SCIENCE CLASS IX
CHAPTER-10 GRAVITATION

Q.1. State two factors on which the gravitational force between two objects depends.

Ans. The two factors on which the gravitational force between two objects depends are

(i) Masses of two objects.

(ii) Distance between the two objects.

Q.2. What would happen if the centrifugal force between moon and earth vanish away?

Ans. If the centrifugal force between moon and earth vanish away, then the moon moves along a straight line path with uniform speed.

Q.3. The earth is acted upon by gravitational of sun then it does not fall into the sun. why?

Ans. The earth does not fall into the sun because the earth remains in its circular orbit due to the gravitational force acting on it.

Q.4. How is acceleration due to gravity of a falling body related to its mass?

Ans. Acceleration due to gravity does not depend on the mass of the falling body rather it depends on the mass of the planet toward which the body is falling.

Q.5. Which force bring tides in the ocean?

Ans. Gravitational force of the moon bring tides in the ocean.

Q.6. Identify the device used to measure weight of a body.

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

Ans. Spring balanced is used to measure weight of a body.

Q.7. How does the of a body vary with its height.

Ans. For a body at height h,

$$\text{Weight} \propto \frac{1}{(R+h)^2}$$

Q.8. Name the device used to measure mass of a body.

Ans. Pan balance is used to measure the mass of a body.

Q.9. When a body is thrown upwards its velocity becomes zero at the highest point. What will be its acceleration at this point?

Ans. The acceleration at this point is equal to the value of g in the downward direction.

Q.10. In vacuum, which of the two a feather and a coin reach the ground first on being dropped?

Ans. In vacuum, both feather and coin will reach the ground simultaneously because air resistance is absent.

Q.11. The astronauts in space feel weightless. Why?

Ans. They do not exerts any force/weight on their spaceship in the absence of gravity in space.

Q.12. What will be the mass and weight of a unit mass at the centre of earth?

Ans. At the centre of earth, weight of an object is zero because mass is 1 kg but weight is zero.

Q.13. Why should the bullet be fired a little above the line of target?

Ans. The bullet follows a curved path due to gravity of earth.

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

Q.14. What exerts greater attractive force on the other earth on an apple or apple on the earth?

Ans. According to Newton's law of gravitational, both exert equal magnitude of gravitational force on each other.

Q.15. Name the place on the earth's surface where the weight of a body is maximum and minimum?

Ans. Weight is maximum at poles and minimum at equator.

Q.16. Does air resistance very with surface area of the body?

Ans. Yes, more the surface area, more will be the air resistance.

Q.17. Two masses 4 kg and 2 kg are dropped from 5 m and 10 m from the ground respectively. Which will be accelerated more?

Ans. Acceleration due to gravity is independent of mass. So, they accelerate equally.

Q.18. When a spring balance, holding a mass is let fall freely, what is the reading it will show?

Ans. It will show zero reading. Since it is falling freely.

Q.19. What keeps the moon in uniform circular motion around the earth?

Ans. Gravitational force between the moon and the earth keeps moon in uniform circular motion around the earth.

Q.20. What is the final velocity, when a body is dropped from a height?

Ans. The final velocity is zero when a body is dropped from a height.

Q.21. Which forces causes things to fall towards the earth?

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

Ans. Gravitational force causes things to fall towards the earth.

Q.22. Anu buys 100 g of gold at the poles. What will be the weight of gold at equator?

Ans. Value of acceleration due to gravity (g) is less at equator than poles, so weight of 100 g gold will be less at equator.

Q.23. Two objects attract each other with an attractive force F. If masses of both the objects are doubled, calculate the new force between them.

Ans. Force between two objects $F \propto m_1 m_2$, if mass of both the objects are doubled then

$F \propto (2m_1)(2m_2) = F \propto 4m_1 m_2$

So, force between two objects becomes 4 times.

Q.24. Two particles are placed at some distance. If the mass of each of the two particle is doubled, keeping the distance between them unchanged, what will be the value of gravitational force between them?

Ans. Gravitational force, $F = G\frac{Mm}{r^2}$

If mass of each particle is doubled

Therefore $F' = G\frac{(2M)(2m)}{r^2}$

or $F' = 4G\frac{Mm}{r^2}$

$F' = 4F$

Q.25. An apple falls from a tree because of gravitational attraction between the earth and apple. If F_1 is the magnitude of force exerted by the earth on the

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

apple and F_2 is the magnitude of force exerted by apple on earth, then find the relation between F_1 and F_2 .

Ans. From third law of motion, to every action, there is an equal and opposite reaction and they act on two different bodies, so F_1 and F_2 are equal.

Q.26. Although gravitational force which acts on the bodies is propotional to their masses, then why do heavy bodies not fall faster than lighter bodies.

Ans. The acceleration due to gravity is independent of the mass of the object.

Q.27. Two bodies of different masses are allowed to fall freely. How do their accelerations vary? Compare.

Ans. Acceleration produced in freely falling bodies is the same for all bodies, irrespective of their masses.

Q.28. When do we use the term ' force of gravity' rather than 'force of gravitation'?

Ans. We use the term 'force of gravity' rather than 'force of gravitation' for the force of attraction between two bodies in which one body had infinitely large mass.

Q.29. At which place on the earth, the acceleration due to gravity is zero.

Ans. At the centre of the earth, the acceleration due to gravity is zero.

Q.30. Where can the weight of a body be zero , apart from the centre of the earth?

Ans. Apart from the centre of the earth, the weight of an object can be zero in the inter-planetary space, where g = 0.

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

Q.31. If the earth attracts an apple, does the apple also attract the earth. If yes, why does the earth not move towards the apple?

Ans. The reason is that acceleration of the apple is very high while that of the earth is negligible due to its infinitely large mass. Consequently the earth attracts an apple, but the apple does not attract the earth towards itself.

Q.32. Name the scientist who determined the value of universal gravitational constant.

Ans. Cavendish determined the value of universal gravitational constant.

Q.33. If gravitational force acts between all objects, why don't they move towards each other?

Ans. The gravitational force is very weak, hence objects kept on a surface don't move towards each other.

Q.34. Distance between two objects is halved. How does the gravitational force between them change?

Ans. When distance is half, F becomes for times as

$$F \propto \frac{1}{r^2}$$

Q.35. A stone dropped from a tree taken 2 s to reach the ground. Find its velocity on striking the ground.

Ans. Given, u = 0, t = 2 s, v = ?

From equation, v = u + at = 0 + 9.8 × 2 = 19.6 m/s

Q.36.Suppose gravity of earth suddenly becomes zero, then which direction will the moon begin to move if no other celestial body affects it?

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

Ans. The moon will begin to move in a straight line in the direction in which it was moving at that instant because the circular motion of moon is due to centripetal force provided by the gravitational force of the earth.

Q.37. Two objects of masses m_1 and m_2 are dropped in vacuum from a height above the surface of earth (m_1 is greater than m_2). Which one will reach the ground first and why?

Ans. Both will reach the ground at the same time because acceleration produced in freely falling bodies is the same for all bodies, irrespective of their masses.

Q.38. In Newton's universal law of gravitation, what does universal mean?

Ans. The word universal means the law holds the same everywhere in the universe.

Q.39. How does tha value of G vary with height above the ground?

Ans. The value of g decreases with increase in height above the ground.

Q.40.What is the source of centripetal force that a planet requires to revolve around the sun? On what factor does that force depend?

Ans. The motion of the planet around the sun is due to the centripetal force. This centripetal force is provided by the gravitational force between the planet and the sun.

This force depends on the mass of the sun and mass of the planet, on the distance between sun and planet.

Q.41. An object is thrown vertically upwards and reaches a height of 10 m. Find (i) the velocity with which it was thrown up.

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

(ii) time taken by it to reach the highest point.

($g = 9.8\ m/s^2$)

Ans. Height of an object, h = 10 m

Acceleration due to gravity g = - 9.8 m/s^2

(negative sign in taken for upward motion)

Final velocity, v = 0

(i) $u = \sqrt{v^2 - 2gh}$

$= \sqrt{0 - 2(-9.8)(10)}$

$= \sqrt{196} = 14$ m

(ii) Time taken, $t = \frac{v-u}{g} = \frac{0-14}{-9.8} = 1.4$ s

Q.42. A car falls off a ledge and drops to the ground in 0.5. Find

(i) the speed on striking the ground.

(ii) its average speed during 0.5 s.

(iii height of ledge from the ground ($g = 10\ m/s^2$)

Ans. Initial velocity, u = 0, time taken, t= 0.5 s, acceleration due to gravity, g = 10 m/s^2

(i) $v = u + gt = 0 + 10 \times 0.5 = 5$ m/s

(ii) $v_{av} = \frac{u+v}{2} = \frac{0+5}{2} = 2.5$m/s

(iii) $h = ut + \frac{1}{2}gt^2$

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

$= 0 + \frac{1}{2} \times 10 \times (0.5)^2 = 1.25$ m

Q.43. Two stones are taken and simultaneously thrown from a tower. One is thrown horizontally while other is dropped down. Which of them reaches the ground first and why?

Ans. Both the stones reach the ground together.

Reasons

(i) Time of descent along vertical path does not depend on horizontal velocity.

(ii) Initial vertica; velocity of both bodies is zero while g on both is same.

Q.44. Calculate the average density of earth in terms of g, G and R.

Ans. According to the formula, Density = $\frac{Mass}{Volume}$

If radius of earth is R, volume = $\frac{4}{3}\pi$ R^3.

(since shape of earth is spherical)

Mass of earth, M = $\frac{gR^2}{G}$ $\left[therefore\ G = \frac{GM}{R^2}\right]$

Therefore Density = $\frac{gR^2}{G} \Big/ \frac{4}{3}\pi R^3$

$= \frac{3g}{4\pi RG}$

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

Q.45. The weight of any person on moon is about 1/6th of that on earth. He can lift a mass of 15 kg on the earth. What will be the maximum weight which can be lifted by the same force applied by the person on the moon?

Ans. Maximum weight which can be lifted = mg

$= 15 \text{ kg} \times 9.8 \text{ m/s}^2 = 147 \text{ N}$

Weight which can be lifted on moon

$$= 147 \text{ N} \times \frac{1}{\frac{g\ earth}{6}}$$

(therefore At moon, acceleration due to gravity is $\frac{1}{6}$th to that of earth)

$$= \frac{147 \times 6}{9.8} = \frac{147}{1.63} = 90 \text{ kg}$$

Q.46. Given $g_{earth} = 10 \text{ m/s}^2$, find the weight of a 5 kg object on (i) earth and (iii) moon.

Ans. (i) $W_{earth} = mg_{earth} = 5 \times 10 = 50 \text{ N}$

(ii) $W_{moon} = \frac{W_{earth}}{6} = \frac{50}{6} = 8.33\text{N}$

Q.47. A body is dropped from a height h. what is its height above the ground after 2 s of its fall? ($g = 10\text{m/s}^2$)

Ans. Initial velocity u = 0, time taken r = 2s, acceleration due to gravity a = g

As $s = ut + \frac{1}{2}gt^2$

$$= 0 + \frac{1}{2} \times 10 \times (2)^2 = 20 \text{ m}$$

Q.48. Find the gravitational force of attraction between a body of unit mass and moon, given

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

mass of the moon = 7.4×10^{22} kg,

radius of moon = 1.74×10^{6} m,

G = 6.67×10^{-11} Nm^2/kg^2

Ans. Mass of the body m = 1 kg,

Mass of the moon, M = 7.4×10^{22}kg,

Radius of moon R = 1.74×10^{6}m

Therefore F = $\frac{GMm}{R^2}$

$= \frac{6.67 \times 10^{-11} \times 7.4 \times 10^{22} \times 1}{(1.74 \times 10^{6})^2}$

= 1.63 N

Q.49. A ball is dropped from a height half of the earth's radius Find the value of g at this point.

Ans. At (R+h) = R + $\frac{R}{2} = \frac{3R}{2}$ height, (therefore h = R/2)

$g = \frac{GM}{(R+h)^2} = \frac{GM}{(3\,R/2)^2} = \frac{4GM}{9R^2}$

$= \frac{4}{9} \times 10 = 4.44$ m/s^2

Q.50. How was Galileo able to conclude that the acceleration of an object falling freely towards the earth does not depend on the mass of the object?

Ans. Galileo climbed to the top of the leaning tower of Pisa in the presence of a large gathering and dropped spheres of different masses and materials from the top simultaneously.

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

All the spheres reached the earth's surface at the same time. So, he conclude that the acceleration of an object falling freely towards the earth does not depend on the mass of the object.

Q.51. Mention any four phenomena that the universal law of gravitation was able to explain.

Ans. The universal law of gravitation was able to explained successfully

(i) The force that binds us to the earth,

(ii) The motion of the moon around the earth,

(iii) The motion of planets around the sun and

(iv) The tides due to the moon and the sun.

Q.52. Why does a body reach the ground quicker at poles than at the equator when dropped from the same height?

Ans. The acceleration due to gravity is more at the poles than at the equator. The time taken for a body is smaller if the acceleration due to gravity is more when the initial velocities and the distance travelled are the same. So, when dropped from the same height a body reaches the ground quicker at poles than at the equator.

Q.53. A stone is dropped from a cliff. What will be its speed when it has fallen 100 m?

Ans. Height, h = 100 m, initial velocity u = 0

$$V^2 = u^2 + 2gh$$

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

$= 0 + 2 \times 9.8 \times 100 = 1960$

$v = 44.2$ m/s

Q.54. How would the weight of an object change if it is initially weighed in Delhi and then taken to the

(i) Poles (ii) Equator?

Ans. (i) The weight of an object at poles is heavier. At poles the acceleration due to gravity is maximum.

(ii The weight of an object at equator is lighter and at equator it is minimum.

Q.55. What will be the weight of the following objects on the earth when weight on the moon is

(i) 1800 kg (ii) 400 kg

Ans. Weight on the earth $W_e = 6 \times W_m$.

So,

(i) $W_e = 6 \times 1800 \times 10 = 108000$ N

(ii) $W_e = 6 \times 400 \times 10 = 24000$ N

Q.56. Give two reasons for the variation of g at the equator and the poles.

Ans. The variation of g at the equator and at the poles are

(i) Difference in the radius and

(ii) Rotation of the earth

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

Q.57. Estimate the gravitational force between two protons ($1.6 \times 10^{-27} \times 1.6 \times 10^{-27}$ kg) separated by a distance of 1 A.

Ans. Gravitational force F = $\frac{G\,M_P M_P}{r^2}$

Mass of protons, $M_P = 1.6 \times 10^{-27}$kg (given)

Distance = 1 A = 10^{-10}m

Therefore F = $\frac{6.67 \times 10^{-11} \times 1.6 \times 10^{-27} \times 1.6 \times 10^{-27}}{(10^{-10})^2}$

$= 17 \times 10^{-45}$ N

Q.58. What is the acceleration due to gravity at a height $\frac{R}{5}$ from the surface of the earth (radius R)?

Ans. We know that at any height,

$$g = \frac{GM}{(R+h)^2}$$

If h = $\frac{R}{5}$,

Then g = $\frac{GM}{\left(R+\frac{R}{5}\right)^2} = \frac{GM}{R^2} \times \frac{25}{36} = 0.69\,\frac{GM}{R^2}$

Q.59. A ball is thrown up with the velocity of 19.6 m/s.

(i) How long will it take to reach the maximum height?

(ii) How high will it go?

Ans. Initial velocity, u = 19.6 m/s

Acceleration value to gravity, g = -9.8 m/s^2

(i) Final velocity, v= 0 at maximum height

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

Therefore $t = \frac{u}{g} = \frac{19.6}{9.8} = 2s$

(ii) $V = u^2 - 2gh$

$u^2 = 2gh$

$= \quad h = \frac{u^2}{2g} = \frac{(19.6)^2}{2 \times 9.8} = 19.6$ m

Q.60. Define the term centre of gravity. Does it vary from centre of mass always. Give reason with an example.

Ans. Centre of gravity is defined as the point at which the entire force of gravity is said to act.

Centre of gravity and centre of mass coincide for little masses. For example in a uniform rod, they coincide. For larger extended bodies, they will not coincide, since g varies.

Q.61. What will be the weight felt by a man of mass(m) accelerating up with a lift by a m/s^2 upwards?

Ans. Consider a man of mass (m) standing inside a lift. The force acting are indicated as shown below. The net force should provide the necessary acceleration to the man so that he is accelerated along with the lift.

Therefore $M - mg = ma$

$M = ma + mg$

So, he fells more weight than usual.

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

Q.62. On the earth, a stone is thrown from a height in a direction parallel to the earth's surface while another stone is simultaneously dropped from the same height. Which stone would reach the ground first and why?

Ans. Time taken by both stone

$$t = \sqrt{\frac{2h}{g}}$$

Therefore, if we drop down a stone from a height and at same time throw another stone in horizontal direction, then both the stones strike the earth simultaneously at different places.

Q.63. Suppose gravity of earth suddenly becomes zero, then in which direction will the moon begin to move if no other celestial body affects it?

Ans. In the absence of gravity of earth, the moon flies off along a straight line. This straight line will be a tangent to the circular path.

Q.64. Identical packets are dropped from two aeroplanes, one above the equator and the other above the north pole, both at height h. assuming all conditions are identical, will those packets take same time to reach the surface of earth. Justify your answer.

Ans. No, those packets do not take same time to reach the surface of earth. The earth is not a perfect sphere. As the radius of the earth increases from the poles to the equator, the value of g becomes greater at the poles than at the equator.

Q.65. Find the weight of 80 kg man on the surface of the moon? What should be his mass on the earth and on the moon?

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

(g_e = 9.8 m/s^2 , g_m = 1.63 m/s^2)

Ans. Mass on the earth = Mass on the moon = 80 kg

$W_e = 9.8 \times 80 = 784$ N

$W_m = 1.63 \times 80 = 130.4$ N

Q.66. What is the distance covered by a freely falling body during the first three seconds of its motion? (Take g = 10 m/s^2)

Ans. u = 0, t = 3 s, g = 10 m/s^2

$$s = ut + \frac{1}{2}gt^2$$

$$= 0 + \frac{1}{2} \times 10 \times (3)^2 = 4.5 \text{ m}$$

Q.67. Give reasons

(i) Moon does not have atmosphere.

(ii) If you jump on the moon, you will rise much higher than if you jump on the earth.

Ans. (i) Moon does not have strong gravity to hold atmospheric gases.

(ii) Acceleration due to gravity (g) is much less on the moon surface.

Hence, $h = \frac{v^2-u^2}{2g}$ is larger.

Q.68. Suppose that the radius of the earth becomes twice of its original radius without any change in its mass. Then, what will happen to your weight?

Ans. We know that,

$$F = G\frac{Mm}{r^2}$$

Weight of a body is the force with which a body is attracted towards the earth,

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

$$W = \frac{GMm}{r^2}$$

If the radius of the earth becomes twice of its original radius, then

$$W = G\frac{Mm}{(2R)^2} = \frac{GMm}{4R^2} = \frac{W}{4}$$

Thus, the weight will be reduced to one-fourth of the original.

Q.69. Give the characteristics of gravitational force.

Ans. The characteristics of gravitational force are

(i) Weak force (ii) long range force

(iii) always attractive in nature

Q.70. How much would a 70 kg man weight in the moon? What would be his mass on the earth and on the moon? (Acceleration due to gravity on moon = 1.63 m/s^2)

Ans. Let us calculate the weight of the man on the moon.

Mass of the man on the moon, m = 70 kg

Acceleration due to gravity, g = 1.6 m/s^2

We know that weight is given by

W = m × g = 70 × 1.63 = 114.1 N

Thus, the man weight 114.1 N on the moon. We know that the mass of a body is constant everywhere in universe. So, the mass of this man would be same on the earth as well as on the moon. Hence, the mass will be 70 kg on earth as well as on moon.

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

Q.71. To find the height of a bridge over a river, when a stone is dropped freely in the river from the bridge. The stone takes 2 s to touch the water surface in the river. Calculate the height of the bridge from the water level (g = 9.8 m/s^2).

Ans. Initial velocity of the stone, u = 0

Time taken, t = 2s

Acceleration due to gravity, g = 9.8 m/s^2

Height of the bridge, h = ?

Using equation $h = ut + \frac{1}{2} gt^2$

$= 0 \times 2 + \frac{1}{2} 9.8 (2)^2$

$= \frac{1}{2} \times 9.8 \times 4 = 19.6$ m

Thus, the height of bridge above the water level is 19.6 m.

Q.72. Prove that if a body is thrown vertically upward, the time of ascent is equal to the time of descent.

Ans. The upward motion is given below

$v = u - gt_1$, $0 = u - gt_1$, $t_1 = \frac{u}{g}$ .....(i)

and the downward motion

$v = u + gt_2$, $v = 0 + gt_2$

As the body falls back to the earth with the same velocity it was thrown vertically upwards.

Therefore $v = u$, $u = 0 + gt_2$

$t_2 = \frac{u}{g}$ .....(ii)

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

from Eqs. (i) and (ii), we have

$t_1 = t_2$

Time of ascent = Time of descent

Q.73. On the earth, a stone is thrown from a height in a direction parallel to the earth's surface while another stone is simultaneously dropped from the same height. Which stone would reach the ground first and why?

Ans. For both the stones

Initial velocity, u = 0

Acceleration in downward direction = g

Now, $h = ut + \frac{1}{2}gt^2$

$h = 0 + \frac{1}{2}gt^2$ = $h = \frac{1}{2}gt^2$

$t = \sqrt{\frac{2h}{g}}$

Both stones will take the same time to reach the ground because the two stones fall from the same height.

Q.74. State the source of centripetal force that a planet requires to revolve round the sun. On what factors does the force depend?

Suppose this force suddenly becomes zero, then in which direction will the planet begin to move, if no other celestial body affects it?

Ans. The source of centripetal force is the gravitation force.

It depends upon the following factors

(i) Mass of the earth and the sun.

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

(ii) Distance between the earth and the sun.

If this force suddenly becomes zero then the planet will begin to move in a straight line in the direction in which it was moving at that instant.

Q.75. (i) Seema buys few grains of gold at the poles as per the instruction of one of her friends. She hand over the same when she meets her at the equator. Will the friend agree with the weight of gold bought? If not, why?

(ii) if the moon attracts the earth, why does the earth not move towards the moon?

Ans. (i) No, her friend will not agree with the weight of gold bought because weight at poles is greater than the weight at equator.

(ii We know that the gravitational force is always attractive, still the moon does not fall on the earth because the gravitational force between earth and the moon works as the necessary centripetal force for the moon to make it revolving the earth.

Q.76. Manu is an archery trainer. While teaching his students, he asks them to keep the arrow a little obove the target. Sonu is very curious to know the reason behind this and asks him. Manu explains very patiently to Sonu, on how the arrow travels when released.

Read the above passage and answer the following questions

(i) What explanation does Manu give to sonu?

(ii) What are the values of Sonu?

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

(iii) What are the values of Manu?

Ans. (i) He tells Sonu that the arrow follows a curved path (projectile motion) and hits a little below the aim.

(ii Sonu is inquisitive, recipient, logical and questioning child.

(iii Manu is patient, scientific, logical and convincing.

Q.77. Raju sees a kite string cut in the sky. He wants to catch it. So he stands just below the position to kite. To his dismay, the kite falls away much farther and is caught by someone else. He is very disappointed. He tells his grandfather that it should fall down straight just like a coin. His grandfather then explains him the reason behind this. He also buys him a new kite.

Reason the above passage and answer the following questions

(i) Why does the kite not fall straight down?

(ii) Give the list of values of Raju.

(iii) Give the list of values of his grandfather.

Ans. (i) Kite is affected by air resistance and changes path with air currents.

(ii) Raju is inquisitive, sporting, questioning and thoughtful boy.

(iii) His grandfather is patient, intelligent, logical and kind man.

Q.78. Mohit throws a ball horizontally while Shobbit throws a ball vertically downwards from a tower.

Both of them do so in an attempt to see who hits the stone on ground first. After that, they try to reason their findings

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

Read the above passage and answer the following questions

(i) Which ball reaches the ground first?

(ii) What are the values of Mohit and Shobbit?

Ans. (i) Both balls reach the ground simultaneously Because both of them have been dropped from the same height.

(ii Mohit and Shobbit are inquisitive, logical, experimental and competitive.

Q.79. Shikha buys a few grams of precious stones in Delhi. She takes them to equator and is surprised to see that their weight is reduced. She thinks that she has been cheated. She goes back to the seller and claims the exchange amount. The shopkeeper explains her how weight differs due to value of g. Satisfied, Shikha goes back.

Read the above passage and answer the following questions

(i) List few values of Shikha.

(ii) What are the values of shopkeeper?

(iii) How does g vary with distances?

Ans. (i) Shikha jumps to conclusion without thinking twice.

(ii) Shopkeeper is logical, patient and scientific.

(iii) $g \propto 1/R^2$, at equators g is minimum and at poles g is maximum.

Q.80. Shikhaj was taught the concept of gravitation in class. He wondered why a table and chair not move towards each other. Confused, he goes to prof. Raman

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co

who makes him sit and calculate the gravitational force between a table and chair of given masses. Shikhaj is now convinced about the small magnitude of these forces.

Read the above passage and answer the following questions

(i) What values of Prof. Raman must be noted?

(ii) Which values of Shikhaj will you appreciate?

(iii) How do you think practicle situation helps in understanding something better?

Ans. (i) Prof. Raman is practicle, inspiring and systematic.

(ii) Shikhaj is inquisitive, applicative and thoughtful.

(iii) Practicle situation helps to develop a better understanding of the concept and tells how it is related to daily life situation.

Address: Plot No 420, Behind Shopprix Mall, Vaishali Sector 5, Ghaziabad – 201010
M: 9999907099, 9818932244 O: 0120-4130999
Website: www.vaishalieducationpoint.com , www.educationsolution.co