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Physics Grade 12 — Chapter 1

Gravitation

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Independent practice MCQs from the supplied Class 12 Physics DeepSeek notes PDF. Total: 32 questions.

A. Important / Main Topics

1. Newton's law of universal gravitation states that the force between two masses is:

(A) Directly proportional to the product of their masses and inversely proportional to the square of the distance between them
(B) Directly proportional to the distance between them
(C) Inversely proportional to the product of their masses
(D) Independent of their masses

Correct Answer: A

Explanation: The law states , which is the defining relationship of universal gravitation. F □g m m /r1 2 2 10/21/26, 10:16 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1297/1830.

2. The SI unit of the gravitational constant is:

(A) N m kg
(B) N m kg
(C) N m kg
(D) N m kg

Correct Answer: B

Explanation: From , rearranging gives , so the units are N m kg.

3. Gravitational field strength is defined as:

(A) Gravitational force multiplied by mass
(B) Mass per unit gravitational force
(C) Gravitational force per unit mass
(D) Gravitational force per unit distance

Correct Answer: C

Explanation: Gravitational field strength is , the force per unit mass at a point.

4. A satellite is any object that:

(A) Moves in a straight line
(B) Falls freely to Earth
(C) Escapes Earth's gravity
(D) Orbits a planet due to gravity

Correct Answer: D

Explanation: A satellite is defined as any object that orbits a planet due to the force of gravity, maintaining a s.

5. A geostationary satellite has an orbital period of:

(A) 24 hours 6.67×10 N kg−11 −1 9.8 N kg−1 3×10 N kg8 −1 1.6 N kg−1 9.8 N kg−1 g≈9.8 N kg−1 −2 g/r GM/r GMr Gr/M GM/r v =0 GM/r 10/21/26, 10:16 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1299/1830
(B) 12 hours
(C) 48 hours
(D) 1 hour

Correct Answer: A

Explanation: A geostationary satellite must match Earth's rotation period of 24 hours.

6. Gravitational potential is defined as:

(A) Gravitational force per unit mass
(B) Gravitational potential energy per unit mass
(C) Gravitational potential energy times mass
(D) Gravitational force times mass

Correct Answer: B

Explanation: Gravitational potential is defined as Gravitational potential energy per unit mass.

7. Gravitational field lines for a point mass:

(A) Point radially outward
(B) Are parallel straight lines
(C) Point radially inward
(D) Form closed loops

Correct Answer: C

Explanation: Gravitational force is attractive, so field lines point inward.

8. The natural satellite of Earth is:

(A) The Sun
(B) Mars
(C) Venus
(D) The Moon

Correct Answer: D

Explanation: The Moon is Earth's natural satellite.

9. Gravitational force is an example of:

(A) A non-contact force
(B) A contact force
(C) A repulsive force
(D) A frictional force

Correct Answer: A

Explanation: Gravitational force is an example of A non-contact force.

10. If the distance between two masses is doubled, the gravitational force becomes:

(A) Twice
(B) One-quarter
(C) Half
(D) Four times

Correct Answer: B

Explanation: , so doubling the distance reduces the force to one-quarter.

11. If the distance between two masses is tripled, the gravitational force becomes:

(A) Three times
(B) One-third
(C) One-ninth
(D) Nine times

Correct Answer: C

Explanation: , so tripling reduces by a factor of 9.

12. −62.3 MJ kg−1 +62.3 MJ kg−1 9.8 J kg−1 −62.3 MJ kg−1 V =−GM /R ≈E E −62.3 MJ kg−1 F□1/r2 F□1/r2 r F 10/21/26, 10:16 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1302/1830 As we move above the Earth's surface, the value of :

(A) Increases
(B) Remains constant
(C) First increases then decreases
(D) Decreases

Correct Answer: D

Explanation: −62.3 MJ kg−1 +62.3 MJ kg−1 9.8 J kg−1 −62.3 MJ kg−1 V =−GM /R ≈E E −62.3 MJ kg−1 F□1/r2 F□1/r2 r F 10/21/26, 10:16 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1302/1830 As we move above the Earth's surface, the value of Decreases.

13. For a point outside a uniform sphere, the gravitational field behaves as if:

(A) All mass is concentrated at the centre
(B) The mass is spread uniformly over the surface
(C) There is no gravitational field
(D) The mass is concentrated at the surface

Correct Answer: A

Explanation: For a point outside a uniform sphere, the gravitational field behaves as if All mass is concentrated at the centre.

14. Inside a uniform sphere, the gravitational field strength:

(A) Decreases toward the centre
(B) Increases steadily toward the surface
(C) Remains constant
(D) Is zero everywhere

Correct Answer: B

Explanation: Inside a uniform sphere, the gravitational field strength Increases steadily toward the surface.

15. If the orbital radius of a satellite is increased, its orbital velocity: g g =h gR /(R +E2 E h)2 g g 10/21/26, 10:16 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1303/1830

(A) Increases
(B) Remains the same
(C) Decreases
(D) Becomes zero

Correct Answer: C

Explanation: , so larger radius means lower speed.

16. The orbital velocity of a satellite depends on:

(A) Mass of the satellite
(B) Colour of the satellite
(C) Shape of the satellite
(D) Mass of the central body and orbital radius

Correct Answer: D

Explanation: The orbital velocity of a satellite depends on Mass of the central body and orbital radius.

B. Less Important / Secondary Topics

17. A geostationary satellite must orbit:

(A) Directly above the equator
(B) Above the poles
(C) In a polar orbit
(D) In an inclined orbit

Correct Answer: A

Explanation: It must be equatorial to appear fixed above a point on Earth.

18. As distance increases, gravitational potential energy:

(A) Decreases (becomes more negative)
(B) Increases (becomes less negative)
(C) Remains constant
(D) Becomes positive

Correct Answer: B

Explanation: as increases, approaches zero from below.

19. Does gravitational potential depend on the mass of the test object?

(A) Yes, directly proportional
(B) Yes, inversely proportional
(C) No, it is independent of test mass
(D) Only at infinity

Correct Answer: C

Explanation: No, it is independent of test mass — this correctly answers the question.

20. Gravitational field strength and acceleration due to gravity are:

(A) Different quantities with different units
(B) Always zero
(C) Only equal at the poles
(D) Equivalent quantities

Correct Answer: D

Explanation: Both equal , so they are equivalent.

21. As distance increases, gravitational potential:

(A) Increases (becomes less negative)
(B) Decreases (becomes more negative)
(C) Remains constant
(D) Becomes positive

Correct Answer: A

Explanation: as increases, approaches zero from below.

22. If the height above Earth's surface is doubled, the value of at that height will:

(A) Increase
(B) Decrease further
(C) Remain the same
(D) Become zero

Correct Answer: B

Explanation: If the height above Earth's surface is doubled, the value of at that height will Decrease further.

23. Closer gravitational field lines indicate:

(A) A weaker field
(B) Zero field
(C) A stronger field
(D) A uniform field GMm/r −GMm/r GMm/r2 −GMm/r2 −GMm/r r V =−GM/r r V g g h h 10/21/26, 10:16 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1307/1830

Correct Answer: C

Explanation: Closer gravitational field lines indicate A stronger field.

24. If the mass of one of two attracting bodies is doubled and the distance between them is also doubled, the gravitational force becomes:

(A) Double
(B) One-quarter
(C) Unchanged
(D) Half

Correct Answer: D

Explanation: If the mass of one of two attracting bodies is doubled and the distance between them is also doubled, the gravitational force becomes Half.

25. A satellite orbits at a height equal to Earth's radius. Its orbital speed compared to a satellite in low orbit (just above the surface) is:

(A) Smaller by a factor of 7.66 km s−1 3.07 km s−1 30 km s−1 11.2 km s−1 3.07 km s−1 v ≈0 3.07×10 m s3 −1 F□m m /r1 2 2 F r 2/4=1/2 2 10/21/26, 10:16 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1308/1830

(B) Greater

(C) The same

(D) Smaller by a factor of 2

Correct Answer: A

Explanation: For low orbit, . For , . Since , the speed is of the low-orbit speed.

26. A geostationary satellite must be placed at a specific altitude because:

(A) The gravitational force is strongest there

(B) Its orbital period must equal Earth's rotation period

(C) It must avoid the Van Allen belts

(D) It must be above the atmosphere

Correct Answer: B

Explanation: A geostationary satellite must be placed at a specific altitude because Its orbital period must equal Earth's rotation period.

27. If the mass of Earth were larger but its radius remained the same, the value of on the surface would:

(A) Decrease 2 r=R E h=R Er=2R E v □0 1/ r 1/ 2 v :A v B 2:1 :2 1 1: 2 1:2 1: 2 v□1/ r r =A 2r B v /v =A B =r /r B A 1/ 2 g 10/21/26, 10:16 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1309/1830

(B) Remain the same

(C) Increase

(D) Become zero

Correct Answer: C

Explanation: If the mass of Earth were larger but its radius remained the same, the value of on the surface would Increase.

28. If the radius of Earth were larger but its mass remained the same, the value of on the surface would:

(A) Increase

(B) Remain the same

(C) Become zero

(D) Decrease

Correct Answer: D

Explanation: If the radius of Earth were larger but its mass remained the same, the value of on the surface would Decrease.

29. A body is taken from Earth's surface to a height equal to Earth's radius. Its weight becomes:

(A) One-quarter

(B) Half

(C) One-eighth

(D) The same

Correct Answer: A

Explanation: At height , . Weight , so weight becomes.

30. A satellite is in a geostationary orbit. If Earth's rotation period were to increase, the required orbital radius would:

(A) Decrease

(B) Increase

(C) Remain the same

(D) Become zero

Correct Answer: B

Explanation: A satellite is in a geostationary orbit. If Earth's rotation period were to increase, the required orbital radius would Increase.

31. If the distance between two masses is halved, the gravitational potential energy of the system:

(A) Halves
(B) Remains the same
(C) Doubles in magnitude (becomes more negative)
(D) Becomes positive

Correct Answer: C

Explanation: If the distance between two masses is halved, the gravitational potential energy of the system Doubles in magnitude (becomes more negative).

32. The escape speed from Earth is . A satellite is launched with a speed of . It will: −GM/2d −2GM/d d V =−GM/d−GM/d=−2GM/d r=(GMT /4π)2 2 1/3 T r U=−GMm/r r U 11.2 km s−1 8 km s−1 10/21/26, 10:16 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1312/1830

(A) Escape Earth's gravity
(B) Move in a circular orbit
(C) Remain stationary
(D) Move in an elliptical orbit or fall back

Correct Answer: D

Explanation: If the speed is below escape speed and not the correct circular-orbit speed, the satellite follows an elliptical path or falls back.