



# PHYSICS

## BOOKS - S CHAND PHYSICS (ENGLISH)

### SAMPLE QUESTION PAPER 4

#### Section A

1. The term inertia was first used by :

A. Newton

B. Galileo

C. Aristotle

D. Kepler

**Answer: D**



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2. A bullet of mass 40 g moving with a speed of  $90\text{m.s}^{-1}$  enters a heavy wooden block and is stopped after a distance of 60 cm . The

average resistive force exerted by the block on the bullet is :

A. 180 N

B. 20 N

C. 270 N

D. 320 N

**Answer: C**



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3. A motor cyclist rides around the well with a round vertical wall and does not fall down while riding because

A. The force of gravity disappears.

B. He loses weight somehow.

C. He is kept in this path due to the force exerted by surrounding air.

D. The frictional force of the wall balances his weight.

**Answer: D**



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4. A block of mass  $m$  is at rest on an inclined plane. The coefficient of static friction is  $\mu$ . The maximum angle of incline before the block begins to slide down is :

A.  $\tan^{-1}(\mu / m)$

B.  $\tan^{-1}(\mu)$

C.  $\tan^{-1}(\mu / 2)$

D.  $\cos^{-1}(\mu)$

**Answer: B**



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5. The value of Young's modulus of elasticity for a perfectly rigid body is :

A. Zero

B. Infinite

C. 1

D. 100

**Answer: B**



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**6. What is the dimensional formula of angular velocity?**



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7. What is the relation between coefficient of friction and angle of repose ?



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8. Which law of motion does give the measure of force ?



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9. Why is earth flat at the poles ?





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**10.** Explain why raindrops falling under gravity do not acquire high velocity.



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**11.** By which methods can the internal energy of an ideal gas be changed ?



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12. Write the relation between acceleration, displacement and frequency of a particle executing SHM.



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## Section B Answer All Questions

1. A girl press her physics text book against a rough vertical wall with her hand. The direction of the frictional force on the book exerted by the wall is

A. Downwards

B. upwards

C. Out from the wall

D. into the wall

**Answer: B**



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2. Find the dimensions of  $a/b$  in the relation

$F = a\sqrt{x} + bt^2$ , where  $F$  is force,  $x$  is distance

and  $t$  is time.



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3. A cyclist bends while taking turn to

- A. Reduce friction
- B. Generate required centripetal force
- C. Reduce apparent weight
- D. Reduce speed

**Answer: B**



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4. When is the work done by a force is positive and when is it negative ?



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5. Mountain roads rarely go straight up the slope but wind up gradually. Why ?



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6. The weight of a body on the surface of the earth is 63 N what is the gravitational force on it due to the earth at a height equal to half the radius of the earth?



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7. The area of cross - section of a wire is  $1 \text{ mm}^2$  and its length is 2 m. How much work will be done to increase its length by 0.1 mm ?

The Young's modulus of elasticity for the material of the wire is  $2 \times 10^{11} \text{ Nm}^{-2}$ .



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8. Explain why do small bit of camphor dropped on water surface dance about.



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9. Why are the cooling coils fitted on the upper portion of the refrigerator ?



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10. The vessels A and B made of different materials but having identical shape, size and thickness are filled with ice and kept at the same place. Ice melts at the rate of  $100 \text{ g min}^{-1}$  and  $150 \text{ g min}^{-1}$  in A and B respectively. Assuming that heat enters both vessels through the walls only, calculate the ratio of thermal conductivities of their materials.



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**11.** The piston in the cylinder head of a locomotive has a stroke (twice the amplitude) of 1.0 m. If the piston moves with simple harmonic motion with an angular frequency of 200 rad/min, what is its maximum speed ?



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**12.** As in sound, can beats be observed by two light sources ? Explain.



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**13.** A pipe 20 cm long is closed at one end. Which harmonic mode of the pipe is resonantly excited by a 430 Hz source? Will this same source be in resonance with the pipe if both ends are open? (Speed of Sound = 344 m/s)



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[Section C Answer All Questions](#)

1. A tuning fork is sounded together with a stretched sonometer wire of length 50 cm. When the tension in the wire is 100 N, 4 beats are heard. Find the frequency of the tuning fork if the same number of beats are heard when the tension in the wire is reduced to 81 N.



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2. What do you understand by harmonics ? Explain giving sketch, that both types of

harmonics even and odd are produced in a stretched string.



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3. The resultant vector of  $\vec{P}$  and  $\vec{Q}$  is  $\vec{R}$ . On reversing the direction of  $\vec{Q}$  the resultant vector becomes  $\vec{S}$ . Show that

$$R^2 + S^2 = 2(P^2 + Q^2)$$



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4. A stone tied to the end of a string 80 cm long is whirled in a horizontal circle with a constant speed. If the stone makes 14 revolutions in 25 s, what is the magnitude and direction of acceleration of the stone ?



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5. A simple harmonic oscillation is represented by the equation  $y = 0.5 \sin(50\pi t + 1.8)$ . Where  $y$  is in meter and  $t$  is in second. Find its

amplitude, frequency, time period and initial phase.



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6. State theorem of perpendicular axes.



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7. Derive an expressions for torque in Cartesian - Coordinates.



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8. During blood transfusion the needle is inserted in a vein where the gauge pressure is 2000 Pa. At what height must the blood container be placed so that blood may just enter the vein? [use the density of whole blood from table].



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9. A body cools from  $60^{\circ}C$  to  $40^{\circ}C$  in 7 minutes. Temperature of surrounding is  $10^{\circ}C$ . After next 7 minutes what will be its temperature ? During whole process Newton's law of cooling is obeyed.



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[Section D Answer All Questions](#)



1. A car is moving on a circular path and takes a turn. If  $R_1$  and  $R_2$  be the reactions on the inner and outer wheels respectively, then



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2. A 60kg is pushed horizontally with just enough force to start it moving across a floor and the same force continues to act afterwards. The coefficient of static friction

and sliding friction are 0.5 and 0.4 respectively  
the acceleration of the body is



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3. A body of mass  $m$  suspended from an ideal spring is executing simple harmonic oscillations. The force constant of the spring is  $k$  and the time period of the body is  $T$ . Show by dimensional method that the formula  $T = 2\pi m / k$  is incorrect. Establish its correct form.



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4. Define work. What is SI unit of work ? What is meant by positive work, negative work and zero work ? Illustrate your answer with two examples of each type.



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5. A body of mass  $2.0 \text{ kg}$  initially at rest is moved by a horizontal force of  $0.50 \text{ N}$  on a smooth table. Find the work done by the force

in 8.0 s and show that this equals the change in the kinetic energy of the body.



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6. What is Stokes law ? Define terminal velocity and calculate it for a spherical body moving vertically in a liquid and show that it is proportional to square of the radius of the spherical body.



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7. In a Millikan's oil drop experiment what is the terminal speed of a drop of radius  $2.0 \times 10^{-5} m$ , and density  $1.2 \times 10^3 kgm^{-3}$  ?.

Take the viscosity of air at the temperature of the experiment to be  $1.8 \times 10^{-5} Nsm^{-2}$  How much is the viscous force on the drop at that speed ? Neglect buoyancy of the drop in air.



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