

CLASS 11

PHYSICS

EXTRA QUESTIONS

## Class 11 Physics Chapter 7 Gravitation – Extra Questions with Answers

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Extra practice questions for Class 11 Physics Chapter 7 (Gravitation), beyond the textbook. These Class 11 Physics Chapter 7 important questions are handy for last-minute exam practice.

### Contents

Very Short Answer Questions (1 mark)

Short Answer Questions (2–3 marks)

Higher-Order Thinking / Application Questions

Class 11 Physics Chapter 7 – Solutions and Notes

Extra practice questions for Class 11 Physics Chapter 7 (Gravitation), beyond the textbook. These Class 11 Physics Chapter 7 important questions are handy for last-minute exam practice.

### Very Short Answer Questions (1 mark)

**Q1. What is the value of the universal gravitational constant  $G$ ?**

Ans:  $6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$ .

**Q2. Write the formula for orbital velocity of a satellite.**

Ans:  $v_o = \sqrt{GM/r}$ .

**Q3. What is a geostationary satellite?**

Ans: A satellite orbiting Earth with a period of 24 hours, appearing stationary relative to a point on Earth's surface.

**Q4. How does the value of  $g$  vary with height above Earth's surface?**

Ans:  $g$  decreases with height above Earth's surface.

**Q5. State Kepler's second law.**

Ans: The radius vector from the Sun to a planet sweeps out equal areas in equal intervals of time.

### Short Answer Questions (2–3 marks)

**Q6. Two masses of 4 kg and 6 kg are 2 m apart. Find the gravitational force between them ( $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$ ).**

Ans:  $F = Gm_1m_2/r^2 = 6.67 \times 10^{-11} (4)(6)/4 = 4 \times 10^{-10} \text{ N}$  (approx).

**Q7. If Earth's mass is  $6 \times 10^{24}$  kg and radius  $6.4 \times 10^6$  m, find the acceleration due to gravity at the surface.**

Ans:  $g = GM/R^2 = 6.67 \times 10^{-11} (6 \times 10^{24}) / (6.4 \times 10^6)^2 \approx 9.8 \text{ m/s}^2$ .

**Q8. Find the escape velocity from Earth given  $g = 9.8 \text{ m/s}^2$  and  $R = 6.4 \times 10^6$  m.**

Ans:  $v_e = \sqrt{(2gR)} = \sqrt{(2 \times 9.8 \times 6.4 \times 10^6)} \approx 11.2 \text{ km/s}$ .

### Higher-Order Thinking / Application Questions

**Q9. A planet orbits the Sun at a distance 4 times that of Earth. Using Kepler's third law, find the ratio of its orbital period to Earth's orbital period, and explain the reasoning.**

Ans: By Kepler's third law,  $T^2 \propto r^3$ . So  $T_{\text{planet}}/T_{\text{Earth}} = (r_{\text{planet}}/r_{\text{Earth}})^{3/2} = 4^{3/2} = 8$ . The planet's orbital period is 8 times that of Earth. This follows because Kepler's third law establishes a fixed proportionality between the cube of the orbital radius and the square of the period for all bodies orbiting the same central mass (the Sun).

**Q10. Explain why astronauts in an orbiting spacecraft experience weightlessness even though Earth's gravity is still acting on them, relating this to the concept of free fall.**

Ans: Astronauts in orbit are in a state of continuous free fall toward Earth, but because the spacecraft has enough horizontal (tangential) velocity, it keeps 'missing' the Earth as it falls, resulting in a circular orbit. Since both the astronaut and the spacecraft are accelerating toward Earth at the same rate (due to gravity alone, with no other supporting force acting on the astronaut relative to the spacecraft), there is no normal force between the astronaut and the spacecraft floor, which is what we perceive as weight. Hence, despite gravity still acting on them, astronauts experience apparent weightlessness because they are in a state of

free fall along with their spacecraft.

## Class 11 Physics Chapter 7 – Solutions and Notes

For complete step-by-step answers and a quick summary, check the [Class 11 Physics Chapter 7 Solutions](#) and [Class 11 Physics Chapter 7 Revision Notes](#).

**See also:** [Chapter 1](#) | [Chapter 2](#) | [Chapter 3](#) | [Chapter 4](#) | [Chapter 5](#) | [Chapter 6](#) | [Chapter 7](#)

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