



PHYSICS

BOOKS - MBD

MODEL PAPER 1

Exercise

1. What is dimension of G ?



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2. Is it possible to accelerate a body if its speed is constant?



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3. Can a body have zero velocity and still be accelerated?



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4. Explain how friction helps in walking.



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5. Express the unit vector \hat{A} mathematical form



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6. A person sitting in a moving train throws a ball vertically upwards. How does the ball appear to move to an observer inside the train



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7. A person sitting in a moving train throws a ball vertically upwards. How does the ball appear to move to an observer outside the train?



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8. Is radius of gyration of a body a constant quantity?



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9. Why cannot we move a finger without disturbing all the stars ?



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10. Why does the temperature of a gas decrease when it is allowed to expand adiabatically?



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11. How does the internal energy of an ideal gas differ from real gas?



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12. What is the time period of simple pendulum in a spaceship?



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13. Can specific heat of a gas be negative?



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14. Name factors which affect the property of elasticity of a solid.



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15. The magnitude of $(\hat{i} + \hat{j})$ is

A. $2\hat{i}$

B. $2\hat{j}$

C. 2

D. $\sqrt{2}$

Answer:



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16. If β is the angle between $(\hat{i} + \hat{j})$ with \hat{i} ,
then β is

A. 90°

B. 45°

C. 0°

D. 180°

Answer:



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17. The angle between $(\hat{i} + \hat{j})$ and $(\hat{i} - \hat{j})$ is

A. 90°

B. 45°

C. 0°

D. 180°

Answer:



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18. Two vectors \vec{A} and \vec{B} have their resultant equal to either of them, the angle between them is

A. 90°

B. 45°

C. 120°

D. 180°

Answer:



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19. If $\vec{A} \cdot \vec{B} = \vec{B} \cdot \vec{C}$ when θ_1 is the angle between A and B. θ_2 is the angle between B and C. We can say $A=C$ if

A. $\theta_1 = \theta_2$

B. $\theta_1 > \theta_2$

C. $\theta_1 < \theta_2$

D. $\theta = 90^\circ$ and $\theta_2 = 0^\circ$

Answer:



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20. The earth and the moon are attracted to each other by gravitational force. Does the earth attracts the moon with a force that is greater than or smaller than or the same as

the force with which the moon attracts the earth ? Why ?

- A. More than that exerted the moon
- B. Same as that exerted by the moon
- C. Less than that exerted by the moon
- D. Not related to that exerted by the moon

Answer:



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21. A stone is released from the top of a tower of height 19.6 m. Calculate the final velocity just before touching the ground.

A. $19.6ms^{-1}$

B. $3841.4ms^{-1}$

C. $196ms^{-1}$

D. $384.14ms^{-1}$

Answer:



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22. Find the wrong statement : The acceleration due to gravity decreases if

A. we go down the surface of the earth towards its centre

B. the rotational velocity of the earth is increased

C. we go up from the surface of the earth

D. we go from the equator towards the poles on the surface of the earth.

Answer:



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23. If the earth suddenly shrinks (without changing mass) to half its present radius, the value of g will be

A. $g/2$

B. $4g$

C. $2g$

D. $g/4$

Answer:



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24. At what altitude in metre will the acceleration due to gravity be 25% of that at the earth's surface? (R is the radius of the earth)

A. $3R$

B. R

C. $R/2$

D. 2R/3

Answer:



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25. State principle of homogeneity of dimension and its use in dimensional analysis.



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26. The time of flight of a body projected with initial velocity u at an angle θ is T . What will be the time of flight if the body is projected with same velocity at an angle $(90^\circ - \theta)$?



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27. A bullet fired at an angle of 30° with the horizontal hits the ground 3.0 km away. By adjusting its angle of projection, can one hope to hit a target 5.0 km away? Assume the

muzzle speed to be fixed and neglect air resistance.



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28. A heavier and lighter body have the same momentum. Show that lighter body possesses more velocity.



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29. Friction is a necessary evil. Explain.



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30. State and prove work-energy theorem.



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31. Show that the area of the triangle contained between the vectors \vec{a} and \vec{b} is one half of the magnitude of $\vec{a} \times \vec{b}$.



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32. Lighter the body, smaller will be the acceleration with which it falls towards the earth. Is this statement true? Explain.



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33. What is Stokes' law? Derive the relation by method of dimensions.



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34. What do you mean by reversible and irreversible process? Give example.



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35. Calculate the number of degrees of freedom of molecules of hydrogen in 1 cc of hydrogen gas at NTP.



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36. A hollow sphere is filled with water through a small hole in it. It is hung by long thread and as water slowly flows out from the hole at the bottom, one finds that the periods of oscillation first increases and then decreases. Explain. Why.



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37. Resolve a given vector into two rectangular (or orthogonal) components(i.e. in a plane)





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38. A new system of units is proposed in which unit of mass is α kg, unit of length β m and unit of time γ s. How much will 5 J measure in this new system?



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39. Define elastic limit and discuss stress-strain graph



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40. Find the amount of work done in blowing a soap bubble of surface tension $0.06Nm^{-1}$ from 2 cm radius to 5 cm radius.



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41. Calculate the external work done when an ideal gas is expanded adiabatically.



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42. Write the expression for the speed of propagation of transverse and longitudinal waves in different media and check these relations dimensionally.



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43. The velocity of a particle executing SHM is V_1 when displacement is X_1 and V_2 when displacement is x_2 . What is the amplitude of vibration of the particle?



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44. What is a projectile? What do you understand by trajectory? Show that motion of a projectile fired horizontally is a parabola.



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45. Define centripetal and centrifugal forces. Explain with the help of neat diagram, how banking provides the centripetal force

necessary for a car to go in circular track.

(ignore friction between types and road).



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46. State and prove Bernoulli's theorem for liquid having streamline flow.



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47. What is meant by coefficient of linear expansion, superficial expansion and cubical

expansion? Derive the relation between them.



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48. What is mean free path of a gas molecule?

Show that the mean free path is inversely proportional to the pressure of the gas. Does the mean free path depend upon the temperature of the gas?



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49. State and explain the law of equipartition of energy of a dynamic system and use it to find the value of the ratio of the two specific heats of a monoatomic, and diatomic and a triatomic gas molecule.



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