



# PHYSICS

## BOOKS - HT Olympiad Previous Year Paper

### NSO QUESTION PAPER 2016 SET B

Science

1. A body starts from rest and travels a distance  $x$  with uniform acceleration, then it

travels a distance  $2x$  with uniform speed, finally it travels a distance  $3x$  with uniform retardation and comes to rest. If the complete motion of the particle is along a straight line, then the ratio of its average velocity to maximum velocity is

A.  $6:7$

B.  $4:5$

C.  $2:3$

D.  $3:5$

**Answer: D**



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2. A student uses a spring balance of range 500 g wt. He records the weight of a small iron cube of mass 100 g in air, in tap water and in a concentrated solution of common salt in water. His three readings taken in the given order are  $W_1$ ,  $W_2$  and  $W_3$ . His measurements could be

A.  $W_1 = W_2 = W_3$

B.  $W_1 > W_2 > W_3$

C.  $W_1 < W_2 < W_3$

D.  $W_1 < W_2 > W_3$

**Answer: B**



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**3.** Read the given statements and select the correct option.

Statement 1 : A spaceship, while entering the Earth's atmosphere is likely to catch fire.

Statement 2: The temperature of the upper atmosphere is very high.

A. Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.

B. Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.

C. Statement 1 is true but statement 2 is false.

D. Both statements 1 and 2 are false.

**Answer: C**



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4. Two particles, one with constant velocity  $50m/s$  and the other with uniform acceleration  $10m/s^2$ , start moving simultaneously from the same position in the same direction. They will be at a distance of  $125m$  from each other after

A.  $5s$  and  $5(1 + \sqrt{2})s$

B.  $5s$  and  $10s$

C.  $5(1 + \sqrt{2})s$  and  $10s$

D.  $10s$  and  $10(1 + \sqrt{2})s$

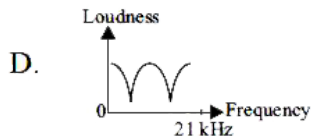
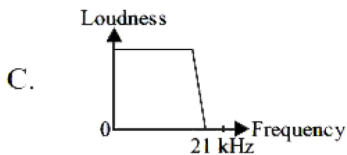
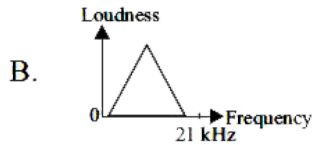
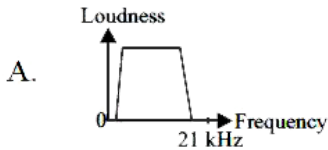
**Answer: A**



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5. A signal generator is connected to a loud speaker. Keeping the amplitude of the wave constant, the frequency of the sound is

increased from 0 Hz to 21 kHz. Which of the following graphs shows the variation of the loudness of the sound with the frequency as heard by a normal healthy man?



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6. A body is projected vertically up. At certain height above the ground, the ratio of its



potential energy to the kinetic energy is 2:3. At what height above the ground, the ratio of its kinetic energy to the potential energy will be 2 : 3 ?

A.  $\frac{2}{5}h$

B.  $\frac{3}{2}h$

C.  $\frac{4}{7}h$

D.  $\frac{9}{8}h$

**Answer: B**



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7. In an experiment to measure the speed of sound in air, a boy stands 40 m from a wall and bangs two pieces of wood together. At the instant he hears the echo, he bangs them together again. He does this activity 50 times. The time taken for 50 bangs is 12 s. Which calculation gives the speed (in  $\text{m s}^{-1}$ ) of sound in air?

A.  $\frac{10}{40 \times 50}$

B.  $\frac{40 \times 50}{12}$

C.  $\frac{40 \times 2 \times 50}{12}$

D.  $\frac{40 \times 2 \times 12}{50}$

**Answer: C**



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8. The vessels A and B of equal volume and weight are immersed in water to depth  $h$ . The vessel A has an opening at the bottom through which water can enter. If the work

done in immersing A and B are  $W_A$  and  $W_B$  respectively, then

A.  $W_P > W_Q$

B.  $W_P < W_Q$

C.  $W_P = W_Q$

D. Cannot be predicted.

**Answer: B**



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9. The density of a planet PL1 is thrice that of planet PL2. The acceleration due to gravity at the surface of PL1 is  $\frac{1^{th}}{9}$  of that at the surface of planet PL2. If the radius of planet PL2 is  $R$ , then the radius of planet PL1 will be

A.  $R/3$

B.  $R/27$

C.  $27R$

D.  $81R$

**Answer: B**



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**10.** A ball of mass 400 g is dropped from a height of 5 m. A boy on the ground hits the ball vertically upwards with a bat with an average force of 100 N, so that it attains a vertical height of 20 m. The time for which the ball remains in contact with the bat is (Take  $g = 10 \text{ m s}^{-2}$ )

A. 0.08 s

B. 0.12 s

C. 2 s

D. 5 s

**Answer: B**



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**11.** Which of the following statements does explain how a positively charged object becomes neutral when someone touches it?

A. Electrons flow from the object.

B. Electrons flow on to the object.

C. Protons flow from the object.

D. Protons flow on to the object.

**Answer: B**

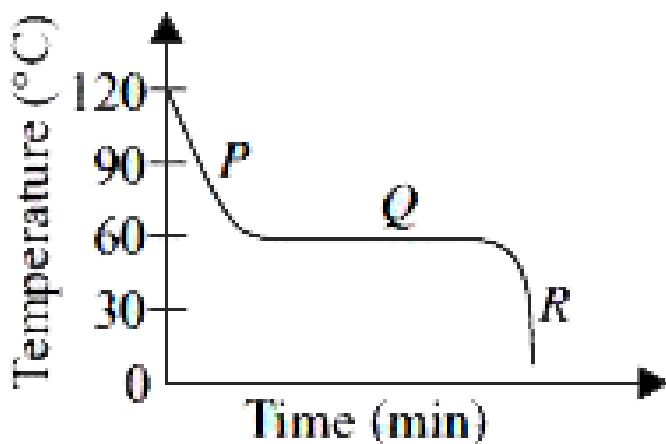


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**12.** Dhairya, a Class 9 student heated a solid 'X' beyond its melting point. Then, he allowed the hot liquid to cool slowly and recorded the temperature at regular time intervals until it



cooled to  $20^{\circ}\text{C}$ . He obtained the given cooling curve.



The parts of graph where 'X' exists in solid state, in liquid state and in both solid and liquid states are respectively

A. Q, P and R

B. P, Q and R

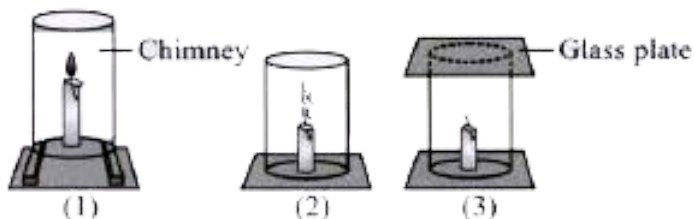
C. R, P and Q

D. R, Q and P

**Answer: C**

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**13.** Observe the given figures carefully :



Which of the following statements is/are incorrect?

- I. Candle 1 burns freely due to presence of air.
- II. Smoke is produced in candle 2 due to less supply of air.
- III. Flame finally goes off in candle 3 as air is not available.

A. II only

B. I and II only

C. I and III only

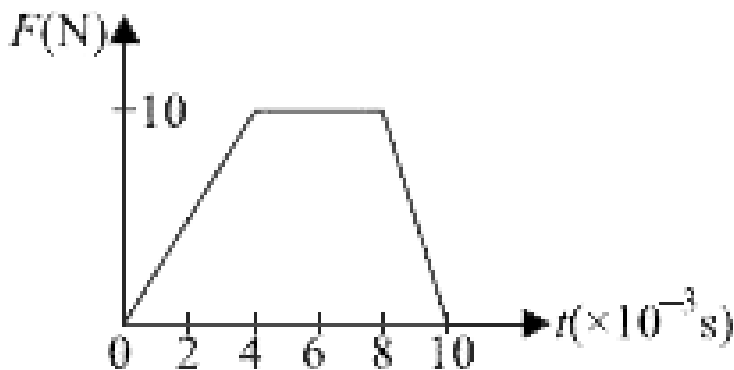
D. None of these

**Answer: D**



## Achievers Section

1. A particle of mass  $70\text{ g}$ , moving at  $50\text{ cm s}^{-1}$ , is acted upon by a variable force opposite to its direction of motion. The force  $F$  is shown as a function of time.



After the force stops acting, the particle moves with a speed of

- A.  $50 \text{ cm s}^{-1}$  in reverse direction
- B.  $100 \text{ cm s}^{-1}$  in reverse direction
- C.  $150 \text{ cm s}^{-1}$  in original direction
- D.  $100 \text{ cm s}^{-1}$  in original direction.

**Answer: A**



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2. Fill in the blanks by choosing an appropriate option. On the surface of the earth, acceleration due to gravity at poles is (i) and that at equator is (ii). The value of acceleration due to gravity (iii) with height above the centre of earth to its surface and (iv) with height above the surface of earth.

- |    | (i)     | (ii)    | (iii)     | (iv)      |
|----|---------|---------|-----------|-----------|
| A. | Maximum | Minimum | Increases | Decreases |
| B. | Maximum | Minimum | Decreases | Decreases |
| C. | Minimum | Maximum | Increases | Decreases |
| D. | Minimum | Maximum | Increases | Increases |



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