



# PHYSICS - 9TH

## IMPORTANT NUMERICAL QUESTIONS (9TH GRADE)

A separate PDF has been released for questions related to graph.



- **MOTION**
- **FORCE AND LAWS OF MOTION**
- **GRAVITATION**
- **WORK, POWER, ENERGY**
- **SOUND & FLOATATION**

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Material Curated by

Er. Sonal Agrawal Sir

Ex. Scientist , BARC Mumbai

## CBSE Class 9 Physics - Numerical Questions

### Motion

#### Moderate

1. A car accelerates from 10 m/s to 30 m/s in 5 seconds. Find its acceleration and distance covered.
2. A ball is dropped from a height of 80 m. Find the time taken to reach the ground and velocity just before impact. ( $g = 9.8 \text{ m/s}^2$ )
3. A car moving at 72 km/h comes to rest in 10 s. Find its acceleration and stopping distance.
4. A cyclist starts from rest and accelerates at  $2 \text{ m/s}^2$ . Find velocity after 10 s and distance covered.
5. A train moving with uniform acceleration covers 100 m in 5 s. If its initial velocity was 5 m/s, find its acceleration.

#### Difficult

6. A stone is thrown vertically upward with 20 m/s. Find the maximum height and total time taken to return. ( $g = 9.8 \text{ m/s}^2$ )
7. A car starts from rest and accelerates at  $3 \text{ m/s}^2$  for 10 s, then moves with uniform velocity for 5 s and decelerates to rest in 3 s. Find total distance.
8. A ball thrown vertically upward returns in 4 s. Find the initial velocity and height attained.
9. A train accelerates uniformly from 10 m/s to 50 m/s in 20 s. Find acceleration and distance covered.
10. A car moving at 90 km/h stops in 5 s due to brakes. Find retardation and stopping distance.

#### Very Difficult

11. A rocket accelerates from 100 m/s to 500 m/s in 20 s. Find the acceleration and distance covered. If it then decelerates at  $10 \text{ m/s}^2$ , how much time will it take to stop?
12. A stone is dropped from a 100 m tall building, and after 2 s, another stone is thrown downward with an initial velocity of 10 m/s. Find when and where they will meet.

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## Force and Laws of Motion

### Moderate

1. A force of 50 N is applied to a 10 kg mass. Find acceleration.
2. A bullet of mass 50 g is fired from a gun with 500 m/s velocity. Find the recoil velocity of a 5 kg gun.
3. A force of 20 N acts on a 5 kg body for 4 s. Find final velocity if the body starts from rest.
4. A body of mass 4 kg moves with 10 m/s. A force of 20 N acts on it for 2 s. Find final velocity.
5. A boy pushes a 2 kg box with a 10 N force. If friction is 4 N, find acceleration.

### Difficult

6. A truck of mass 4000 kg moving at 20 m/s stops in 10 s. Find braking force.
7. A 10 g bullet moving at 300 m/s penetrates 20 cm into a target. Find the resistive force.
8. A person of mass 60 kg jumps from a height of 3 m and stops in 0.1 s after landing. Find force exerted by ground.
9. A force of 100 N acts on a 50 kg cart for 5 s. Find final velocity if it starts from rest.
10. A 2 kg ball moving at 5 m/s collides with a wall and rebounds with 4 m/s in 0.2 s. Find force exerted by the wall.

### Very Difficult

11. A truck of mass 5000 kg moving at 30 m/s collides with a stationary car of mass 1000 kg. After the collision, the car moves at 20 m/s. Find the final velocity of the truck and the loss of kinetic energy.
12. A machine gun fires 10 bullets per second, each of mass 50 g, with a velocity of 400 m/s. Find the force required to hold the gun.

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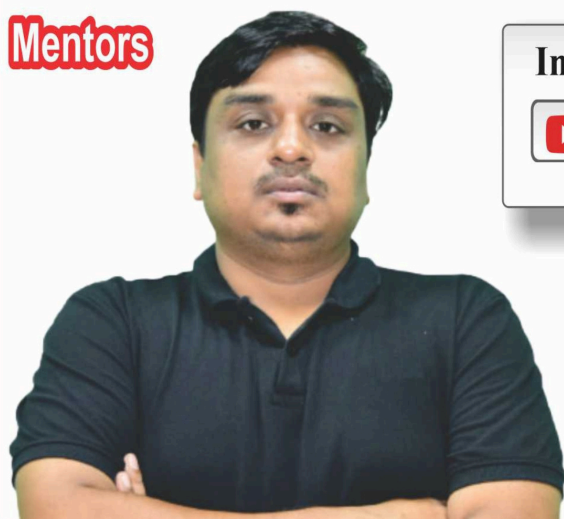


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## Gravitation

### Moderate

1. A 10 kg object weighs 100 N on Earth. What will be its weight on the Moon ( $g_{\text{moon}} = 1.63 \text{ m/s}^2$ )?
2. Two masses of 5 kg and 10 kg are placed 3 m apart. Find gravitational force between them.
3. A stone is thrown up with 15 m/s. Find max height and time of flight.
4. An object weighs 80 N on Earth. What will be its weight on a planet with  $g = 4 \text{ m/s}^2$ ?
5. A satellite orbits Earth at a height of 400 km. If Earth's radius is 6400 km, find its total distance from Earth's center.

### Difficult

6. A body of mass 3 kg falls from 15 m. Find potential and kinetic energy just before impact. ( $g = 9.8 \text{ m/s}^2$ )
7. A body is thrown up with 30 m/s. Find kinetic and potential energy at the highest point. (Mass = 5 kg)
8. The mass of Earth is  $6 \times 10^{24} \text{ kg}$  and Moon's mass is  $7.35 \times 10^{22} \text{ kg}$ . Find the gravitational force if distance is  $3.84 \times 10^8 \text{ m}$ .
9. A satellite of mass 400 kg orbits Earth at 500 km height. Find gravitational force exerted by Earth.
10. A ball dropped from 50 m attains speed 30 m/s before hitting ground. Verify using energy conservation.

### Very Difficult

11. A satellite of mass 2000 kg orbits Earth at a height of 500 km. Find the gravitational force acting on it. (Mass of Earth =  $6 \times 10^{24} \text{ kg}$ , Radius of Earth = 6400 km)
12. A body of mass 10 kg is taken from Earth to a planet where the gravitational acceleration is  $6 \text{ m/s}^2$ . If the gravitational potential energy on Earth is 2000 J, find its potential energy on the new planet.

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## Work, Power, Energy

### Moderate

1. A 60 kg man climbs a 12 m ladder in 6 s. Find power developed.
2. A pump lifts 2000 kg of water to 15 m in 10 s. Find power output.
3. A body of mass 5 kg moves with 8 m/s. Find kinetic energy.
4. A 400 g stone is thrown up with 12 m/s. Find potential energy at max height.
5. A car of mass 1200 kg moving at 20 m/s stops due to brakes. Find work done.

### Difficult

6. A 4 kg body moves at 12 m/s. If 50 N force acts, find stopping distance.
7. A crane lifts 700 kg load to 25 m in 12 s. Find power.
8. A bullet of mass 25 g moving at 350 m/s is stopped in 0.02 s. Find force applied.
9. A 50 kg boy runs up a 6 m staircase in 3 s. Find power.

### Very Difficult

10. A force of 500 N is applied at an angle of  $30^\circ$  to pull a 50 kg block over a distance of 20 m. If the coefficient of friction is 0.2, find the work done against friction and net work done.
11. A roller coaster starts from rest at a height of 50 m and reaches the lowest point with a speed of 20 m/s. Find the energy lost due to friction (mass of the roller coaster = 2000 kg,  $g = 9.8 \text{ m/s}^2$ ).

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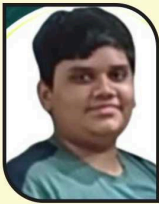




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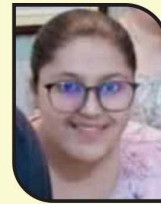
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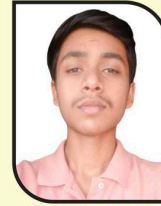
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## सीयू के छात्र मनु व मनीष का इंटेल कंपनी में चयन, 21 लाख सालाना पैकेज



बिलासपुर छात्र मनु कश्यप और मनीष कुमार सिंह का चयन इंटेल प्राइवेट लिमिटेड के लिए हुआ है। कंपनी इन छात्रों को सालाना 21 लाख रुपए का पैकेज दे रही है। ये दोनों छात्र सत्र 2017 में सीयू के इलेक्ट्रॉनिक्स एंड कम्युनिकेशन इंजीनियरिंग विभाग से बीटेक की उपाधि प्राप्त की। वर्तमान में ये भारतीय प्रौद्योगिकी संस्थान (आईआईटी) दिल्ली में एमटेक कर रहे हैं। इंटेल कॉरपोरेशन एक अमेरिकी बहुराष्ट्रीय कंपनी है। सिलिकॉन वैली में सांता क्लारा स्थित इस कंपनी का भारत में मुख्यालय बेंगलूर है।

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## Sound & Floatation

### Moderate

1. A sound wave has frequency 2500 Hz and wavelength 0.6 m. Find speed.
2. A liquid's density is  $850 \text{ kg/m}^3$ . Find up thrust on a  $0.02 \text{ m}^3$  object in it.
3. Sonar sends a signal returning in 3 s. If sound speed in water is 1500 m/s, find depth.
4. An object weighs 150 N in air, 120 N in water. Find density.
5. A sound wave takes 2.5 s to travel 850 m. Find speed.

### Difficult

6. A ship of mass  $3 \times 10^7 \text{ kg}$  floats in water. How much water is displaced? (Density of water =  $1000 \text{ kg/m}^3$ )
7. An organ pipe has a fundamental frequency of 200 Hz. Find its wave length if sound speed = 340 m/s.
8. Find the depth of a lake if a sound wave returns in 5 s. (Speed of sound = 1500 m/s)
9. A sonar sends an ultrasound wave returning in 4 s. Find object distance. (Speed = 1500 m/s)

### Very Difficult

10. A sonar device sends an ultrasound wave which returns in 6 s. If the speed of sound in water is 1500 m/s, find the depth of the ocean floor. Also, calculate how much deeper the ocean floor would be if the sound speed were 1600 m/s.
11. A cube of wood of side 0.5 m is floating in water with 40% of its volume submerged. Find its density. Also, find how much of the cube will be submerged if placed in oil of density  $850 \text{ kg/m}^3$ .

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## Answer Key

### Motion

1. Acceleration =  $4 \text{ m/s}^2$ , Distance = 100 m
2. Time = 4.04 s, Velocity = 39.2 m/s
3. Acceleration =  $-2 \text{ m/s}^2$ , Stopping Distance = 100 m
4. Velocity = 20 m/s, Distance = 100 m
5. Acceleration =  $3 \text{ m/s}^2$
6. Max Height = 20.4 m, Total Time = 4.08 s
7. Total Distance = 350 m
8. Initial Velocity = 19.6 m/s, Height = 19.6 m
9. Acceleration =  $2 \text{ m/s}^2$ , Distance = 600 m
10. Retardation =  $-5 \text{ m/s}^2$ , Stopping Distance = 62.5 m
11. Acceleration =  $20 \text{ m/s}^2$ , Distance = 6000 m, Time to Stop = 50 s
12. Time = 3.77 s, Meeting Height = 58.8 m

### Force and Laws of Motion

1. Acceleration =  $5 \text{ m/s}^2$
2. Recoil Velocity =  $-5 \text{ m/s}$
3. Final Velocity = 16 m/s
4. Final Velocity = 18 m/s
5. Acceleration =  $3 \text{ m/s}^2$
6. Braking Force =  $-8000 \text{ N}$
7. Resistive Force =  $-2250 \text{ N}$
8. Force Exerted = 18000 N
9. Final Velocity = 10 m/s
10. Force Exerted = 90 N
11. Final Velocity of Truck = 26 m/s, Loss of KE = 400,000 J
12. Required Force = 200 N



## Gravitation

1. Weight on Moon = 16.3 N
2. Gravitational Force =  $3.7 \times 10^8$  N
3. Max Height = 11.5 m, Time of Flight = 3.06 s
4. Weight on Planet = 32 N
5. Total Distance from Earth's Center = 6800 km
6. PE Before Impact = 441 J, KE Before Impact = 441 J
7. KE = 0 J, PE = 2250 J
8. Gravitational Force =  $1.98 \times 10^{20}$  N
9. Gravitational Force =  $3.52 \times 10^4$  N
10. Verified by Energy Conservation
11. Gravitational Force =  $3.52 \times 10^4$  N
12. Potential Energy on New Planet = 1200 J

## Work, Power, Energy

1. Power = 120 W
2. Power = 30 kW
3. Kinetic Energy = 160 J
4. Potential Energy = 24 J
5. Work Done = 240,000 J
6. Stopping Distance = 2.88 m
7. Power = 14.58 kW
8. Force Applied = 4375 N
9. Power = 1000 W
10. Work Against Friction = 1962 J, Net Work Done = 8664 J
11. Energy Lost Due to Friction = 196,000 J

## Sound & Floatation

1. Speed = 1500 m/s





2. Up thrust = 17 N
3. Depth = 2250 m
4. Density = 500 kg/m<sup>3</sup>
5. Speed = 340 m/s
6. Water Displaced =  $3 \times 10^7$  kg
7. Wavelength = 1.7 m
8. Depth = 3750 m
9. Object Distance = 3000 m
10. Ocean Depth = 4500 m, Deeper Depth = 4800 m
11. Wood Density = 400 kg/m<sup>3</sup>, Submerged in Oil = 47%