MOTION

1. (a) Derive the equation of motion $S = ut + \frac{1}{2}at^2$ by graphical mehod.
   (b) Derive the equation of motion $v^2 = u^2 + 2as$ by graphical mehod.

2. Which of the two bodies A and B in the following graph is moving with higher speed and why?
3. Give an example of uniform circular motion.
4. Distinguish between speed and velocity. A bus is moving with a speed of 72 km/hr On applying brakes it comes to rest in 5s. Find the acceleration and the distance travelled by the bus before coming to rest.
5. Draw a position- time graph for an object in uniform motion. Show that slope of the position time graph gives the velocity of the object.

6. Differentiate between distance and displacement. Length of the hour hand of a clock is R. Find the distance and displacement between 12 and 12.30.
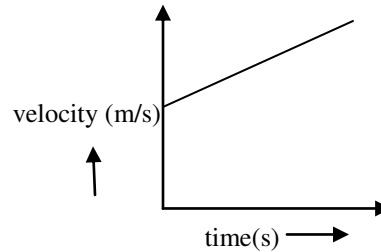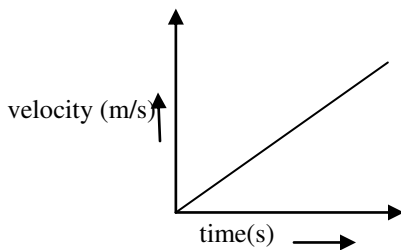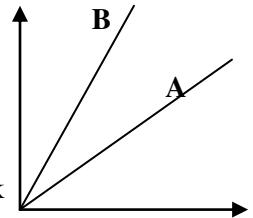
7. Give one similarity and one dissimilarity between the above two graphs.
8. What do you understand by the term acceleration?What is meant by its being positive or negative? Explain with example.What is its SI unit?
9. Identify the speed time graph which respectively represents the case of :
   (i)   A ball thrown vertically upwards and returning to the hands of the thrower.
   (ii)   A body negatively accelerating to a constant speed and then accelerating.
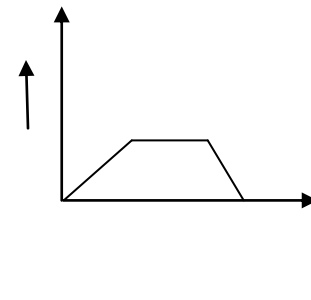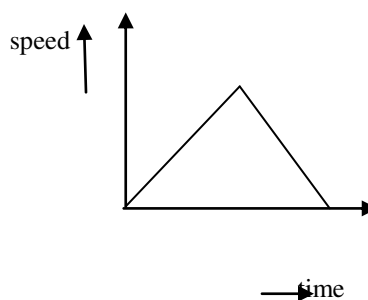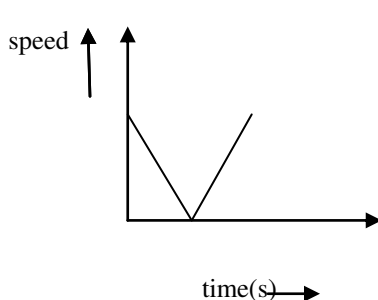
10. At the end of a race, a runner decelerates from the velocity of 9.00m/s at a rate of $2m/s^2$. (a) How far does he travel in the next 5s ? (b) What is his final velocity? (c) How much time will it take to finally stop?
11. A body can have zero velocity but not zero average speed. Justify giving an example.
12. Define uniform acceleration. Give one example of uniformly accelerated motion.
13. A bus decreases its speed from 72 km/hr to 54 km/hr in 5s. Find the acceleration of the bus.

14. A motor cycle moving with a speed of 5m/s obtains to an acceleration of $0.2m/s^2$. Calculate the speed of the motor cycle after 10s and the distance travelled by this time.
15. A body is moving with a velocity of 15m/s. If the motion is uniform , what will be its velocity after 10 s?
16. Starting from rest, Rohan pressed the accelerator of his car to attain a velocity of 12m/s in 30s. Then he applies brakes , such that the velocity of the car slows down to 8m/s in the next 5s . Calculate the acceleration of the car in both cases.
17. A powerful motor cycle can accelerate from rest to 28m/s in only 4s.(a) What is its average acceleration? (b) How far does it travel in that time?

FORCE

1. What is momentum of a mass of 75 kg when he moves with a velocity of 2m/s.
2. State reason for the following:
i)   While catching a fast moving cricket ball a fielder in the ground gradually pulls his hands backwards with the moving ball.
ii)   If a man jumps out from a boat the boat moves backwards
iii)   When a fireman directs a powerful stream of water on a fire from a hose-pipe, the hose pipe tends to go backwards.
3. If the mass of a body and the force acting on it are both doubled , what happens to its acceleration?
4. A physical quantity 'X' is identified as rate of change of velocity. Name 'X', with its SI unit. If for an object in motion value of 'X' is zero, is the object in uniform motion or not? Give reason for your answer.
5. Explain:
a) It is easier to stop a tennis ball rather than a cricket ball moving with the same speed.
b) A runner presses the ground with his feet before starts his run.
6. A boy of mass 50 kg running at 5 m/s jumps on to a 20 kg trolley travelling in the same direction at 1.5 m/s. Find their common velocity.
7. What is the relation between the mass m and the weight W of a body? What are the differences between the two?
8. How does a Kung fu master breaks pile of tiles with a blow from his hand. Explain it mathematically.
9. On what factors does the magnitude of the following physical quantities depend?
i)   Momentum   ii) Force   iii) Inertia
10. State Newton's first law of motion. Why this law is called law of inertia? On basis of this law explain the following:
a) It is necessary to wear seat belt while driving a vehicle.
b) When carpet is beaten with a stick dust comes out of it.
c) It is difficult to push a heavy box than an empty box of same size
11. State Newton's first, second and third law of motion.
12. A heavy person experiences more sideways push when a moving vehicle turns suddenly. Why?

GRAVITATION

1. How does the value of 'g' at the poles change as compared to the value of 'g' at the equator?
2. A stone and the earth attract each other with an equal and opposite force. Why then we see only the stone falling towards the earth but not the earth rising towards?

3. A boy on 78.4m high cliff drops a stone. One second later, he throws another stone downwards with some speed.The two stones reach the ground simultaneously. Find the speed with which the second stone was thrown.
4. Prove that if the earth attracts two bodies placed at the same distance from the centre of the earth, with equal force then their masses will be same.
5. Mathematically express the acceleration due to gravity in terms of mass of the earth and radius of the earth.
6. Why is "G" called a universal constant?
7. A stone weighs 490N on a planet whose acceleration due to gravity is one-half of the earth's value. Calculate (i) the mass of the stone   (ii)weight of the stone on earth.
8. If you divide the total distance travelled on a car trip by the time for the trip are you calculating the average speed or the magnitude of the average velocity. Under what circumstances are these two quantities the same. Illustrate with an example.
9. A stone resting on the ground has a gravitatinal force of 20N acting on it. What is the weight of the stone? Find its mass. (g = 10 m/s^2)
10. Why are the tides caused?
11. a)Differentiate between 'G' and 'g'.
    b)Is the value of 'g' same everywhere on earth? Reason out.
    c) How does the gravitational force between two objects change if distance between them is tripled?