

AL HUDA SCIENCE ACADEMY

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Most Important Long Questions & Numerical of Physics

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Important Long Questions

1. Differentiate between physical and non-physical quantities.
2. Define SI prefixes. Explain with suitable examples.
3. Define base units. Describe the name and symbol of base units.
4. Define and explain least count with the example of a metre rule. Also write its error.
5. What are Vernier Callipers? Describe their structure and importance.
6. Define micrometer screw gauge. Describe its structure and importance.
7. Write the rules of rounding off digits.
8. How many ways are there to represent vectors? Explain the symbolic representation of vectors.
9. Define resultant vector. Explain the head-to-tail rule.
10. Explain the concept of force with practical examples.
11. State Newton's first law of motion. Explain with examples.
12. Describe Newton's laws of motion.
13. Describe methods to reduce friction.
14. Define sliding friction. Explain its categories.
15. Define and explain momentum and impulse. Also derive the mathematical form of impulse.
16. Define momentum and express Newton's second law of motion in terms of change in momentum.
17. State and explain the principle of conservation of momentum.
18. What is the resolution of vectors? How is a force resolved into horizontal and vertical components?
19. Calculate the magnitude and direction of a force determined from its perpendicular components.
20. Explain the principle of moments with an example.
21. State and explain the conditions of equilibrium.
22. Explain stable equilibrium with a suitable example.
23. Explain unstable equilibrium with a suitable example.
24. Explain neutral equilibrium with a suitable example.
25. Define centripetal force. Write its formula and direction.
26. Discuss the washing machine as an example of a source of centripetal force.
27. Write a brief note on the cream separator.
28. What is meant by kinetic energy? State its unit. Describe how it is determined.
29. Explain potential energy with an example and derive its relation.
30. State the law of conservation of energy. Explain it using an example of a body falling from a certain height in terms of its potential energy and kinetic energy.
31. Explain the effect of variation of atmospheric pressure with height.
32. Describe Pascal's law. State its applications with examples.
33. Discuss the working of a hydraulic press.
34. Write the working of hydraulic brakes.
35. What are temperature scales? Explain different scales of temperature.
36. Define thermometers. Explain the basic properties of thermometric material.
37. Explain the conversion of temperature from one scale to another.
38. What are the important properties of magnets? Explain.
39. Define magnetization. Explain the phenomenon of induced magnetism.

40. Distinguish between temporary and permanent magnets.
 41. Define strength of magnetic field. Explain with suitable examples.
 42. Write the uses of electromagnets.
 43. What is a circuit breaker? Why is it used?
 44. Write the methods to demagnetize a magnet.
 45. Discuss the basic concept of quantum mechanics.
 46. What are the main branches of physics? State briefly.
 47. What is the scope of physics in everyday life? Give some examples.
 48. Define scientific method. Write its basic steps.
 49. A force of 200 N is acting on a cart at an angle of 30° with the horizontal direction. Find the x- and y-components of the force.
 50. A force of 160 N is acting on a wooden box at an angle of 60° with the horizontal direction. Determine the values of its x- and y-components.
 51. A 150 g stone attached to a string is whirled in a horizontal circle at a constant speed of 8 m/s. The length of the string is 1.2 m. Calculate the centripetal force acting on the stone. Neglect the effects of gravity.
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Important Numerical Problems

1. Write using correct prefixes: (a) 5.0×10^4 cm (b) 580×10^2 g (c) 45×10^{-4} s
2. State the number of seconds in (a) a day (b) a week (c) a month, and state your answers in scientific notation.
3. Solve the following addition/subtraction. State your answers in scientific notation: (a) 4×10^{-4} kg + 3×10^{-5} kg (b) 5.4×10^{-6} m – 3.2×10^{-5} m
4. Solve the following multiplication/division. State your answers in scientific notation: (a) $(5 \times 10^4 \text{ m}) \times (3 \times 10^{-2} \text{ m})$ (b) $(6 \times 10^8 \text{ kg}) / (3 \times 10^4 \text{ m}^3)$
5. Express the density of mercury given as 13.6 g/cm³ in kg/m³.
6. State the number of significant digits in each measurement: (a) 0.0045 m (b) 2.047 m (c) 3.40 m (d) 3.420×10^4 m
7. Draw the representative lines of the following vectors: (a) a velocity of 400 m/s making an angle of 60° with the x-axis. (b) a force of 50 N making an angle of 120° with the x-axis.
8. A car is moving with an average speed of 72 km/h. How much time will it take to cover a distance of 360 km?
9. A truck starts from rest. It reaches a velocity of 90 km/h in 50 seconds. Find its average acceleration.
10. A car passes a green traffic signal while moving with a velocity of 5 m/s. It then accelerates at 1.5 m/s^2 . What is the velocity of the car after 5 seconds?

11. A wagon is moving on the road with a velocity of 54 km/h. Brakes are applied suddenly and it covers 25 m before stopping. Determine the acceleration.
12. A stone is dropped from a height of 45 m. How long will it take to reach the ground? What will be its velocity just before hitting the ground?
13. A 10 kg block is on a smooth surface. A force of 5 N is applied. Find: (a) acceleration (b) velocity after 5 s.
14. A cyclist (55 kg) on a 5 kg bicycle starts from rest, applying 90 N for 8 s, then continues at constant speed for 8 s. Find the total distance.
15. A force of 7500 N moves a 3000 kg truck. Find the acceleration and time to increase speed from 36 km/h to 72 km/h.
16. The mass of a person is 80 kg. What is his weight on Earth and on the Moon? ($g_{\text{moon}} = 1.6 \text{ m/s}^2$)
17. A 160 g cricket ball hits a bat at -28 m/s and leaves at 52 m/s . The contact time is $4 \times 10^{-3} \text{ s}$. Find the average force.
18. What force is required to increase the velocity of an 800 kg car from 10 m/s to 30 m/s in 10 s?
19. A 3 kg ball at 5 m/s collides with a stationary 2 kg ball. They move together. Find their final velocity.
20. A spanner 25 cm long is used to open a nut. If a force of 400 N is applied at the end of the spanner, what is the torque acting on the nut?
21. A signboard is suspended by means of two steel wires. If the weight of the board is 200 N, what is the tension in the strings?
22. Find the work done by a 65 N force in pulling a suitcase for a distance of 20 metres.
23. A force of 20 N acting at an angle of 60° to the horizontal is used to pull a box through a distance of 3 m across a floor. How much work is done?
24. A truck of mass 3000 kg is moving on a road with uniform velocity of 54 km/h. Determine its kinetic energy.
25. A 0.14 kg ball is thrown vertically upward with an initial velocity of 35 m/s . Find the maximum height reached by the ball.
26. A 1000 kg car moving with an acceleration of 4 m/s^2 covers a distance of 50 m in 5 seconds. What is the power generated by its engine?
27. An engine raises 100 kg of water through a height of 80 m in 25 s. What is the power of the engine?
28. A force of 600 N acts on a box to push it 5 m in 15 s. Calculate the power.

29. A box of mass 10 kg is pushed up along a ramp 15 m long with a force of 80 N. If the box rises to a height of 5 m, what is the efficiency of the system?
30. A spring is stretched 20 mm by a load of 40 N. Calculate the spring constant. If an object causes an extension of 16 mm, what will be its weight?
31. A block of wood of density $8 \times 10^3 \text{ kg/m}^3$ has a volume of 60 cm^3 . Find its mass.
32. A brick measures $5 \text{ cm} \times 10 \text{ cm} \times 20 \text{ cm}$. If its mass is 5 kg, calculate the maximum and minimum pressure it can exert on a horizontal surface.
33. Calculate the pressure of a column of mercury 76 cm high. Density of mercury is $13.6 \times 10^3 \text{ kg/m}^3$.
34. In a hydraulic brake, a force of 500 N is exerted on a piston of area 5 cm^2 . Find the pressure transferred and the force on the second piston of area 20 cm^2 .
35. The areas of the small and large pistons are 10 cm^2 and 100 cm^2 . What force is needed on the small piston to lift a car of 4000 N?
36. How much would 30°C be on the Fahrenheit and Kelvin scales?
37. The normal human body temperature is 98.6°F . Convert it into Celsius and Kelvin scales.
38. At what temperature would the Celsius and Fahrenheit thermometer readings be the same? Prove it.
39. Convert 5°F to Celsius and Kelvin scale.
40. What is the equivalent temperature of 25°C on the Fahrenheit and Kelvin scales?

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