

## Worksheet: Gravitation

Madhya Pradesh State Board · Class 9 · Science · 15 questions · 43 marks

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 43

**Q1.** State Newton's universal law of gravitation. [1 mark]

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**Q2.** Find the weight of a 60 kg person on (a) Earth and (b) the Moon. ( $g_{\text{Earth}} = 10 \text{ m/s}^2$ ,  $g_{\text{Moon}} = 1.6 \text{ m/s}^2$ ) [1 mark]

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**Q3.** A box of weight 200 N is placed on a table. The base of the box has area  $0.5 \text{ m}^2$ . What pressure does the box exert on the table? [2 marks]

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**Q4.** A ball is dropped from a height of 20 m. Find the time it takes to reach the ground. ( $g = 10 \text{ m/s}^2$ ) [2 marks]

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**Q5.** Why does an iron nail sink in water but a much heavier ship made of iron floats? [2 marks]

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**Q6.** Two bodies of masses 100 kg and 200 kg are placed 10 m apart. Find the gravitational force between them. ( $G = 6.67 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2$ ) [3 marks]

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**Q7.** A stone is thrown vertically upward with initial velocity 20 m/s. Find (a) the maximum height reached, (b) the time to reach the maximum height. ( $g = 10 \text{ m/s}^2$ ) [3 marks]

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**Q8.** Find the pressure exerted by sea water (density  $1030 \text{ kg/m}^3$ ) at a depth of 100 m. ( $g = 10 \text{ m/s}^2$ ) [3 marks]

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**Q9.** An object has mass 200 g and volume  $50 \text{ cm}^3$ . Find its density and relative density. State whether it will sink or float in water. [3 marks]

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**Q10.** Why is the value of  $g$  less at the equator than at the poles? [3 marks]

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**Q11.** A cubical wooden block of side 10 cm and density  $600 \text{ kg/m}^3$  floats in water. (a) What fraction of the block is submerged? (b) What is the depth of the submerged part below the water surface? [4 marks]

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**Q12.** Calculate the force of gravitational attraction between Earth (mass  $6 \times 10^{24} \text{ kg}$ ) and a person of mass 60 kg standing on Earth's surface. ( $G = 6.67 \times 10^{-11} \text{ N m}^2/\text{kg}^2$ ,  $R_{\text{Earth}} = 6.4 \times 10^6 \text{ m}$ ). Show that the result is the person's weight on Earth. [4 marks]

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**Q13.** A body is thrown vertically upward from a tower of height 25 m with velocity 15 m/s. Find the total time the body remains in the air before hitting the ground. ( $g = 10 \text{ m/s}^2$ ) [4 marks]

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**Q14.** A ship floats with 5 m of its hull below the water surface in fresh water. When it sails into sea water, the hull is now only 4.85 m below the surface. Why? (density\_seawater =  $1030 \text{ kg/m}^3$ , density\_freshwater =  $1000 \text{ kg/m}^3$ ) [4 marks]

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**Q15.** Why is it easier to swim in sea water than in fresh water? [4 marks]

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