

## Gravitation

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Question 1.

A body is projected vertically from the surface of the earth of radius  $R$  with velocity equal to half of the escape velocity. The maximum height reached by the body is

- (a)  $R$
- (b)  $R/2$
- (c)  $R/3$
- (d)  $R/4$

▼ Answer

Answer: (c)  $R/3$

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Question 2.

When the planet comes nearer the sun moves

- (a) fast
- (b) slow
- (c) constant at every point
- (d) none of the above

▼ Answer

Answer: (a) fast

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Question 3.

Keplers second law regarding constancy of arial velocity of a planet is a consequence of the law of conservation of

- (a) energy
- (b) angular momentum
- (c) linear momentum
- (d) none of these

▼ Answer

Answer: (b) angular momentum

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Question 4.

The escape velocity for a body projected vertically upwards from the surface of the earth is  $11\text{km/s}$ . If the body is projected at an angle of  $45^\circ$  with the vertical, the escape velocity will be

- (a)  $11/\sqrt{2}\text{ km/s}$
- (b)  $11\sqrt{2}\text{ km/s}$
- (c)  $2\text{ km/s}$
- (d)  $11\text{ km/s}$

▼ Answer

Answer: (d)  $11\text{ km/s}$

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Question 5.

The radii of the earth and the moon are in the ratio  $10 : 1$  while acceleration due to gravity on the earths surface and moons surface are in the ratio  $6 : 1$ . The ratio of escape velocities from earths surface to that of moon surface is

- (a)  $10 : 1$
- (b)  $6 : 1$

- (c) 1.66 : 1
- (d) 7.74 : 1

▼ Answer

Answer: (d) 7.74 : 1

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Question 6.

The escape velocity of a body from the surface of the earth is  $v$ . It is given a velocity twice this velocity on the surface of the earth. What will be its velocity at infinity?

- (a)  $v$
- (b)  $2v$
- (c)  $\sqrt{2}v$
- (d)  $\sqrt{3}v$

▼ Answer

Answer: (d)  $\sqrt{3}v$

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Question 7.

The period of geostationary artificial satellite is

- (a) 24 hours
- (b) 6 hours
- (c) 12 hours
- (d) 48 hours

▼ Answer

Answer: (a) 24 hours

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Question 8.

If the radius of the earth were to shrink by 1% its mass remaining the same, the acceleration due to gravity on the earth's surface would

- (a) decrease by 2%
- (b) remain unchanged
- (c) increase by 2%
- (d) will increase by 9.8%

▼ Answer

Answer: (c) increase by 2%

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Question 9.

The mean radius of the earth is  $R$ , its angular speed on its own axis is  $\omega$  and the acceleration due to gravity at earth's surface is  $g$ . The cube of the radius of the orbit of a geo-stationary satellite will be

- (a)  $r^2g / \omega$
- (b)  $R^2\omega^2 / g$
- (c)  $RG \omega^2$
- (d)  $R^2g / \omega^2$

▼ Answer

Answer: (d)  $R^2g / \omega^2$

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Question 10.

If escape velocity from the earth's surface is 11.2 km/sec. then escape velocity from a planet of

mass same as that of earth but radius one fourth as that of earth is

- (a) 11.2 km/sec
- (b) 22.4 km/sec
- (c) 5.65 km/sec
- (d) 44.8 km/sec

▼ [Answer](#)

Answer: (b) 22.4 km/sec

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Question 11.

Geo-stationary satellite

- (a) revolves about the polar axis
- (b) has a time period less than that of the earth's satellite
- (c) moves faster than a near earth satellite
- (d) is stationary in the space

▼ [Answer](#)

Answer: (a) revolves about the polar axis

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Question 12.

If the radius of the earth were to be reduced by 1% its mass remaining the same, the acceleration due to gravity on the surface of the earth will

- (a) increase by 1%
- (b) decrease by 2%
- (c) decrease by 1%
- (d) increase by 2%

▼ [Answer](#)

Answer: (d) increase by 2%

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Question 13.

If the distance between the earth and the sun were half its present value, the number of days in a year would have been

- (a) 64.5
- (b) 129
- (c) 182.5
- (d) 730

▼ [Answer](#)

Answer: (b) 129

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Question 14.

If the radius of the earth were to shrink by 1% its mass remaining the same, the acceleration due to gravity on the earth's surface would

- (a) decrease by 2%
- (b) remain unchanged
- (c) increase by 2%
- (d) will increase by 9.8%

▼ [Answer](#)

Answer: (c) increase by 2%

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Question 15.

If escape velocity from the earth's surface is 11.2 km/sec. then escape velocity from a planet of mass same as that of earth but radius one fourth as that of earth is

- (a) 11.2 km/sec
- (b) 22.4 km/sec
- (c) 5.65 km/sec
- (d) 44.8 km/sec

▼ [Answer](#)

Answer: (b) 22.4 km/sec

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Question 16.

The radii of the earth and the moon are in the ratio 10 : 1 while acceleration due to gravity on the earth's surface and moon's surface are in the ratio 6 : 1. The ratio of escape velocities from earth's surface to that of moon's surface is

- (a) 10 : 1
- (b) 6 : 1
- (c) 1.66 : 1
- (d) 7.74 : 1

▼ [Answer](#)

Answer: (d) 7.74 : 1

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Question 17.

Average density of the earth

- (a) is a complex function of  $g$
- (b) does not depend on  $g$
- (c) is inversely proportional to  $g$
- (d) is directly proportional to  $g$

▼ [Answer](#)

Answer: (b) does not depend on  $g$

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Question 18.

An infinite number of identical point masses each equal to  $m$  are placed at points  $x = 1, x = 2, x = 4, x = 8, \dots$ . The total gravitational potential at point at  $x = 0$  is

- (a)  $-Gm$
- (b)  $-2Gm$
- (c)  $+2Gm$
- (d) infinite

▼ [Answer](#)

Answer: (b)  $-2Gm$

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Question 19.

A body is projected vertically from the surface of the earth of radius  $R$  with velocity equal to half of the escape velocity. The maximum height reached by the body is

- (a)  $R$
- (b)  $R/2$
- (c)  $R/3$
- (d)  $R/4$

▼ [Answer](#)

Answer: (c) R/3

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Question 20.

A satellite is revolving around the earth in a circular orbit with a velocity of 7.07 km/s. What minimum increase in its velocity is needed to make it escape gravitational pull of earth?

- (a) 4.23 km/s in the direction of its velocity
- (b) 11.3 km/s in a direction perpendicular to its velocity
- (c) 2.93 km/s in the direction of its velocity
- (d) 4.23 km/s in a direction perpendicular to its velocity

▼ [Answer](#)

Answer: (c) 2.93 km/s in the direction of its velocity

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