestrian and the bus stops near the distance of 1m only, then find the acceleration of the bus.
10. A bus while moving with  $32\text{ms}^{-1}$  uniform velocity, saw that another bus was moving from its rest position with  $4\text{ms}^{-2}$  acceleration, the bus was 80m in front of the 1<sup>st</sup> bus.
  - i) Find out the traveling distance of the 2<sup>nd</sup> bus after 15 s.
  - ii) When will the buses meet with one another? Explain mathematically.
11. After hitting a football it rolls 90 m distance on the field at uniform retardation and then the goalkeeper catches it. At the time of hitting the velocity of the ball was 108 km/h.
  - i) After how much time the goalkeeper will catch the ball?
  - ii) If the ball would be thrown upwards would it cross the same distance? Analyze mathematically.
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