PHYSICS

BOOKS - TARGET PHYSICS (HINGLISH)

FRICTION IS SOLIDS AND LIQUIDS

Mcq

1. Friction is always

A. parallel to the motion of the body.

B. perpendicular to the surface of contact.

C. tangential to the surface of contact.

D. inclined to the surface of contact.

Answer: C

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2. When two sufaces are coated with lubricant, friction between the surfaces ______

A. becomes zero

B. decreases

C. remainjs constant

D. increases

Answer: B

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3. Out of the following which is NOT a friction ?

A. contact friction

B. fluid friction

C. viscous force

D. collision

Answer: D

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4. Friction is caused by

A. interlocking betweeen the irregularities on the contact surface.

B. apparent area of contact.

C. repulsive force between air and surface in earth .

D. gravitational force of attraction towards the earth.

Answer: A

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5. Which of the following is a CORRECT statement ?

A. Apparent contact area is equal to acual contact area.

B. Apparent contact area is half of the actual contact area.

C. Apparent contact area is less than actual contact area.

D. Apparent contact area is greater than actual contact area.

Answer: D

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6. The elevation of one suface _____ depression in other surface.

A. gets interlocked with

B. makes free movement over

C. transfers free electrons to

D. gets unlocked with

Answer: A

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7. When a block is kept on the table, its weight acts vertically downwards then the force exerted by the surface on the block is

A. vertically upwards called normal reaction.

B. vertically downwared called normal reaction.

C. tangential force acting along the motion .

D. tangential force acting opposite to the motion.

Answer: A

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8. In equilibrium, limiting force of static friction (F_s) acting between two surface in contact and applied force (F) is related by

A. $F_s > F$

B. $F_s < F$

C. $F_s = F$

D. $F_s = \frac{1}{2}F$

Answer: C

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9. Fraction between two bodies in contact when one body just moves or tends to move over the other is called as

A. static fraction

B. kinetic friction

C. dynamic friction

D. rolling friction

Answer: A

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10. Choose the CORRECT relation.

A. static friction $<$ kinetic friction $>$ rolling friction.

B. static friction $>$ kinetic friction $<$ rolling friction.

C. static friction $<$ rolling friction $>$ kinetic friction.

D. static friction $>$ kinetic friction $>$ rolling friction.

Answer: D

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11. The limiting force of static friction is approximately independent of

A. apparent area of surfaces in contact.

B. nature of surfaces in contant.

C. materials of the surfaces in contact.

D. normal reaction between two surface in contact.

Answer: A

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12. Coefficient of static friction does not depend upon

A. nature and materials of the surfaces.

B. normal reaction

C. limiting force of static friction.

D. apparent area of contact.

Answer: B

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13. According to 1^{st} law of static friction, the relation between F_s and N is given by

A. $F_s \propto N^2$

B. $F_s \propto \frac{1}{N}$

C. $F_s \propto \frac{1}{N^2}$

D. $F_s \propto N$

Answer: D

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14. If the normal reaction is doubled, the frictional force is ________

A. halved

B. unchanged

C. doubled

D. triple

Answer: C

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15. A block of 50 kg rests on a table. A horizontal force of 294 N is required to just move the block, the coefficient of static friction between the surfaces in contant (μ_s)

is

A. 5.88

B. 1.67

C. 0.6

D. 0.17

Answer: C

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16. The friction that exists between the surface of two bodies in contact when one body is sliding over the other is called ______.

A. rolling friction

B. kinetic friction

C. static friction

D. steady friction

Answer: B

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17. Choose the CORRECT statement.

A. The magnitude of the force of kinetic friction depends upon shape of surface in contact.

B. The magnitude of force of kinetic friction depends upon apparent area of the surface in contact.

C. Force of kinetic friction is independent of material of the surfaces in contact.

D. The magnitude of the force of kinetic friction is approximately independent of the relative velocity provided it is not too large or small.

Answer: D

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18. A block of mass 4 kg resting on horizontal surface can be kept in uniform motion on the horizontal surface by the application of the force 16 N, the coeffcient of kinetic friction between the two surfaces is

A. 0.51

B. 0.41

C. 0.31

D. 0.21

Answer: B

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19. why are liquids and gases categorised as fuids ?

A. elastic bodies

B. plastic bodies

C. fluids

D. semisolids

Answer: C

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20. Static and homogeneous fluids are ______.

A. istropic

B. hetergeneous

C. stagnant

D. colloidal

Answer: A

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21. The________ exerted by a liquid at rest per unit area normal to the surface in contact with the liquid is called pressure.

A. velocity

B. displacement

C. thrust

D. work

Answer: C

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22. Liquid of density ρ in a container exerts pressure P given by (height of liquid h and area A)

A. $P = Ah\rho g$

B. $p = h\rho g$

C. $P = \frac{h\rho g}{A}$

D. $P = \frac{\rho g}{Ah}$

Answer: B

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23. Weight of the liquid column is given by

A. volume of the liquid $\times$ density of liquid $\times$ g

B. mass of the liquid $\times$ density of liquid

C. volume of the liquid $\times$ height of the liquid

D. cross sectional area of the liquid $\times$ density of liquid $\times$ g

Answer: A

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24. Choose the CORRECT relation.

A. A bsolute pressure =

Gauge pressure + Atmospheric pressure

B. Atmospheric pressure =

Absolute pressure + Gauge pressure

C. Atmospheric pressure =

Gauge pressure - A bsulute pressrue

D. Absolute pressure=

Atmospheric pressure -Gauge pressrue

Answer: A

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25. At what depth in fresh water the pressure on a diver is one atmosphere ?

[Density of water $=10^3 kgm^{-3}$, Normal pressure $= 10^5 Pa, g = 10ms^{-2}$]

A. 11 m

B. 10.5 m

C. 10 m

D. 9.8 m

Answer: C

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26. What is the pressure at the bottom of the ocean at a place where it is 3 km deep ?

[atmospheric pressure $= 1.01 \times 10^5 Pa,$

Density of sea water $= 1030 kgm^{-30}]$

A. $1.01 \times 10^5 Pa$

B. $3 \times 10^5 Pa$

C. $1.01 \times 10^7 Pa$

D. $3 \times 10^7 Pa$

Answer: D

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27. The shape of the vessel containing the liquid does not affect the pressure. This is known as

A. hydraulic pressure.

B. hydrostatic pressure.

C. hydrostatic paradox.

D. hydrostatic parallax.

Answer: C

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28. Pascal's law in NOT applicable to ________.

A. fluids

B. gases

C. solids

D. liquids

Answer: C

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29. The pressure applied to any part of the enclosed fluid at rest is transmitted undiminished to every portion of the fluid and to the walls of the vessel. This is ________.

A. Stock's law

B. Newton's law

C. Pascal's law

D. Torricelli's law

Answer: C

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30. To measure pressure difference, a device used is ________.

A. baromater

B. venturimeter

C. open tube manometer

D. aneroid barometer

Answer: C

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31. Liquid in the open tube monometer has ________ For measureing small pressure differende.

A. low density

B. high density

C. alcohol

D. water

Answer: A

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32. In a hydraulic lift, F_1 and F_2 are the force acting on the small piston and large piston having radii r_1 and r_2 rspectively, then

A. $F_1 = \frac{r_2^2}{r_1^2} F_2$

B. $F_2 = \frac{r_2^2}{r_1^2} F_1$

C. $F_1 = \frac{r_1}{r_2} F_2$

D. $F_1 = \frac{r_2}{r_1} F_2$

Answer: B

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33. Which of the following is NOT an application of Pascal's law ?

A. Hydraulic brakes

B. Hydraulic lift

C. Hydraulic press

D. Aerodynamic lift

Answer: D

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34. The two femurs each of cross-sectional area $10 cm^2$ support the upper part of a human body of mass 40 kg. the average pressure sustained by the femurs is (take $g = 10 ms^{-2}$)

A. $3.92 \times 10^5 Pa$

B. $1.96 \times 10^5 Pa$

C. $3.92 \times 10^2 Pa$

D. $1.96 \times 10^2 Pa$

Answer: B

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35. What is the barometric height of a liquid of density 3.4 g cm^{-3} at a place, where that for mercury barometer is 70 cm?

A. 70 cm

B. 140 cm

C. 228 cm

D. 280 cm

Answer: D

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36. Viscosity is the property of the liquids and gases which is more closely related to _____.

A. elasticity

B. inertia

C. tension

D. friction

Answer: D

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37. In streamline flow of liquid through a pipe of uniform cross sectional area, all stremlines are

A. divided into plane layers.

B. divided into reactangular blocks.

C. parallel to the axis of the tube.

D. circular in shape.

Answer: C

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38. In stremline flow, the velocity of a liquid at a given point is

A. constant in magnitude only.

B. constant in direction but not constnat in magnitufe.

C. not constnat in direction but constnat in magnitude.

D. always constant in magnitude and direction.

Answer: D

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39. For streamline flow of an incompressible fluid, If A is area and v is speed then equation of continuity is

A. Av = constant

B. $A + v =$ constant

C. $\frac{A}{v} =$ constant

D. $\frac{v}{A} =$ constant

Answer: A

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40. Select the CORRECT statement.

A. Two stremlines are always perpendicular.

B. Two streamlines will intersect at an angle of 30° between them.

C. Two streamlines will never intersect.

D. Two streamlines will not exist.

Answer: C

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41. An incompressible fluid flows steadily through a cylindrical pipe which has radius 2 R at point A and radius R at point B farther along the flow direction. If the velocity at point A is v, its velocity at point B is

A. $\frac{v}{2}$

B. v

C. 2v

D. 4v

Answer: D

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42. A pipe 2 cm in diameter has a constriction of diameter 1 cm. What it's the velocity of flow at the constriction. If velocity of flow in the broader region of the pipe is 5 cm/s?

A. 10 cm/s

B. 20 cm/s

C. 25 cm/s

D. 30 cm/s

Answer: B

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43. Flooded river is an example of _____

A. streamline flow

B. turbulent flow

C. laminar flow

D. viscos flow

Answer: B

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44. When the velcity of flow of liquid is greater than critial velocity, the liquid is said to have

A. streamline flow

B. laminar flow

C. turbulent flow

D. viscos flow

Answer: C

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45. The viscous force acting on adjacent layers of liquid is

A. perpendicular to it.

B. vertically downward.

C. verticlly upward.

D. tangential to it.

Answer: D

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46. Velocity of liquid layer kept in a vessel is maximum at ______.

A. top

B. bottom

C. middle

D. cannot be predicted

Answer: A

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47. The velocity of liquid flowing through a tube at certain distance from the axis of tube

A. increases with distance.

B. remains constant.

C. decreases with distance.

D. depends upon length of the tube.

Answer: C

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48. The rate of change of velocity with distance measured from stateonary layer is called ______.

A. acceleration

B. force

C. time

D. velocity gradient

Answer: D

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49. The S.I. unit and dimensions of velocity gradient is streamline flow is

A. $m/s, \left[M^0L^1T^{-1}\right]$

B. $m, \left[M^0L^1T^0\right]$

C. $M^{-1}, \left[M^0L^{-1}T\right]$

D. $S^{-1}, \left[M^0L^0T^{-1}\right]$

Answer: D

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50. An incompressible liquid flows through a uniform cross section tube with velocity 12 cm/s. the thickness of liquid layer is 0.8 cm then velocity of gradient of flow is

A. $15s^{-1}$

B. $12s^{-1}$

C. $18s^{-1}$

D. $5s^{-1}$

Answer: A

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51. The velocity gradient of certain liquid is $5s^{-1}$. If thickness of liquid layer is 2.5 cm, then velocity of flow of liquid will be

A. 10 cm/s

B. 2.5 cm/s

C. 12.5 cm/s

D. 5 cm/s

Answer: C

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52. The tangential force or viscous force on any layer of the liquid is directly proportional to the velcoity gradient dv/dx. Then the direction of velcoity gradient is

A. perpendicular to the direction of flow of the liquid.

B. parallel to the direction of the flow of the liquid.

C. opposite to the direction of the flow of the liquid.

D. independent of the direction of the flow of liquid.

Answer: A

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53. Coefficient of viscosity of a liquid does not depend upon ______

A. velocity gradient

B. area of layer

C. direction of liquid flow

D. nature of the liquid

Answer: C

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54. A meal plate having an area of $0.04m^2$ is placed on a horizontal wooden surface. Oil of coefficient of viscosity $2Ns/s^2$ is is introduced between the plate and the surface till the thickness of the oil layer is 0.5 mm. The horizontal force needed to drug the plate along the surface with a velocity of 5 cm/s is

A. 80 N

B. 60 N

C. 8 N

D. 6 N

Answer: C

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55. The force of 2000 dyne is required to move a flat glass plate of surface area $10cm^2$ with a velocity of 1 cm/s over a surface of glycerine 1 mm thick. The coefficient of viscosity of glycerine is

A. 0.2 poise

B. 0 poise

C. 20 poise

D. 20.5 poise

Answer: C

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56. Viscous force on a small sphere of radius r moving in a fluid varies directly with

A. r^2

B. r

C. $\frac{1}{r}$

D. $\left(\frac{1}{r}\right)^2$

Answer: B

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57. Two metal ball of radius R and 2 R falling through a fluid have same velocity at some point. The viscous drag acting on them at that instant are in the ratio

A. $1:4$

B. $1:2$

C. $2:1$

D. $4 : 1$

Answer: B

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58. A rain drop of radius 0.5 mm has a terminal velocity in air 2 m/s. If the coefficient of viscosity of air is 1.8×10^{-4} poise, the viscous drag on the rain drop will be

A. 0.014 dyne

B. 0.02 dyne

C. 0.034 dyne

D. 0.04 dyne

Answer: C

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59. When a spherical body falls through a viscous fluid, it experiences a viscous force, the motion of the body is

A. initially accelerated then becomes constant.

B. continuously accelerated.

C. continously moving with different velocity.

D. initially constant then decreases till it becomes zero.

Answer: A

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60. Which of the following is correct formula for terminal velocity of a body in a vissous liquid ?

A. $\frac{9}{2} \cdot \frac{r^3(\sigma - \rho)g}{\eta}$

B. $\frac{2}{9} \cdot \frac{r^3(\rho - \sigma)g}{\eta}$

C. $\frac{2}{9} \cdot \frac{r^2 g(\rho - \sigma)}{\eta}$

D. $\frac{2}{9} \cdot \frac{r^2(\rho - \sigma)}{\eta g}$

Answer: C

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61. find the terminal velocity of a steel ball 2mm in diameter falling through glycerine. Relative density of steel =8, relative density of glycerine =1.3 and viscosity of glycerine=8.3 poise.

A. $15.14 \times 10^{-3} m / s$

B. $17.43 \times 10^{-3} m / s$

C. $14.43 \times 10^{-4} m / s$

D. $17.43 \times 10^{-2} m / s$

Answer: B

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62. A drop of radius 2×10^{-5} and density $1.2 \times 10^3 kg / m^3$ falls through air. The viscosity of air is $1.8 \times 10^{-5} Ns / m^2$. Neglecting buoyancy due to air, the terminal speed of the drop is

A. $2.8 cm / s$

B. $3.8 cm / s$

C. $4.8 cm / s$

D. $5.8cm/s$

Answer: D

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63. The terminal velocity of a water drop of radius 0.01 mm falling through air is 1.12 cm/s. If the density of air is neglected, the coefficient of viscosity of air is

[density of water $= 10^3 kg/m^3, g = 9.8m/s^2]$

A. $2 \times 10^{-5} Ns / m^2$

B. $1.9 \times 10^{-5} Ns / m^2$

C. $1.8 \times 10^{-5} Ns / m^2$

D. $1.7 \times 10^{-5} Ns / m^2$

Answer: C

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64. Critical velocity is given by

A. $v_C = \frac{N\eta}{\rho D}$

B. $v_C = \frac{N\eta\rho}{D}$

C. $v_C = \frac{N\rho D}{\rho}$

D. $v_C = \frac{N}{\eta\rho D}$

Answer: A

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65. If Renynold's number is greater than 3000, the flow of liquid is

A. laminar

B. turbulent

C. regular

D. irregular

Answer: B

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66. Water is flowing therough a tube of diameter 1 cm at 8 cm/s. Taking $\eta = 10^{-2}$ poise the flow of liquid and Reynold's number are

A. streamline, 80

B. streamline, 800

C. strbulent, 8000

D. turblent, 9000

Answer: B

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67. Bernoulli's principle is based on the law of conservation of

A. conservation of linerar momentum.

B. conservation of energy.

C. conservation of kinetic energy.

D. conservation of angular momentum.

Answer: B

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68. Pain gun is based on ________.

A. Archimede's principle

B. Boyle's law

C. Bernoulli's prinicple

D. newton's laws of motion

Answer: C

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69. Bernoulli's principle is true under which of the following (conditions) assumpritons ?

A. The fluid is non-viscous and its flow is turbulent.

B. The fluid is non-viscous and its flow is stermline.

C. The fluid is viscous and its flow is turbulent.

D. The fluid is viscous and its flow is streamline.

Answer: B

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70. In case of the streamline flow of non-visocous and incompressible fluid, which of the following statemetn is CORRECT ?

A. The sun of pressure energy, K.E. per tunit mass and P.E. pre unit mass always remains constant at every point.

B. The sum of pressuer energy, K.E. per unit mass and P.E. per unit mass is constant in the beginning.

C. The sun of pressure energy, K.E. per unit mass and P.E. per unit mass is not constant at every point.

D. The pressure energy is equal to sum of K.E. per unit mass and P.E. per unit mass at every point.

Answer: A

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71. If P is the pressure on a Liquid of area A and the liquid moves through a certain distance the work done per unit volume is _______.

A. Force

B. Density

C. Pressure

D. Pressure $\times$ Area

Answer: C

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72. The velocity of efflux of liquid through orifice is equal to velocity which a body attains while falling freely from the free surface of liquid to the orifice. This is known as ________.

A. Bernoulli's theorem

B. Torricelli's law

C. Stoke's law

D. Pascal's law

Answer: B

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73. A cylinder of height 20 m is completely filled with water. The velocity of efflux of water through a hole on the side wall of the cylinder near its bottom is (Take $g = 10ms^{-2}$)

A. 10

B. 20

C. 25.5

D. 5

Answer: B

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74. In a vessel containing water, a hole is made at a depth of 0.10 m from the free surface. What would be the velocity of efflux ?

A. $14m/s$

B. $4m/s$

C. $20.8m / s$

D. $1.4m / s$

Answer: D

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75. A device used for measuring the rate of flow of liquid through pipes is called...........

A. calorimeter q

B. speedometer

C. venturimeter

D. theromemeter

Answer: C

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76. The venturimeter measures the pressure difference by measureing ______.

A. height difference

B. temperature difference

C. velocity difference

D. volume difference

Answer: A

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77. What is the minimum pressure required to force the blood from the heart to the top of the head (vertical distance $0.5m$) ? [density of blood is 1040 kg m^{-3}. Fraction is to be neglected and $g = 9.8ms^{-2}$]

A. $1050Nm^{-2}$

B. $2080Nm^{-2}$

C. $5096Nm^{-2}$

D. $6096Nm^{-2}$

Answer: C

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78. Air is streaming past a horizontal airplane wing such that its speed is 120 metre per sec over the upper surface and 90 metre per sec at the lowers surface. If the density of air is 1.3 kg per $metre^3$ and the wing is 10 metre long and has an average width of 2 metre, then the difference of the pressure on the two sides of the wing is :

A. 4095.0 pascal

B. 409.50 pascal

C. 40.950 pascal

D. 4.0950 pascal

Answer: A

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79. In airfoil, the streamline are crowed above the wings of aeroplane more than those below it. This causes (during take off)

A. pressure to drop above wings and results in dynamic lift.

B. pressure to drop below wings and results in dynamic lift.

C. no difference in pressure.

D. to push the aeroplane.

Answer: A

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80. An airfoil has ________.

A. convex shape

B. concave shape

C. concavo-convex shape

D. plan e shape

Answer: A

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81. Which of the following is NOT an example of application of Bernoulli's principle ?

A. Venturimeter

B. Dynamic lift

C. Air purifier

D. Barometer

Answer: D

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82. Maximum acceleration of the train in which a box lying on its floor will ramain stationary, is

$\left[\mu_s = 0.15, g = 10m/s^2\right]$

A. $70m/s^2$

B. $10.5m/s^2$

C. $7.1m/s^2$

D. $1.5m / s^2$

Answer: D

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83. If μ, N and S represent coefficient of friction, normal reaction and distance moved, then the general expression for work against friction is

A. μNS

B. $\frac{\mu N}{S}$

C. $\frac{\mu S}{N}$

D. $\frac{S}{\mu N}$

Answer: A

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84. Water is filled in a flask up top a heightof 20 cm. The bottom of the flask is circular with radius 10 cm.If the atmospheric pressure is 1.01×10^5 Pa, find the force exerted by the water on the bottom. Take $g = 10 ms^{-2}$ and density of water $= 1000 kgm^{-3}$.

A. $1.03N$

B. $1.03 \times 10^2 N$

C. $1.03 \times 10^4 N$

D. $1.03 \times 10^5 N$

Answer: D

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85. In streamline flow velocity of liquid at the bottom layer is _______.

A. zero

B. maximum

C. mean of velocities of all layers

D. infinity

Answer: A

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86. Sudden fall of atmospheric pressure by a large amount indicates ______.

A. storm

B. fair weather

C. cold weather

D. calm weather

Answer: A

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Mcq Critical Thinking

1. Frictional force is ________.

A. conservation force

B. gravitional force

C. electrostatic force

D. non-conservative force

Answer: D

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2. Assertion: Frection is a conservative force.

Reason: Fraction does not depend upon mass of the body.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reaosn is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer: D

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3. When one body tends to move or move over the another body, the opposition force depends upon ______.

A. surrounding temperature

B. temperature of the bodies

C. density of material

D. nature of the surfaces in contact

Answer: D

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4. When a moving body is suddenly stopped

A. frictional force increases.

B. frictional force gradually reduces to one.

C. frictional force becomes infinite.

D. the frictional force reduces to zero as it is a self adjusting force.

Answer: D

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5. The ball bearings used in a machine are of different materials, this is because

A. adhesive forces are greater than cohesive forces.

B. adhesive forces and cohesive forces are rqual in magnitude, opposite in direction ,

C. adhesive forces are less than choesive forces.

D. machine looks good, attractive.

Answer: C

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6. Assertion : When a bicycle is in motion, the force of friction exerted by the ground on the two wheels is always in forward direction.

Reason : The frictional force acts only when the bodies are in contact

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reaosn is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer: D

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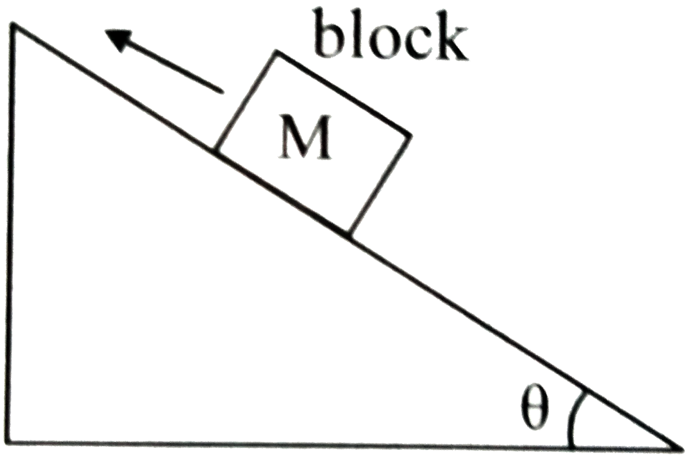
7. A block of mas M is resting on an inclined plane as shown in the figure. The inclination of the plane to the horizontal is gradually increased. It is found that when the angle of inclination is θ the block just begins to slide down the plane. What is the minimum force F applied parallel to the plane that would just make the block move up the plane ?



A. $Mg\sin\theta$

B. $mg\cos\theta$

C. $2Mg\cos\theta$

D. $2Mg\sin\theta$

Answer: D

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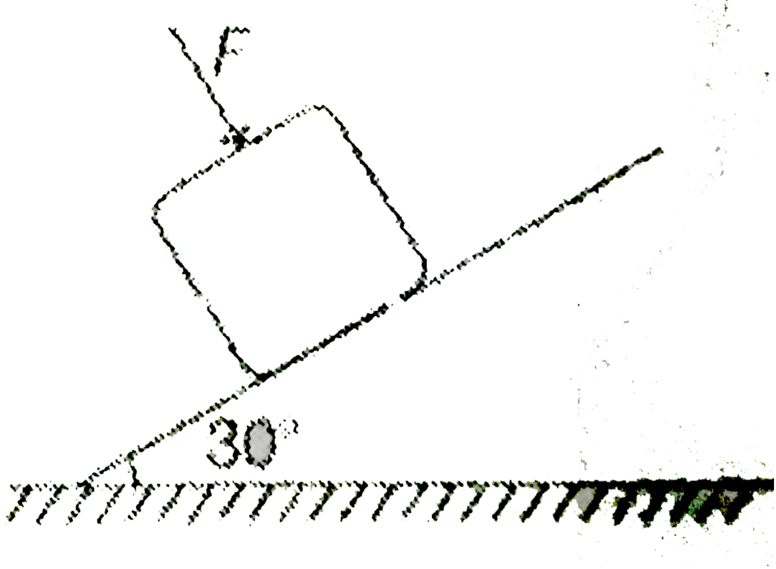
8. A block of mass m=2kg is resting on a rough inclined plane of inclination plane of inclination 30° as shown in figure. The coefficient of friction between the block and the plane is $\mu = 0.5$. What minimum force F should be applied perpendicular to the plane on the block, so that blocks does not slip on the plane? $(g = 10m/s^2)$



A. zero

B. $5.68N$

C. $4.34N$

D. $6.24N$

Answer: B

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9. If F_i and F_g are the frictional force between surface of contact from iron and glass material, then which of the following relation is correct ? Assume that there are same normal reaction on both the surfaces.

A. $G_g = F_i$

B. $F_g \neq F_i$

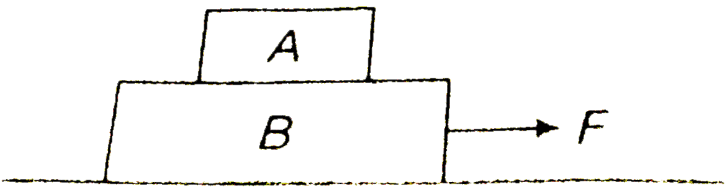
C. $F_g = 2F_i$

D. $F_i = 2F_g$

Answer: B

Watch Video Solution

10. A 4 kg block A is placed on the top of 8 kg block B which rests on a smooth table.



A just slips on B when a force of 12 N is applied on A. Then the maximum horizontal force F applied on B to make both A and B move together, is

A. 12 N

B. 24 N

C. 36 N

D. 48 N

Answer: C

Watch Video Solution

11. Wooden block of weight W_1 is kept on a horizontal surface. A pan is attached to a string which passed over the pulley and other end of the string is attached to block. The weight F_1 is placed in the pan. If the block still remains stationary then

A. $F_1 = F_{2_1}$ and $W_1 F_{2_1}$

B. $F_1 = N$ and $W_1 = \mu_s$

C. $F_1 = F_{s_1}$ and $W_1 = N$

D. $F_1 = N$ and $W_1 = F_{s_1}$

Answer: C

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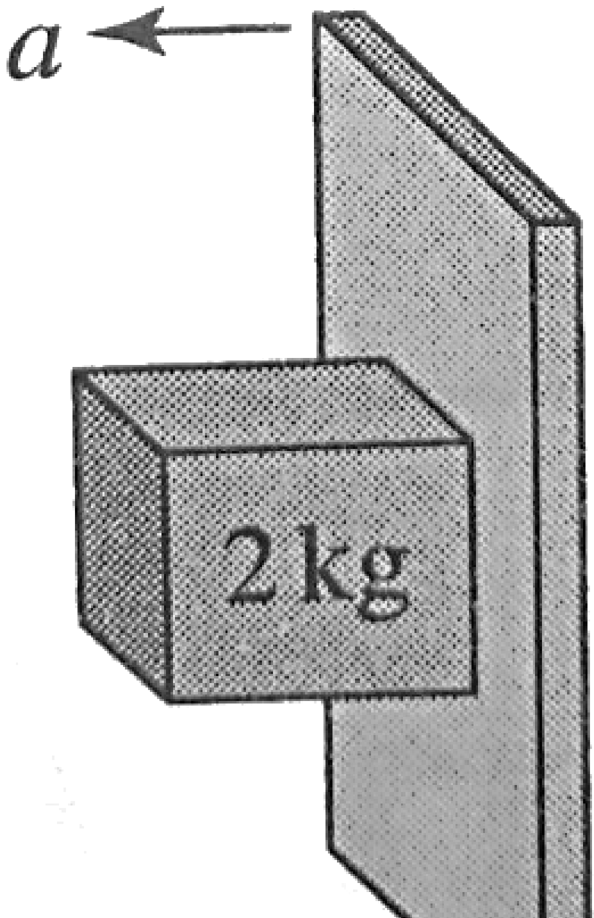


12.

A rough vertical board has an acceleration a so that a 2 kg block pressing against it dows not fall. The coefficient of friction between the block and the board should be

A. $> g/a$

B. $< g/a$

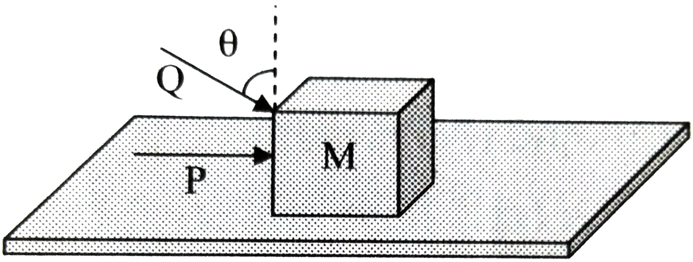
C. $= g/a$

D. $> ag$

Answer: A

Watch Video Solution

13. A block of mass m lying on a rough horizontal plance is acted upon by a horizontal force P and another force Q inclined at an angle θ to the vertical. The block will remain in equilibrium, if the coefficient of friction between it and the surface is



A. $\dfrac{(P + Q\sin\theta)}{(mg + Q\cos\theta)}$

B. $\dfrac{(P\cos\theta + Q)}{(mg - Q\sin\theta)}$

C. $\dfrac{(P + Q\cos\theta)}{(mg + Q\sin\theta)}$

D. $\dfrac{(P\sin\theta - Q)}{(mg - Q\cos\theta)}$

Answer: A

Watch Video Solution

14. A block of mass $10kg$ is placed on a rough horizontal surface having coefficient of friction $\mu = 0.5$. If a horizontal force of $100N$ is acting on it, then acceleration of the will be.

A. zero

B. $10ms^{-2}$

C. $5ms^{-2}$

D. $5.2ms^{-2}$

Answer: C

Watch Video Solution

15. The pressure at a point in a fluid is independent of ________.

A. area

B. force

C. height of liquid

D. direction

Answer: D

Watch Video Solution

16. Assertion : To empty an oil tank, two holes are made.

Reason : Oil will come out two holes so it will emptied faster.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reaosn is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer: C

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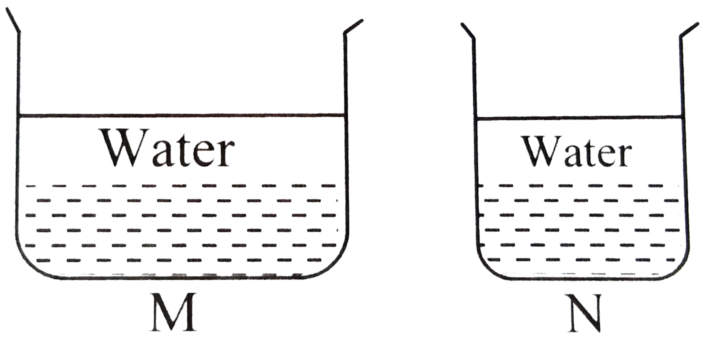
17. From the following figure, select the CORRECT observation



A. The pressure at the bottom of tank (M) is greater than at the bottom of (N).

B. The pressure at the bottom of the tank (M) is smaller than at the bottom of (N).

C. The pressure depends on the shape of the container.

D. The pressure at the bottoms of tank (M) and (N) is same.

Answer: D

Watch Video Solution

18. Two vessels have different base area. They are filled with water to the same height. If the amount of water in one be 6 times that in the other, then the ratio of pressure on their botton will be

A. $16:1$

B. $8:1$

C. $4:1$

D. $1:1$

Answer: D

Watch Video Solution

19. The manual of a car instructs the owner to inflate the tyers to a pressure of 200 kPa, then absolute pressure is

A. 301 kPa

B. 200 kPa

C. 101 kPa

D. 99kPa

Answer: A

Watch Video Solution

20. What is the pressure on a swimmer 10m below the surface of lake? $g = 10ms^{-2}$, atmospheric pressure = $1.01 \times 10^5 Pa$

A. 4 atm

B. 1 atm

C. 2 atm

D. 3.8 atm

Answer: C

Watch Video Solution

21. In car lift compressed air exerts a force F_1 on a small piston having a radius of 5 cm. This pressure is transmitted to a second piston of radius 15 cm. If the mass of the car to be lifted is 1350 kg, what is F_1? What is the pressure necessary to ac complish this task ?

A. $2.03 \times 10^5 Pa$

B. $1.87 \times 10^5 Pa$

C. $1.2 \times 10^5 Pa$

D. $2.42 \times 10^5 Pa$

Answer: A

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22. The densities very very little over a wide range I pressure and temperature in case of _______ hence treated as incompressible.

A. gases

B. liquids

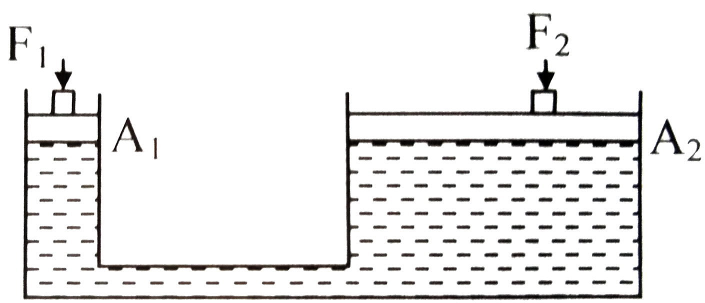
C. fluids

D. LPG

Answer: B

Watch Video Solution

23. Two pistons (areas A_1 and A_2) exerting forces F_1 and F_2 on a liquid exerts pressures P_1 and P_2 as shown in figure. The pistons are at the same horizontal level and do not move under the influence of force, then



A. $F_2 = \frac{A_1}{A_2} F_1$

B. $F_2 = F_1$

C. $P_2 = \frac{A_1}{A_2} P_1$

D. $P_2 = P_1$

Answer: D

Watch Video Solution

24. hydraulic breakes work on priciple of

A. change in pressure results in stopping of wheel motion.

B. change in pressure is transmitted equally to wheels.

C. pressure is tensor quantity.

D. higher applied pressure stop the motion.

Answer: A

Watch Video Solution

25. Choost the CORRECT statement.

A. The liquid pressure is not the same at all points at the same depth.

B. The liquid pressure at all points at the same depth depends on shape of the liquid.

C. The liquid pressure at all points at the same depth depends upon surrounding environment.

D. The liquid pressure is the same at all points at the same depth.

Answer: C

Watch Video Solution

26. A liquid distributed by stirring comes to rest after some time due to its property of

A. surface tension

B. stability

C. viscosity

D. attraction forces between molecules

Answer: D

Watch Video Solution

27. When a fluid is through a tube, thwn the reason of viscous force acting between its different layers will be

A. transfer of energy from one layer to another.

B. transfer to momentum from one later to another.

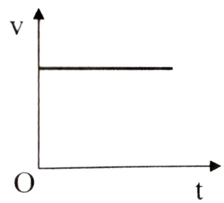
C. equal velocity of the molecules.

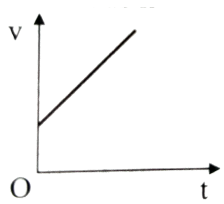
D. changing density along with tube.

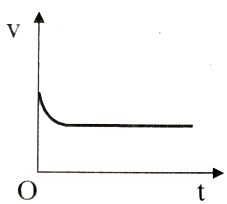
Answer: B

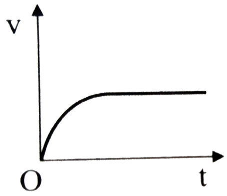
Watch Video Solution

28. From amongst the following curves, which one shows the variation of the velocity v with time t for a small sized spherical body falling vertically in a long column of a viscous liquid

A. 

B. 

C. 

D. 

Answer: D

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29. Deep water runs slow. Explain.

A. rain

B. still

C. turbulent

D. river

Answer: C

Watch Video Solution

30. Water enters through end A with a speed v_1 and leaves through end B with a speed v_2 of cylindrical tube AB. The tube is always completely filled with water. In case I the tube is horizontal, in case II it vertical with the end

A upward and in case III it is vertical with the end B upward. We have $v_1 = v_2$for

A. Case I

B. Case II

C. Case III

D. Each case

Answer: D

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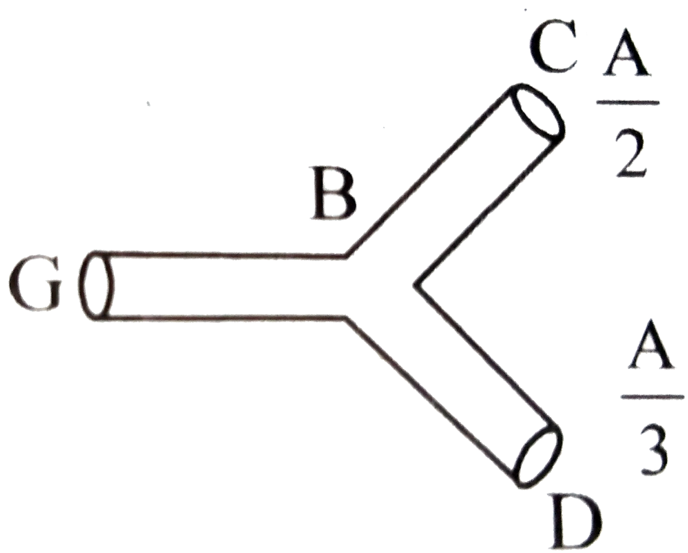
31. A pipe GB is fitted with two pipes C and D as shown in the figure. The pipe has area $A = 24m^2$ at G and velocity of water at G is 10 m/s, and at C is 6 m/s. The velocity of water at D is



A. $21m/s$

B. $3.3m/s$

C. $30m/s$

D. $2.1m/s$

Answer: A

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32. Two drops of equal size are falling vertically through air with a constant terminal velocity of $0.15cm/s$. What should be the velocity if these drops coalesce to from one drop ?

A. $0.15cm/s$

B. $0.15\sqrt{2}cm/s$

C. $0.15 \times 2^{1/3}cm/s$

D. $0.15 \times 2^{2/3}cm/s$

Answer: D

Watch Video Solution

33. In turbulent flow the velocity of the liquid molecules in contact with the walls of the tube.

A. is zero

B. is maximum

C. is equal to critical velocity

D. may have any value

Answer: D

Watch Video Solution

34. The tangential force or viscous force on any layer of the liquid is directly proportional to the velcoity gradient dv/dx. Then the direction of velcoity gradient is

A. perpendicular to the direction of flow of the liquid.

B. parallel to the direction of the flow of the liquid.

C. opposite to the direction of the flow of the liquid.

D. independent of the direction of the flow of liquid.

Answer: A

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35. The relative velocity of two parallel layers of water is 8 cm/sec. If the perpendicular distance between the layers is 0.1 cm, then velocity gradient will be

A. 40 per second

B. 60 per second

C. 80 per second

D. 100 per second

Answer: C

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36. A good lubricant must have

A. highly viscous only

B. volatile in nature only

C. low viscous

D. higly viscous and low volatile

Answer: D

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37. Machine parts are jammed in winter. Why?

A. of low temperature

B. viscosity of lubricant increases

C. viscosity of lubricant decreases

D. of low pressure

Answer: B

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38. A sphere is dropped gently into a medium of infinite extent. As the sphere falls, the force acting downwards on it.

A. remains constnat.

B. decreases for sometime and then becomes constant.

C. increases for sometime and then becomes constant.

D. decreases for sometime and then becomes zero.

Answer: D

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39. Rain drops fall from a great height under gravity. Check the correct statement

A. Their velocity continuously increases till they hit the earth will the same final velocity.

B. They fall with a terminal velocity which is different for drops of different sizes.

C. They fall with a terminal velocity which is the same for very drop.

D. Their velocity goes on increasing continuously till they hit the earth, and the final velocity of each drop is different.

Answer: B

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40. A solid sphere falls with a terminal velocity V in CO_2 gas. If its is allowed to fall in vacuum

A. terminal velocity of sphere $= v$.

B. terminal velocity of sphere $< v$.

C. terminal velocity of sphere $> v$.

D. sphere never attains terminal velocity.

Answer: D

Watch Video Solution

41. The maximum average velocity of water in a tube of diameter 2 cm so that the flow becomes laminer is [Viscosity of water is $10^{-3} Nm^{-2}s^{-1}$]

A. $1ms^{-1}$

B. $0.1ms^{-1}$

C. $10ms^{-1}$

D. $100ms^{-1}$

Answer: B

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42. Bernoulli's equation is ideally valid for

A. Constant, viscous, incompressible, temperature-dependent flow.

B. Variable, non-viscous, incompressible, temperature-dependent flow.

C. Constant, non-viscous, incompressible, temperature-independent flow.

D. Variable, non-viscous, incompressible, temperature-independent flow.

Answer: C

Watch Video Solution

43. The pans of a physical balance are in equilibrium. Air is blown under the right hand pan, then the right hand pan will

A. move up

B. move down

C. move erratically

D. remain at the same level

Answer: B

Watch Video Solution

44. Assertion : Aeroplanes are made to run on the runway before take off, so that they acquire the necessary lift.

Reason : According to Bernoulli's theorem, as velocity increases pressure decreases and viceversa.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reaosn is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer: A

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45. Why two boats moving in parallel directions close to each other get attracted?

A. a streamline flow sets between the two.

B. the boats experience attractive pull towards wach other.

C. the boats experience force of repulsion.

D. the whirlpool is formed at the mid way between two boats.

Answer: B

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46. Water flowing through a horizontal pipe line having a constriction. Then,

A. pressure will be the same througghlut the length of the pipe.

B. pressure will be greater at the constiction.

C. pressuce will be smaller in the wider portion.

D. pressure will smaller at the constriction.

Answer: D

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47. A vessel is filled with water and kerosence oil. The vessel has a small hole in the bottom. Neglecting viscosity if the thickness of water layer is h_1 and kerosens layer is h_2 then the velocity v of flow of water will be (density of water is ρ_1b g/c c and that of kerosense is ρ_2 g/c c

A. $v=\sqrt{2g(h_1+h_2)}$

B. $v=\sqrt{2g\left(h_1+h_2\frac{\rho_2}{\rho_1}\right)}$

C. $v=\sqrt{2g(h_1\rho_1+h_2r\rho_2)}$

D. $v=\sqrt{2g\left(h_1\frac{p_2}{\rho_1}+h_2\right)}$

Answer: B

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48. The reading of pressure meter attached with a closed pipe is $3.5 \times 10^5 Nm^{-2}$. On opening the value of the pipe, the reading of the pressure meter is reduced to $3.0 \times 10^5 Nm^{-2}$. Calculate the speed of the water flowing in the pipe.

A. $100m / s$

B. $50m / s$

C. $10m / s$

D. $0.1m / s$

Answer: C

Watch Video Solution

49. In a venturimeter, ______ remains unchanged along the axis.

A. K.E. of flowing liquid

B. pressure energy of flowing liquid

C. P.E. of flowing liquid

D. Both K.E. and P.E.

Answer: C

Watch Video Solution

50. The speed of the effux from an open tank is identical to that of ______

A. a freely falling body

B. a body moving with varying velocity

C. a body moving tangentially

D. a body at rest

Answer: A

Watch Video Solution

51. The velocity of efflux of an ideal liquid does not depend on

A. acceleration due to gravity

B. height of the liquid level in the vessel

C. viscosity of the liquid

D. Both (B) and (C)

Answer: D

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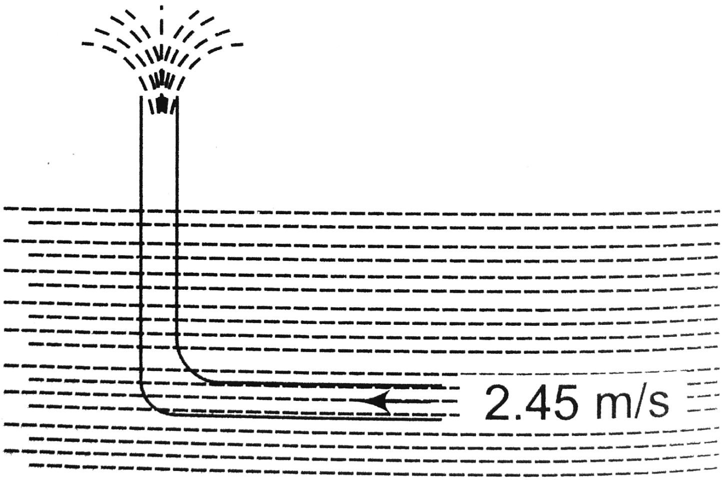
52. An L-shaped tube with a small orifice is held in a water stream as shown in fig. the upper end of the tube is $10.6cm$ above the surface of water. What will be the height of the jet of water coming from the orifice?

(Velocity water steam is $2.45 m / s$)



A. Zero

B. 10.6 cm

C. 19.4 cm

D. 40.0 cm

Answer: C

Watch Video Solution

53. A cylindrical tank has a hole of $1cm^2$ in its bottom. If the water is allowed to flow into the tank from a tube above it at the rate of $70cm^3/\sec$, then the maximum height up to which water can rise in the tank is

A. $0.25cm$

B. $2.5cm$

C. $5cm$

D. $10cm$

Answer: B

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54. With increase in temperature, friction ________.

A. increases

B. decreases

C. remains unchanged

D. may increases or decrease

Answer: B

Watch Video Solution

55. The wheels are cirecular in shape because

A. they required less material.

B. circular wheels are frictionless.

C. they are attractive.

D. rolling friction is least.

Answer: D

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56. A body is moving along a straight horizontal road with a velocity of 21 m/s comes to rest after moving a certain distance. If μ between the body and the surface of road is $0.3,$ the distance covered is $\left[g = 9.8 ms^{-2}\right]$

A. 100 m

B. 80 m

C. 75 m

D. 60 m

Answer: C

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57. A stone weighing 1 kg and sliding on ice with a velocity of 2 m / s is stopped by friction in 10 sec . The force of friction (assuming it to be constant) will be

A. -20 N

B. -0.2 N

C. 0.2 N

D. $20N$

Answer: B

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58. The coefficient of viscosity for hot air is

A. greater than the coefficient of viscosity for cold air.

B. smaller than the coefficient of viscosity for cold air.

C. same as the coefficient of viscosity for cold air.

D. increases or decreases depending on the external pressure.

Answer: A

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59. A car is moving along a straight horizontal road with a speed v_0 . If the coefficient of friction between the tyres and the road is μ , the shortest distance in which the car can be stopped is

A. $\frac{v}{2\mu g}$

B. $\frac{v^2}{2\mu g}$

C. $\left(\frac{v^2}{2\mu g}\right)^{1/2}$

D. $\left(\frac{v^2}{2\mu g}\right)^2$

Answer: B

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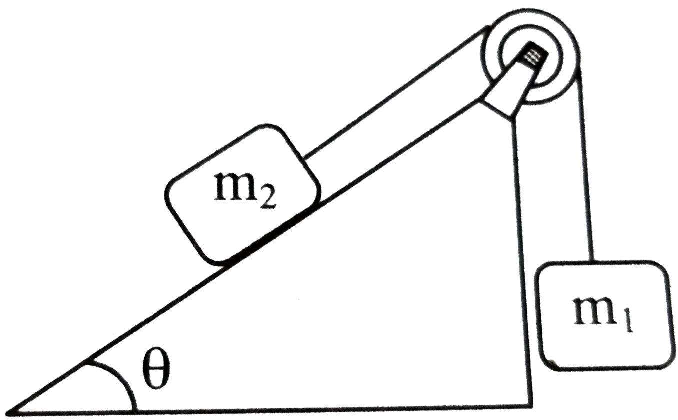
60. The coefficient of friction between m_2 and inclined plane is μ (shown in the figure). If $\frac{m_1}{m_2} = \sin\theta$ then



A. no motion takes place.

B. m_1 moves downward.

C. m_1 moves upward.

D. no sufficient incormation.

Answer: A

Watch Video Solution

61. A vehicle of mass m is moving on a rough horizontal road with momentum P . If the coefficient of friction between the tyres and the road be μ, then the stopping distance is:

A. $\dfrac{P}{2\mu mg}$

B. $\dfrac{P^2}{2\mu mg}$

C. $\dfrac{P}{2\mu m^2 g}$

D. $\dfrac{P^2}{2\mu m^2 g}$

Answer: D

Watch Video Solution

62. A 60 kg body is pushed 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

A. $6m / s^2$

B. $4.9m / s^2$

C. $3.92m / s^2$

D. $1m / s^2$

Answer: D

Watch Video Solution

63. A ball of radius r and density r falls freely under gravity through a distance h before entering water. Velocity of ball does not change even on entering water. If viscosity of water is η the value of h is given by

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A. $\frac{2}{9}r^2g\left(\frac{1-\rho}{\eta}\right)$

B. $\frac{2}{81}r^2g\left(\frac{\rho-1}{\eta}\right)$

C. $\frac{2}{81}r^4g\left(\frac{\rho-1}{\eta}\right)^2$

D. $\frac{2}{9}r^4g\left(\frac{\rho-1}{\eta}\right)^2$

Answer: C

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64. In the houses far away from the municipal water tanks often water does not rise to the top floor. This happens because

A. viscosity of water is vary high.

B. water wets the pipes.

C. of changes in the cross-sectional area of the pipe.

D. of loss of pressure during the flow of water.

Answer: D

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65. A plane is in level flight at constant speed and each of its two wings has an area of $20m^2$. If the speed of rthe air is 180 km/h over the lower wing and 216 km/h over the upper wing surface, determine the plane's mass. (Take air density to be $1kgm^{-3}$ and $g = 10m/s^2$).

A. 2200 kg

B. 1100 kg

C. 1785 kg

D. 2750 kg

Answer: A

Watch Video Solution

66. For a fluid in a steady floe, the increase in flow speed at a constrictin follows ______.

A. conservation of mass and angular momentum

B. conservation of mass and Bernoulli's principle

C. conservation of velocity

D. Torricelli's steorem

Answer: B

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67. A cylindrical tank is filled with water to a level of 4 m. A hole is opened at a height of 60 cm from bottom. The ratio of the area of the hole to that at cross-sectinal area at cylinder is 0.2. Then the velocity with which water is coming out is $(g = 10m / s^2)$

A. $7.9m / s$

B. $9.2m / s$

C. $8.4m / s$

D. $8.9m / s$

Answer: C

Watch Video Solution

68. Assertion: The acceleration of a body down a rough inclined plane is grater than the acceleration due to gravity.

Reason: The body is able to slide on an inclined plane only when its acceleration is greater than acceleration due to gravity.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reaosn is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer: D

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Mcq Competitive Thinking

1. Which one of the following is NOT used to reduce friction ?

A. Oil

B. Ball bearings

C. Sand

D. Graphite

Answer: C

Watch Video Solution

2. STATEMENT-1: It is easier to pull a heavy object than to push it on a level ground and STATEMENT-2: The magnitude fo frictional force depends on the nature of the two surfaces in contact.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reaosn is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer: B

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3. If a ladder weighting $250N$ is placed against a smooth vertical wall having coefficient of friction between it and floor 0.3, then what is the maximum force of friction available at the point of contact between the ladder and the floor?

A. 75 N

B. 50 N

C. 35 N

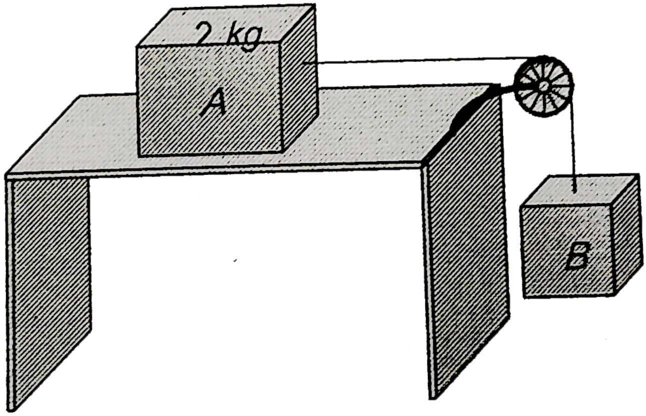
D. 25 N

Answer: A

Watch Video Solution

4. The coefficient of static friction, μ_s between block A of mass 2 kg and the table as shown in the figure is 0.2. What would be the maximum mass value of block B so that the two blocks do not move? The string and the pulley are assumed to be smooth and massless.

$(g = 10m/s^2)$



A. $2.0Kg$

B. $4.0Kg$

C. $0.2Kg$

D. $0.4Kg$

Answer: D

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5. A lift is moving down with an acceleration equal to the acceleration due to gravity. A body of mass M kept on the floor of the lift is pulled horizontally If the coefficient of friction is μ then the frictional resistance offered by the body is .

A. mg

B. μmg

C. $2\mu mg$

D. Zero

Answer: D

Watch Video Solution

6. Maximum acceleration of the train in which a 50 kg box lying on its floor will ramain stationary is (Given: Co-efficient of static friction between the box and the train's floor is 0.3 and $g=10ms^{-2}$)

A. $5.0ms^{-2}$

B. $3.0ms^{-2}$

C. $1.5ms^{-2}$

D. $15ms^{-2}$

Answer: B

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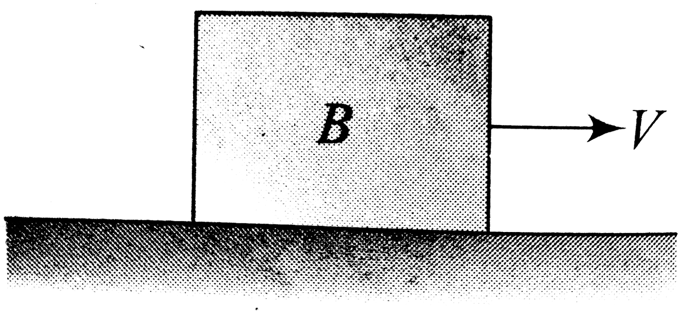
7. A block B is pushed momentarily along a horizontal surface with an initial velocity v . If mu is the coefficient of sliding friction between B and the surface, block B will come to rest after a time:



A. $\frac{v}{\mu g}$

B. $\frac{vg}{\mu}$

C. $\frac{v\mu}{g}$

D. $\frac{\mu g}{v}$

Answer: A

Watch Video Solution

8. A block rests on a rough inclined plane making an angle of 30° with the horizontal. The coefficient of static friction between the block and the plane is 0.8. If the frictional force on the block is 10N, the mass of the block (in kg) is

A. 1 kg

B. 2 kg

C. 3 kg

D. 4 kg

Answer: B

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9. A wooden box of mass $8kg$ slides down an inclined plane of inclination 30° to the horizontal with a constant acceleration of $0.4ms^{-2}$ What is the force of friction between the box and inclined plane ? $\left(g = 10m/s^2\right)$.

A. $12.2N$

B. $24.4N$

C. $36.8N$

D. $48.8N$

Answer: C

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10. A wooden box lying at rest on an inclined surface of a wet wood is held at static equilibrium by a constant force $\vec{F}$ applied perpendicular to the incline. If the mass of the box is 1 kg, the angle of inclination is 30° and the coefficient of static friction between the box and the inclined plane is 0.2, the minimum magnitude of $\vec{F}$ is (Use $g = 10m/s^2$)

A. $0N, as 30^\circ$ is less than angle of repose

B. $\geq 1N$

C. $\geq 3.3N$

D. $\geq 16.3N$

Answer: D

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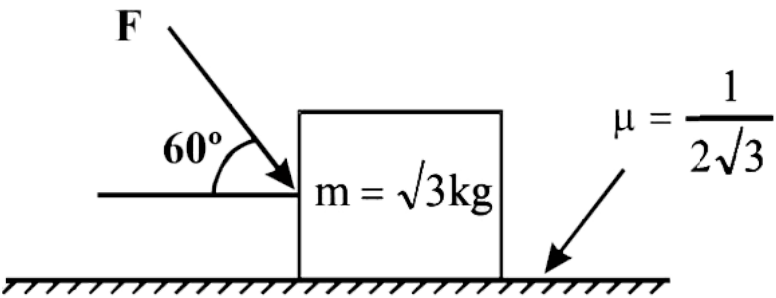
11. What is the maximum value of the force F such that the block shown in the arrangement, does not move?



A. 20 N

B. 10 N

C. 12 N

D. 15 N

Answer: A

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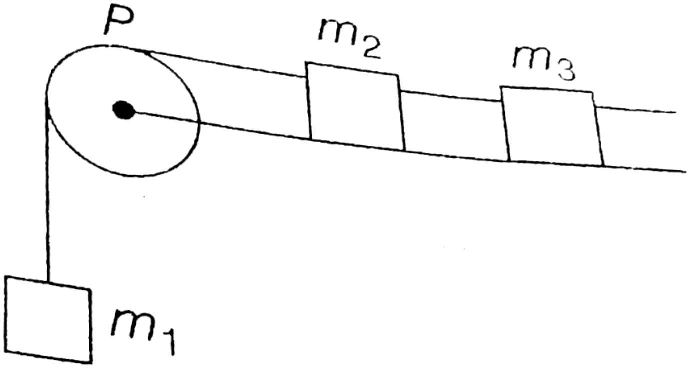
12. A system consists of three masses m_1, m_2 and m_3 connected by a string passing over a pulley P. The mass m_1 hangs freely and m_2 and m_3 are on a rough horizontal table (the coefficient of friction=μ).

The pulley is frictionless and of negligible

mass. The downward acceleration of mass m_1

is (assume, $m_1 = m_2 = m_3 = m$)



A. $\frac{g(1-g\mu)}{9}$

B. $\frac{2g\mu}{3}$

C. $\frac{g(1-2\mu)}{3}$

D. $\frac{g(1-2\mu)}{2}$

Answer: C

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13. Maximum value of static friction is .

A. limiting friction.

B. rolling friction.

C. normal reaction.

D. coefficient of friction.

Answer: A

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14. Which of the following statements is incorrect ?

A. Rolling friction is smaller than sliding friction.

B. Limiting value of static friction is directly proporational to normal reaction.

C. Frictional forcde opposes the relative motion.

D. Coefficient of sliding friction has dimensions of length.

Answer: D

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15. A body of mass M is kept n a rough horizontal surfasce (friction coefficient $= \mu$). A person is trying to pull he body by applying a horizontal force but the body is not moving.

The force by the surface on A is F, where

A. $F = mg$

B. $F = \mu Mgf$

C. $Mg \leq F \leq Mg\sqrt{1+\mu^2}$

D. $Mg \geq F \geq Mg\sqrt{1+\mu^2}$

Answer: C

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16. Consider a frictionless ramp on which a smooth object is made to side down from an initial height 'h'. The distance 'd' necessary to stop the object on a flat track (or coefficient of friction $'\mu'$), kept at the ramp end is

A. h / μ

B. μh

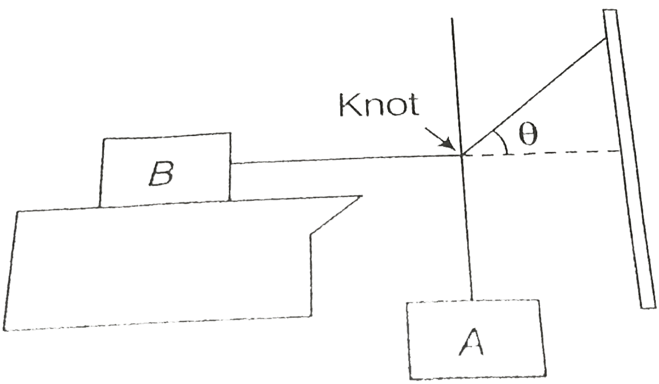
C. $\mu^2 h$

D. $h^2 h$

Answer: A

Watch Video Solution

17. Block B lying on a table weighs w. The coefficient of static friction between the block and the table is mu. Assume that the cord between B and the knot is horizontal. The maximum weight of the block A for which the system will be stationary is



A. $\dfrac{W \tan\theta}{\mu}$

B. $\mu W \tan\theta$

C. $\mu W \sqrt{1 + \tan^2\theta}$

D. $\mu W \sin\theta$

Answer: B

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18. A heavy uniform chain lies on a horizontal table-top. If the coefficient of friction between the chain and table surface is 0.25, then the maximum fraction of length of the chain, that can hang over one edge of the table is

A. 20%

B. 25%

C. 30%

D. 40%

Answer: A

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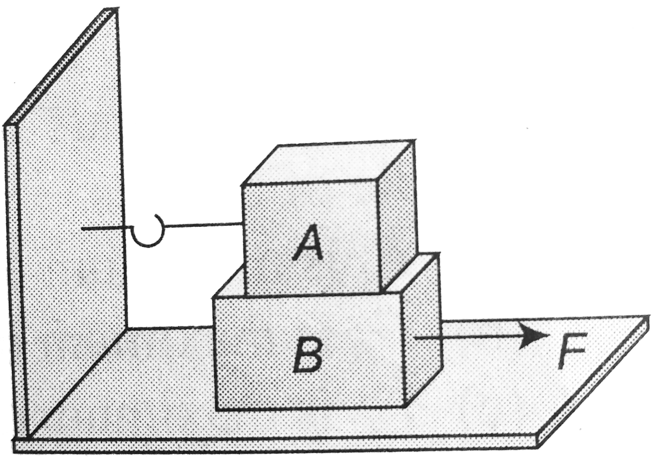
19. A block A with mass 100kg is resting on another block B of mass 200kg. As shown in figure a horizontal rope tied to a wall hold it. The coefficient of friction between A and B is 0.2 while coefficient of friction between B and the ground is 0.3 . the minimum required force F to start moving B will be.



A. 900 N

B. 100 N

C. 1100 N

D. 1200 N

Answer: C

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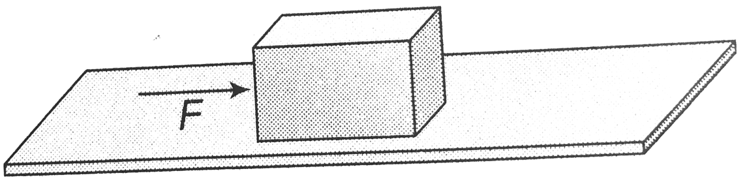
20. A block of mass $2kg$ is kept on the floor. The coefficient of static friction is 0.4 . If a force F of $2.5N$ is applied on the block as shown in the figure, the frictional force between the block and the floor will be.



A. 2.5 N

B. 5 N

C. 7.84 N

D. 10 N

Answer: A

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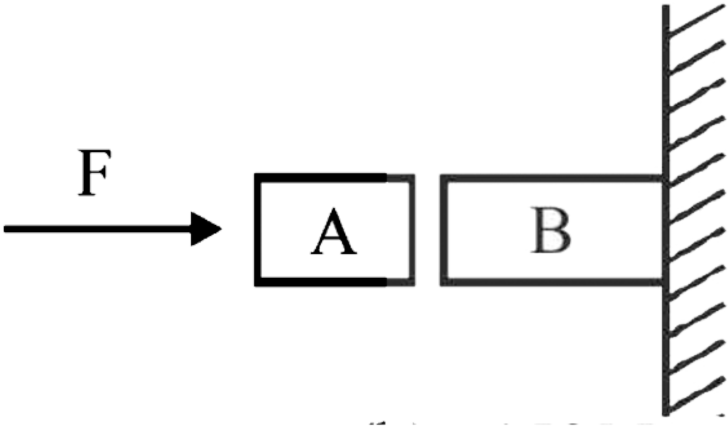
21. Given in figure are two blocks A and B of weight 20N and 100N, respectively. These are being pressed against a wall by a force F as shown. If the coefficient of friction between the blocks is 0.1 and between block B and the wall is 0.15, the frictional force applied by the wall on block B is:



A. 100 N

B. 80 N

C. 120 N

D. 150 N

Answer: C

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22. A block of mass m is lying on horizontal surface of coefficient of friction μ. A force is applied to the block at an angle θ with the horizontal. The block will move with a minimum force F if

A. $\mu = \tan\theta$

B. $\mu = \cos\theta$

C. $\mu = \sin\theta$

D. $\mu = \cot\theta$

Answer: A

Watch Video Solution

23. A marble block of mass 2 kg lying on ice when given a velocity of $6m/s$ is stopped by friction in 10s. Then the coefficient of friction is

A. 0.01

B. 0.02

C. 0.03

D. 0.06

Answer: D

Watch Video Solution

24. A block of mass m_2 is placed on a horizontal table and another block of mass m_1 is placed on top is it. An increasing horizontal force $F = \alpha t$ is exerted on the upper block but the lowwer block never moves as a result. If the coefficient of friction between the blocks is μ_1 coefficient of friction between the blocks is μ_1 and that between the lower block and the table is μ_2, then what is the maximum possible value of μ_1 / μ_2 ?

A. $\frac{m_2}{m_1}$

B. $1 + \frac{m_2}{m_1}$

C. $\frac{m_1}{m_2}$

D. $1 + \frac{m_1}{m_2}$

Answer: B

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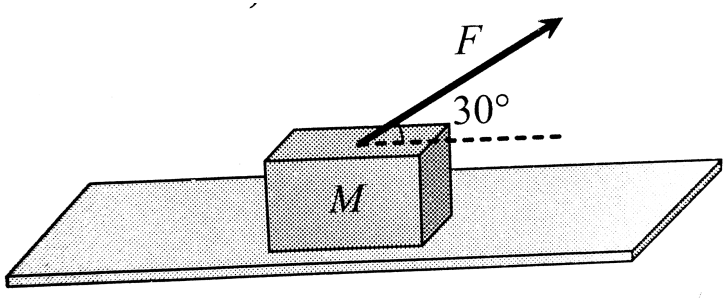
25. A block of mass $m = 5kg$ is resting on a rough horizontal surface for which the coefficient of friction is 0.2 . When a force $F = 40N$ is applied, the acceleration of the block will be $\left(g = 10m/s^2\right)$.



A. $5.73m / s^2$

B. $8.0m / s^2$

C. $9.73m / s^2$

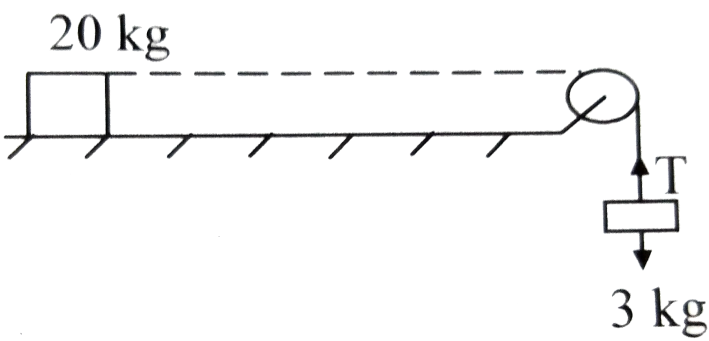
D. $10.0m / s^2$

Answer: A

Watch Video Solution

26. A body of mass 20 kg is moving on a rough horizxontal plane. A block of mass 3 kg is connected to the 20 kg mass by a string of negligible mass through a smooth pulley as shown in the figure. The coefficient of kinetic friction between the heavier mass and teh surface is

$(g = 10m / s^2)$.



A. 0.025

B. 0.035

C. 0.35

D. 0.25

Answer: B

Watch Video Solution

27. A block A of mass m_1 rests on a horizontal table. A light string connected to it passes over a frictionless pulley at the edge of table and from its other end another block B of mass m_2 is suspended. The coefficient of knetic friction between the block and table is

μ_k . When the block A is sliding on the table, the tension in the string is.

A. $\dfrac{(m_2 + \mu_k m_1)g}{(m_1 + m_2)}$

B. $\dfrac{(m_2 - \mu_k m_1)g}{(m_1 + m_2)}$

C. $\dfrac{m_1 m_2 (1 + \mu_k)g}{(m_1 + m_2)}$

D. $\dfrac{m_1 m_2 (1 - \mu_k)g}{(m_1 + m_2)}$

Answer: C

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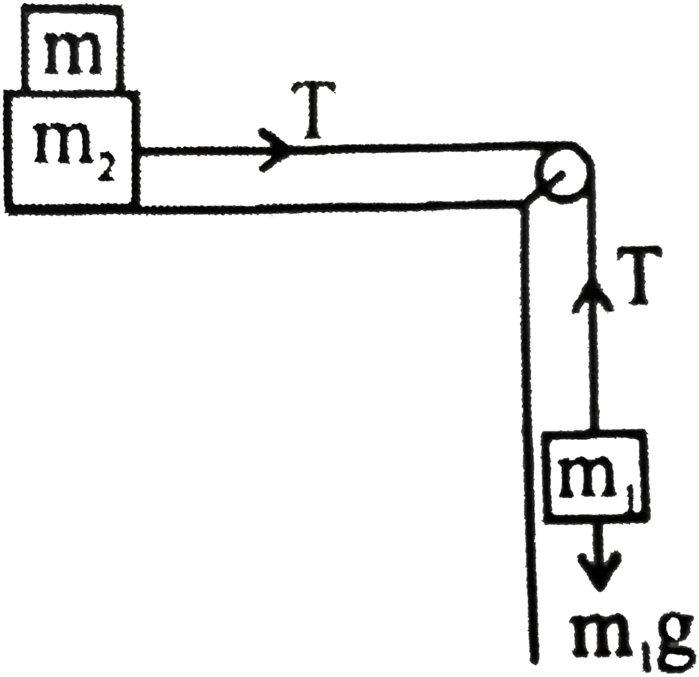
28. Two moasses $m_1 = 5kg$ and $m_2 = 10kg$, connected by an inextensible string over a frictionless pulley, are moving as shown in the figure. The coefficient of friction of horizontal surface is 0.15. The minimum weitght m that should be put on top of m_2 to stop the motion is :-



A. 43.3 kg

B. 10.3 kg

C. 18.3 kg

D. 27.3 kg

Answer: D

Watch Video Solution

29. Air is blown through a hole on a closed pipe containing liquid. Then the pressure will

A. increase on sides.

B. increase downwards.

C. increase in all directions.

D. never increase.

Answer: C

Watch Video Solution

30. The pressure at the bottom of a tank of liquid is not proprtional to

A. Acceleration due to gravity

B. Density of the liquid

C. Height of the liquid

D. Area of the liquid surface

Answer: D

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31. If the atompspheric pressure is P_a then the jpressure P at depth a below the surface of a liquid of density ρ open to the atmosphere is

A. $P_a - \frac{\rho g h}{2}$

B. $P_a - \rho g h$

C. $P_a + \rho g h$

D. $P_1 + \frac{\rho g h}{2}$

Answer: C

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32. By sucking a straw a student can reduce the pressure in his lungs to $750mm$ of $Hg(\text{density}) = 13.6kg / cm^3)$ Using the straw, he can drink water from a glass up to a maximum depth of :

A. 10 cm

B. 75 cm

C. 13.6 cm

D. 1.36 cm

Answer: C

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33. If pressure at half the depth of a lake is equal to 2//3 pressure at the bottom of the lake then what is the depth of the lake ?

A. 10 m

B. 20 m

C. 60 m

D. 30 m

Answer: B

Watch Video Solution

34. What is the pressure on a swimmer 10m below the surface of lake? $g = 10ms^{-2}$, atmospheric pressure = $1.01 \times 10^5 Pa$

A. 3

B. 1

C. 2

D. zero

Answer: C

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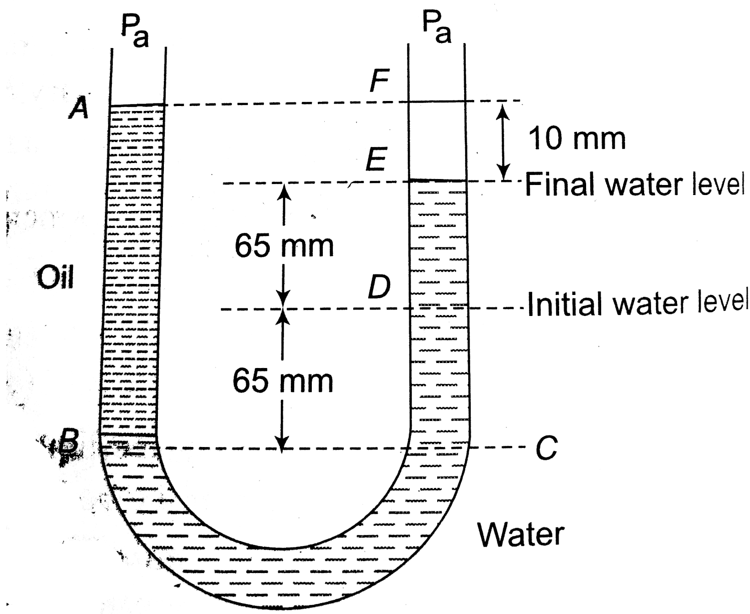
35. A U-tube with both ends open to the atmosphere is partially filled with water. Oil, which is immiscible with water. Is poured into one side until it stands at a distance of $10mm$ above the water level on the other side. Meanwhile the water rises by $65mm$ from its original level (see diagram). The density of the oil is:



A. $650kgm^{-3}$

B. $425kgm^{-3}$

C. $800kgm^{-3}$

D. $928kgm^{-3}$

Answer: D

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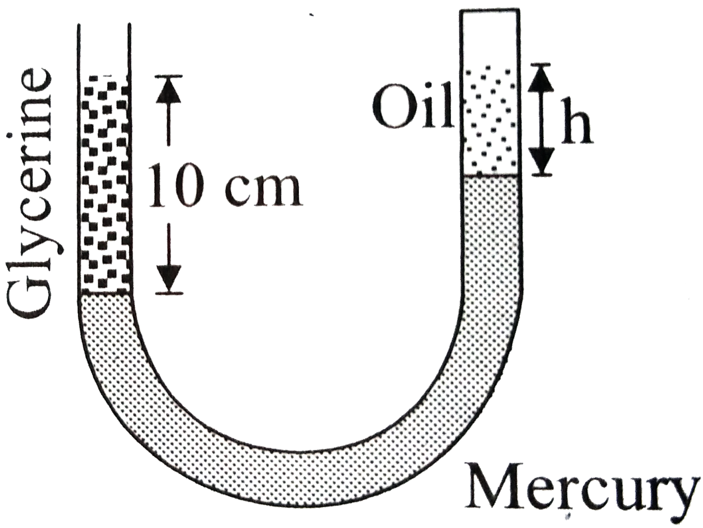
36. A vertical U-tube of uniform inner cross section contains mercury in both sides of its arms. A glycerin (density $= 1.3g/cm^3$) column of length 10 cm is introduced into one of its arms. Oil of density 0.8 gm/cm^3 is poured into the other arm until the upper surfaces of the oil and glycerin are in the same horizontal level. Find the length of the same horizontal level. Find the length of the oil column, Density of mercury $= 13.6g/cm^3$



A. $10.4cm$

B. $8.2cm$

C. $7.2cm$

D. $9.6cm$

Answer: D

Watch Video Solution

37. A manometer connected to a closed tap reads 4.5×10^5 pascal. When the tap is opened the reading of the manometer falls is

4×10^5 pascal. Then the velocity of flow of water is

A. $7ms^{-1}$

B. $8ms^{-1}$

C. $9ms^{-1}$

D. $10ms^{-1}$

Answer: D

Watch Video Solution

38. Clouds appear to float in air due to

A. viscosity of air.

B. surface tension.

C. gravity.

D. elasticity.

Answer: A

Watch Video Solution

39. Viscosity is a transport phenomenon explained using the concept of transfer of

A. mass alone is transported.

B. energy alone is transported.

C. mass and energy are transported.

D. momentum is transported.

Answer: D

Watch Video Solution

40. More viscous oil is used in summer than in winter in motors due to

A. the rise in temperature in summer, the viscosity of oil decreases.

B. the rise in temperature in summer, the viscosity of oil increases.

C. the decrease in surface tension of oil.

D. the increase in surface tension of oil.

Answer: A

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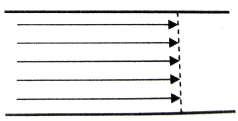
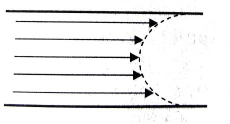
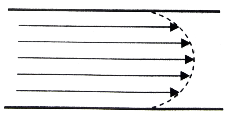
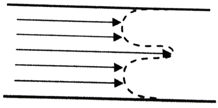
41. A viscous fluid is flowing through a cylindrical tube. The velocity distribution of the fluid is best represented by the diagram

A. 

B. 

C. 

D. 

Answer: C

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42. In stream line flow of liquid, the total energy of liquid constant at ________.

A. all points

B. inner points

C. outer points

D. none of these

Answer: A

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43. Statement-1 : The stream of water flowing at high speed from a garden hose pipe tends to spread like a foundtion when held vertically up, but tends to narrow down when held vertically down.

Statement-2 : In any steady flow of an incompressible fluid, the volume flow rate of the fluid remain constant.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reaosn is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer: A

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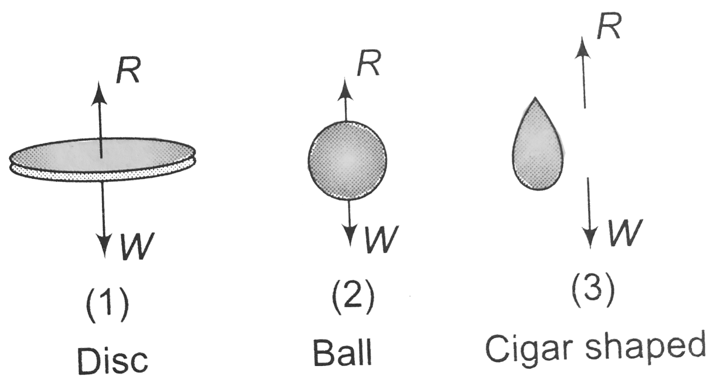
44. When a body falls in air, the resistance of air depends to a great extent on the shape of the body, 3 different shapes are gives. Identify the combination of air resistances which truly represents the physical situation. (the cross sectional areas are the same).



A. $1 < 2 < 3$

B. $2 < 3 < 1$

C. $3 < 2 < 1$

D. $3 < 1 < 2$

Answer: C

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45. Water is flowing through a tube of non-uniform cross-section ratio of the radius at entry and exit end of the pipe is $3 : 2$. Then the ratio of velocities at entry and exit of liquid is

A. $8 : 27$

B. $4 : 9$

C. $1 : 1$

D. $9 : 4$

Answer: B

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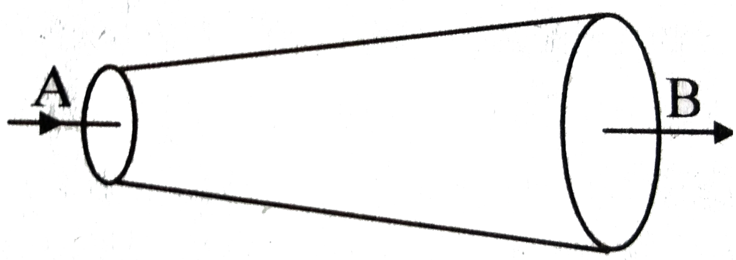
46. An ideal fluid flows through a pipe of circular cross section with diameters 5 cm and 10 cm as shown. The ratio of velocities of fluid at A and B is



A. $4:1$

B. $1:4$

C. $2:1$

D. $1:2$

Answer: A

Watch Video Solution

47. The cylindrical tube of a spray pump has radius R, one end of which has n fine holes, each of radius r. If the speed of the liquid in the tube is V, the speed of the ejection of the liquid through the holes is:

A. $\dfrac{V^2 R}{nr}$

B. $\dfrac{VR^2}{n^2 r^2}$

C. $\dfrac{VR^2}{nr^2}$

D. $\dfrac{VR^2}{n^3 r^2}$

Answer: C

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48. Water is flowing continuously from a tap having an internal diameter 8×10^{-3}m. The water velocity as it leves the tap is $0.4 ms^{-1}$. The diameter of the water stream at a distance 2×10^{-1}m below the tap is close to $(g = 10m / s^2)$

A. $5.0 \times 10^{-3} m$

B. $7.5 \times 10^{-3} m$

C. $9.6 \times 10^{-3} m$

D. $3.6 \times 10^{-3} m$

Answer: D

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49. Velocity of water in a river is

A. same everywhere.

B. more in the middle and less near its banks.

C. less in the middle and more near its banks.

D. increases from one bank to other bank.

Answer: B

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50. The velocity of water in river is 9 km/h of the upper surface . The river is 10 m deep . If the coefficient of viscosity of water is 10^{-2}

poise then the shearing stress between horizontal layers of water is

A. $0.25 \times 10^{-2} N/m^2$

B. $0.25 \times 10^{-3} N/m^2$

C. $0.5 \times 10^{-3} N/m^2$

D. $0.75 \times 10^{-3} N/m^2$

Answer: B

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51. A metal plate of area $500cm^{92})$ is kept on a horizontal surface with a layer of oil of thickness 0.5 mm between them. The horizontal force required to drag the plate with a velocity of 2 cm/s is

(coefficient of viscosity $= 0.9$ kg/ms)

A. 180 N

B. 18 N

C. 0.018 N

D. $1.8N$

Answer: D

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52. Spherical balls of radius 'R' are falling in a viscous fluid of viscosity $'\eta'$ with a velocity 'v'. The retarding viscous force acting on the spherical ball is

A. directly proporational to r but inversely proporational to v.

B. directly proporational to both r and v.

C. inversely proporational to both r and v.

D. inversely proporational to r but directly proporational to velocity v.

Answer: B

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53. A gas bubble of 2 cm diameter rises through a liquid $1.75gmcm^{-3}$ with a fixed speed of $0.35cms^{-1}$.Naglect the density of the gas. The cofficient of viscosity of the liquid is

A. 870 poise

B. 1120 poise

C. 982 poise

D. 1089 poise

Answer: D

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54. What will be the approximate terminal velocity of a rain drop of diamteter $1.8 \times 10^{-3} m$, when density of rain water $\approx 10^3 kgm^{-3}$ and the co-efficient of viscosity of air $\approx 1.8 \times 10^{-5} Nsm^{-2}$? (Neglect buoyancy of air.)

A. $49ms^{-1}$ —

B. $98ms^{-1}$

C. $392ms^{-1}$

D. $980ms^{-1}$

Answer: B

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55. A solid ball of volume V is dropped in a viscous liquid. It experiences a viscous force F. If the solid ball of volume 2V of same material is dropped in the same fluid, then the viscous force acting on it will be

A. $\eta F/2$

B. $F/2$

C. $2F$

D. $2nF$

Answer: C

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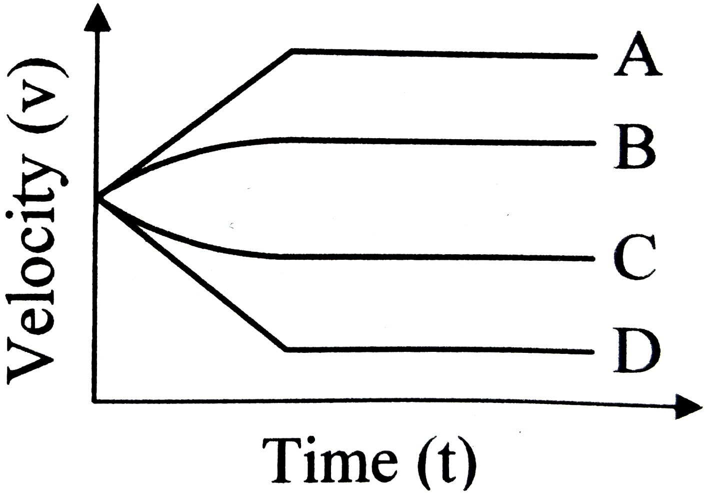
56. A small spherical solid ball is dropped from a great height in a viscous liquid . Its journey in the liquid is best described in the diagram given below by the



A. Curve A

B. Curve B

C. Curve C

D. Curve D

Answer: D

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57. A small metal ball of mass m is dropped in a liquid contained in a vessel , attains a terminal velocity v . If a metal ball of same material but of mass 8 m is droped is same liquid then the terminal velocity will be

A. v

B. 2v

C. 4v

D. 8v

Answer: A

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58. A small sphere of mass m is dropped from a height After it has fallen 100 m it has attained its terminal velocity and continues to fall at that speed. The work done by air friction against the sphere during the first 100 m of fall is-

A. greater than the work done by air friction in the second 100 m.

B. less than the work done by air friction in the second 100 m.

C. equal to 100 mg.

D. greater than 100 mg.

Answer: B

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59. The terminal speed of a sphere of gold (density = 19.5 kg m^{-3}) is 0.2 ms^{-1} in a viscous liquid (density = 1.5 kg m^{-3}). Then, the terminal speed of a sphere of silver (density = 10.5 kg m^{-3}) of the same size in the same liquid is

A. $0.2ms^{-1}$

B. $0.4ms^{-1}$

C. $0.133ms^{-1}$

D. $0.1ms^{-1}$

Answer: D

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60. Two solid spheres of same metal but of mass M and 8M fall simultaneously on a viscous liquid and their terminal velocitied are v and n v, then value of n is

A. 16

B. 8

C. 4

D. 2

Answer: C

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61. Two spheres of equal masses but radii r_1 and r_2 are allowed to fall in a liquid of infinite are allowed to fall in a liquid of infinite column. The ratio of their terminal velocities are

A. 1

B. $r_1 : r_2$

C. $r_2 : r_1$

D. $\sqrt{r_1} : \sqrt{r_2}$

Answer: C

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62. Two drops of the same radius are falling through air with a steady velcoity of $5cms^{-1}$. If the two drops coalesce, the terminal velocity would be

A. $2.5cms^{-1}$

B. $10cms^{-1}$

C. $5\sqrt{2}cms^{-1}$

D. $5 \times 4^{1/3}cms^{-1}$

Answer: D

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63. The onset of turbulence in a liquid is determined by

A. pascal's law.

B. Stocke's law.

C. Reynold's number.

D. Torriclli's law.

Answer: C

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64. The dimensions of Reynold’s constant are

A. $[L^0 m^0 T^0]$

B. $\left[L^{-1}M^{1}T^{-1}\right]$

C. $\left[L^{-1}M^{1}T^{-2}\right]$

D. $\left[L^{-2}M^{1}T^{-1}\right]$

Answer: A

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65. The speed at which the flow of water in a long cylindrical pipe of diameter 2 cm becaomes turbulent is

(The viscosity of water $= 1 \times 10^{-3}$Pa. s and for the onset of turbulent flow in a long cylindrical pipe, Reynolds number =3000)

A. $0.6m / s$

B. $0.45m / s$

C. $0.3m / s$

D. $0.15m / s$

Answer: D

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66. A horizontal pipeline carrying gasoline has a cross-sectional diameter of 5 mm. If the viscosity and density of the gasoline are 6×10^{-3} poise and 720 kg/m^3 respectively, the velocity after which the flow becaomes turbulent is

A. $> 1.66 m/s$

B. $> 3.33 m/s$

C. $> 1.6 \times 10^{-3} m/s$

D. $> 0.33 m/s$

Answer: D

Watch Video Solution

67. The water flows form a tap of diameter 1.25 cm with a rate of $5 \times 10^{-5} m^3 s^{-1}$. The density and coefficient of viscosity of water are $10^3 kgm^{-3}$ and 10^{-3} Pa. s respectively. The flow of water is

A. steady with Reynold's number 5100

B. turbulent with Reynold's number 5100

C. steady with Reynold's number 3900

D. turbulent with Reynold's number 3900

Answer: B

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68. Consider the following equation of Bernoulli's theorem.

$P+\frac{1}{2}\rho v^2+\rho gh=K$ (constant)

The dimensions of K/P are same as that of which of the following

A. Thrust

B. Pressure

C. Angle

D. Velocity

Answer: C

Watch Video Solution

69. Water flows steadily through a horizontal pipe of variable cross-section. If the pressure of water is p at a point where the velocity of flow is v, at another point (pressure p'), where the velocity of flow in ηv : The following statements are given below

A. $P+2\rho v^2$

B. $P-2\rho v^2$

C. $P+\frac{3}{2}\rho v^2$

D. $P-\frac{3}{2}\rho v^2$

Answer: D

Watch Video Solution

70. A manometer connected to a closed tap reads 4.5×10^5 pascal. When the tap is opened the reading of the manometer falls is 4×10^5 pascal. Then the velocity of flow of water is

A. $7ms^{-1}$

B. $8ms^{-1}$

C. $9ms^{-1}$

D. $10ms^{-1}$

Answer: D

Watch Video Solution

71. A wind with speed $40m/s$ blows parallel to the roof of a house. The area of the roof is $250m^2$. Assuming that the pressure inside the house is atmospheric pressure, the force exerted by the wind on the roof and the direction of the force will be : $(\rho_{air} = 1.2kg/m^3)$

A. $(\rho_{\text{air}} = 1.2kg/m^3)$

B. $4.8 \times 10^5 N$, unpwards.

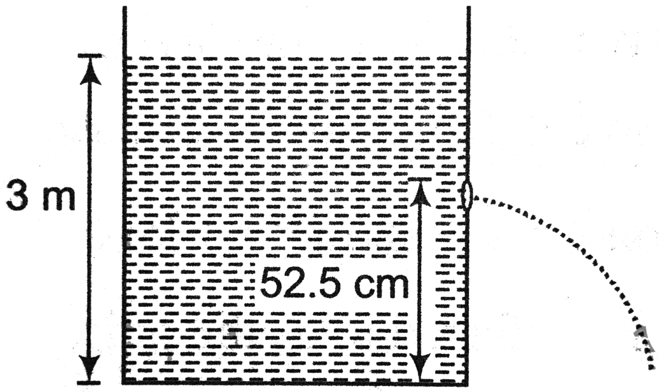
C. $2.4 \times 10^5 N$, upwards.

D. $2.4 \times 10^5 N$, downwards.

Answer: C

Watch Video Solution

72. Water is filled in a cylindrical container to a height of $3m$. The ratio of the cross-sectional area of the orifice and the beaker is 0.1. The square of the speed of the liquid coming out from the orifice is $\left(g = 10m / s^2\right)$.



A. $50m^2 / s^2$

B. $50.5m^2 / s^2$

C. $51m^2 / s^2$

D. $52m^2 / s^2$

Answer: A

Watch Video Solution

73. A cylindrical tank having cross-sectional area A is filled with water to a height of 2.0 m. A circular hole of corss-section area is opened at a height of 75 cm from the bottom. If $a/A = \sqrt{0.2,}$ then velocity with which waer emerges from the hole is

$(g = 9.8ms^{-2})$

A. $4.9ms^{-1}$

B. $4.95ms^{-1}$

C. $5.0ms^{-1}$

D. $5.5ms^{-1}$

Answer: D

Watch Video Solution

74. A cylindrical vessel of 100 cm height is kept filled upto the brim. It has four holes 1,2,3,4 which are respectively at heights of 27 cm, 30 cm , 50 cm and 80 cm from the horizontal floor. The water falling at the maximum horizontal distance from the vessel comes from

A. Hole number 4

B. Hole number 3

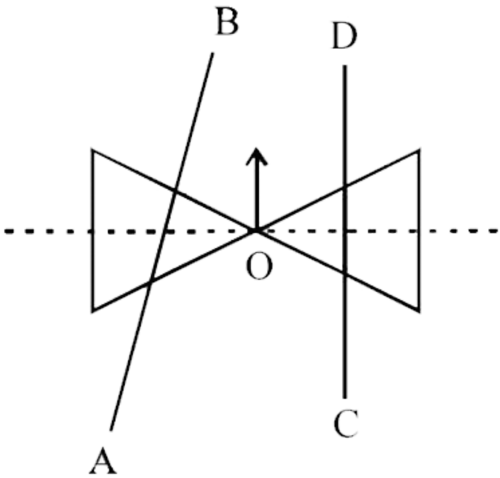
C. Hole number 2

D. Hole number 1

Answer: B

Watch Video Solution

75. A roller is made by joining together two cones at their vertices O, ti is kept on two rails AB and CD, which are placed asymmetrically with its axis perpendiuclar to CD and its center O at the centre of line joining AB and Cd it is given a light push so that it starts rolling with its centre O moving parallel to CD in the direction shown As it moves, the roller wil tand to:



A. turn right.

B. go straight.

C. turn left and right alternately.

D. turn left.

Answer: D

Watch Video Solution

76. The coefficient of static and dynamic friction between a body and the surface are 0.75 and 0.5 respectively. A force is applied to the body to make it just slide with a constant acceleration which is

A. $\frac{g}{4}$

B. $\frac{g}{2}$

C. $\frac{3g}{2}$

D. g

Answer: A

Watch Video Solution

77. A body of mass M is resting on a rough horizontal plane surface the coefficient of friction being equal to μ At $t=0$ a horizontal force $F=F_0t$ starts acting on it , where F_0 is a constant find the time T at which the motion starts?

A. $\frac{\mu Mg}{F_0}$

B. $\frac{Mg}{\mu F_0}$

C. $\frac{\mu F}{Mg}$

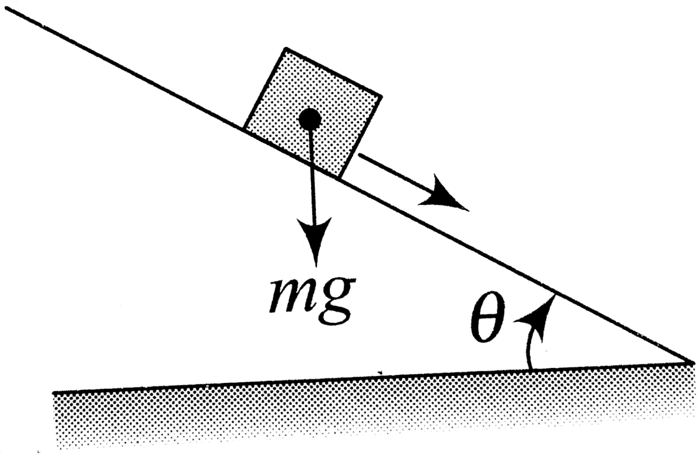
D. $\frac{F}{F_0}$

Answer: A

Watch Video Solution

78. A plank with a box on it at one end is gradully raised about the other end. As the angle of inclination with the horizntal reaches 30° , the box starts to slip and slide $4.0m$

down the plank in $4.0s$. The coefficients of static and knitic friction between the box and the plank will be, respectively.



A. 0.4 and 0.3

B. 0.6 and 0.6

C. 0.6 and 0.5

D. 0.5 and 0.6

Answer: C

Watch Video Solution

79. There is a small hole at the bottom of tank filled with water. If total pressure at the bottom is $3atm(1atm = 10^5 Nm^{-2})$, then find the velocity of water flowing from hole.

A. $\sqrt{400}m/s$

B. $\sqrt{600}m / s$

C. $\sqrt{60}m / s$

D. None of the above

Answer: A

Watch Video Solution

80. The working of venturimeter is based on

A. Trorriclli's law

B. Pascal 's law.

C. Bernoulli's theorem.

D. Stockes's law.

Answer: C

Watch Video Solution

81. In dimension of circal velocity v_0 liquid following through a take are expressed as $(\eta^x \rho^y r^z)$ where η, ρ and $r$are the coefficient of viscosity of liquid density of liquid and radius of the tube respectively then the value of x, y and z are given by

A. $1, 1, 1$

B. $1, \ -1, \ -1$

C. $-1, \ -1, 1$

D. $-1, \ -1, \ -1$

Answer: B

Watch Video Solution

82. The upper half of an inclined plane with inclination ϕ is perfectly smooth while the lower half is rough. A body starting from rest at the top will again come to rest at the bottom if the coefficient of friction for the lower half is given by

A. $\mu = 2\tan\theta$

B. $\mu = \tan\theta$

C. $\mu = \dfrac{2}{\tan\theta}$

D. $\mu = \dfrac{1}{\tan\theta}$

Answer: A

Watch Video Solution

83. A bullet of mass 50 g moving horizontally with a velocity $210ms^{-1}$ gets embedded in a block of mass 1 kg kept on a rough horizontal surface. If the coefficient of kinetic friction between the block and surface is 0.5. The block- bullet system will move a distance of ________ before coming to res t(Acceleration due to gravity $= 10ms^{-2}$).

A. 40 m

B. 30 m

C. 20 m

D. 10 m

Answer: D

Watch Video Solution

84. A body of weight 64 N is pushed with just enough force to start it moving across a horizontal floor and the same force continues to act afterwards. If the coefficients of static and dynamic friction are 0.6 and 0.4 respectively, the acceleration of the body will be (Acceleration due to gravity = g)

A. $\frac{g}{6.4}$

B. $0.64g$

C. $\frac{g}{32}$

D. $0.2g$

Answer: D

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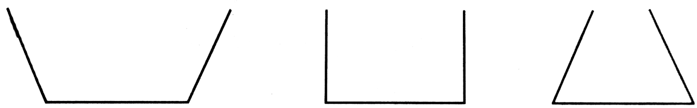
85. The three vessels shown in figure have same base area. Equal volumes of a liquid are poured in the thre vessels. The force on the base will be



A. maximum at vessel A.

B. maximum at vessel B.

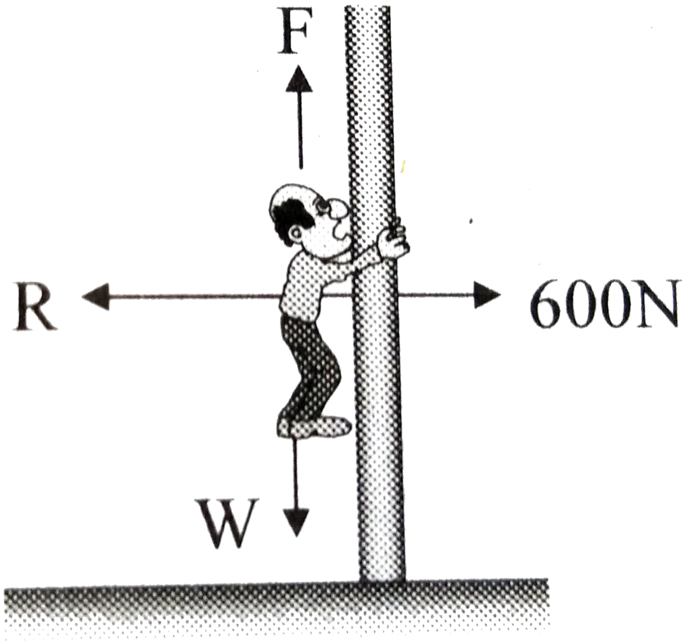
C. maximum at vessel C.

D. equal in all vessels.

Answer: C

Watch Video Solution

86. A fireman of mass 60 kg slides down a pole. As shown in figure. He is pressing the pole with a force of 600 N. The coefficient of friction between the hands and the pole is 0.5. With wht acceleration will the fireman slide down $(g = 10m/s^2)$



A. $1m/s^2$

B. $2.5m/s^2$

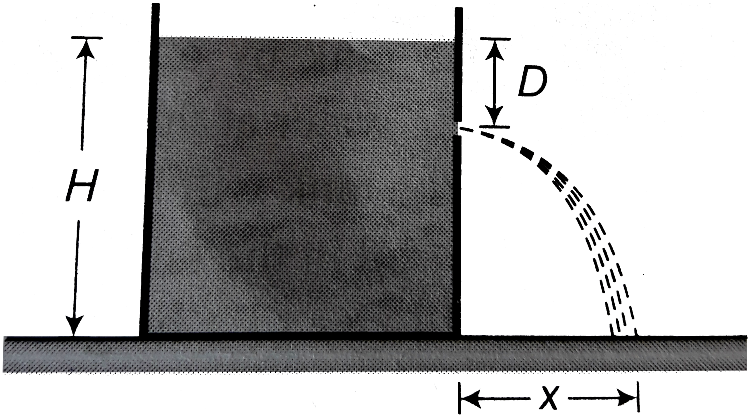
C. $5m/s^2$

D. $10m/s^2$

Answer: C

Watch Video Solution

87. A tank is filled with water up to a height H. Water is allowed to come out of a hole P in one of the walls at a depth D below the surface of water. Express the horizontal distance x in terms of H and D



A. $x = \sqrt{D(H-D)}$

B. $x = \sqrt{\dfrac{D(H-D)}{2}}$

C. $x = 2\sqrt{D(H-D)}$

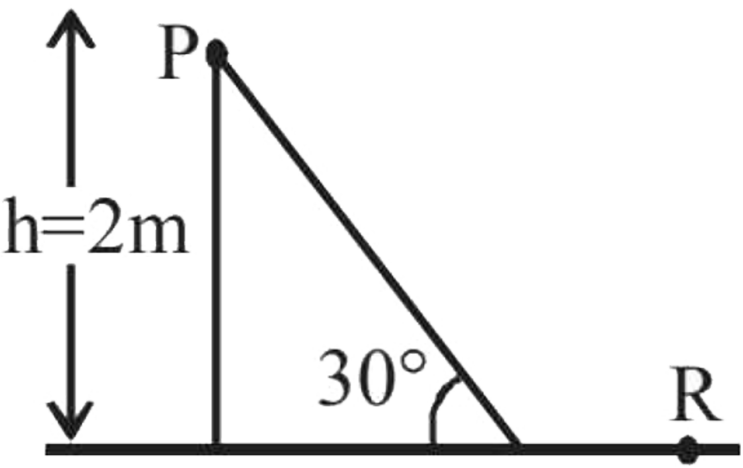
D. $x = 4\sqrt{D(H-D)}$

Answer: C

Watch Video Solution

88. A point particle of mass m, moves long the uniformly rough track PQR as shown in figure. The coefficient of friction, between the particle and the rough track equals μ. The particle is released, from rest from the point P and it comes to rest at a point R. The energies, lost by the ball, over the parts, PQ and QR, of the track, are equal to each other, and no energy is lost when particle changes direction from PQ to QR.

The value of the coefficient of friction μ and the distance x $(= QR)$, are, respectively close to:



A. $0.2 \text{ and } 3.5m$

B. $0.29 \text{ and } 3.5m$

C. 0.29 and $6.5m$

D. 0.2 and $6.5m$

Answer: B

Watch Video Solution

89. A 60 kg weight is dragged on a horizontal surface by a rope upto 2 metres. If coefficient of friction is $\mu = 0.5$ the angle of rope with the surface is 60° and $g = 9.8m / \sec^2$, then work done is

A. 294 joule

B. 315 joule

C. 588 joule

D. 197 joule

Answer: B

Watch Video Solution

90. When a body is moving on a surface, the force of friction is called

A. Static friction.

B. Dynamic friction.

C. Limiting friction.

D. Rolling friction.

Answer: B

Watch Video Solution

91. The speed of the wind passing over the wings of a small aeroplane is 70 m/s and below the wing is 60 m/s. If the mass of the plane is 1000 kg and the area of wing is $14m^2$,

then what will be ther net vertical force on the

aeroplane ?

? (Density of air

$= 1.2kg/m^3$ and $g = 10m/s^2$)

A. 620 N upward

B. 920 N upward

C. 620 N downward

D. 920 N downward

Answer: B

92. A rectangular vessel when full of water takes 10 minutes to be emptied through an orifice in its bottom. How much time will it take to be emptied when half filled with water

A. 9 minutes

B. 7 minutes

C. 5 minutes

D. 3 minutes

Answer: B

Watch Video Solution

93. A vessel completely filled with water has holes 'A' and 'B' at depths 'h' and '3h' from the top respectively. Hole 'A' is a square of side 'L' and 'B' is circle of radius 'r'. The water flowing out per second from both the holes is same. Then 'L' is equal to

A. $r^{\frac{1}{2}}(\pi)^{\frac{1}{2}}(3)^{\frac{1}{2}}$

B. $r(\pi)^{\frac{1}{4}}(3)^{\frac{1}{4}}$

C. $r(\pi)^{\frac{1}{2}}(3)^{\frac{1}{4}}$

D. $r^{\frac{1}{2}}(\pi)^{\frac{1}{3}}(3)^{\frac{1}{2}}$

Answer: C

Watch Video Solution

94. A large open tank has two holes in the wall. One is a square hole of side L at a depth y from the top and the other is a circular hole of radius R at a depth 4y from the top. When the tank is completely filled with water, the quantities of water flowing out per second from both holes are the same. Then, R is equal to

A. $2\pi L$

B. $\frac{L}{\sqrt{2\pi}}$

C. L

D. $\frac{L}{2\pi}$

Answer: B

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95. A body of mass 2 kg is being dragged with uniform velocity of 2 m / s on a rough horizontal plane. The coefficient of friction between the body and the surface is 0.20. The amount of heat generated in 5 sec is . $(4.2\text{joule}/cal \text{ and } g = 9.8m/s^2)$

A. 9.33 cal

B. 10.21 cal

C. 12.67 cal

D. 13.34 cal

Answer: A

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96. A spherical solild of volume V is made of a material of density ρ_1. It is falling through a liquid of density $\rho_2(\rho_2 < \rho_1)$. Assume that the liquid applies a viscous froce on the ball that is proportional ti the its speed v, i.e.,

$F_{viscous} = -kv^2 (k > 0)$. The terminal speed

of the ball is

A. $\frac{Vg\rho_1}{k}$

B. $\sqrt{\frac{Vg\rho_1}{k}}$

C. $\frac{Vg(\rho_1 - \rho_2)}{k}$

D. $\sqrt{\frac{Vg(\rho_1 - \rho_2)}{k}}$

Answer: D

Watch Video Solution

97. The heart of a man pumps 5 liters of blood through the arteries per minute at a pressure of 150 mm of mercury. If the density of mercury be $13.6 \times 10^3 kg / m^3$ and $g = 10m / s^2$ then the power of heat in watt is :

A. 1.50

B. 1.70

C. 2.35

D. 3.0

Answer: B

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Mcq Evaluation Test

1. A body while sliding went straight down an incline of 45° to the horizontal and was subjected to a coefficient of kinetic friction of 0.20. Starting from rest, hwo long did it take him to reach a speed of $50km/hr$? (Ignore air resistance and take $h = 10m/s^{2}$)

A. $2.45s$

B. $9.2s$

C. $1.5 \times 10^2 s$

D. $2.0s$

Answer: A

Watch Video Solution

2. As an air bubble comes from the bottom of a lake to the top, its radius ______

A. increases

B. decreases

C. does not change

D. becomes zero

Answer: A

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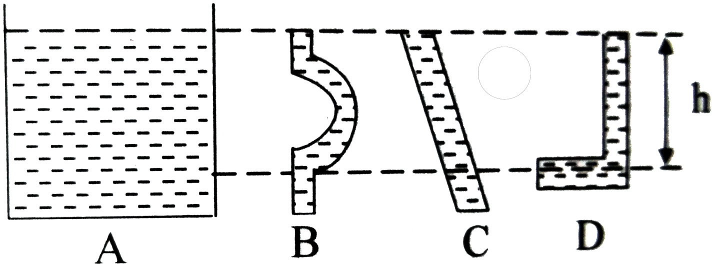
3. Four container of honey are shown in the figure. The pressure at depth h is



A. greatest in A.

B. greatest in D.

C. least in B and C both.

D. equal in all the containers.

Answer: D

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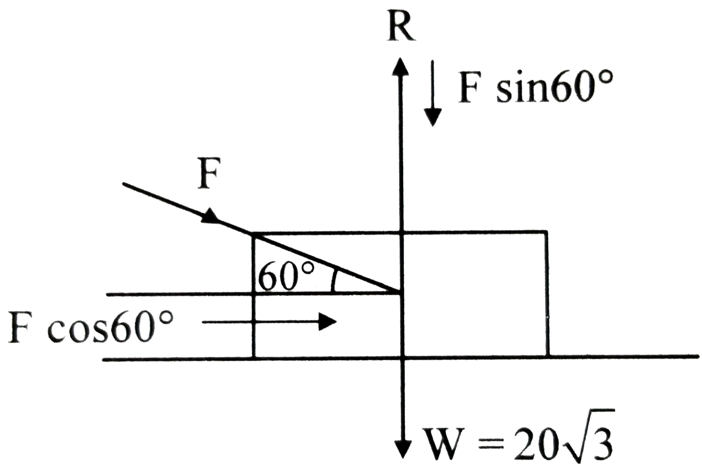
4. What is the maximum value of the force F such that the block shown in the arrangement does not move ?

(Given $\mu = \dfrac{1}{2\sqrt{3}}$



A. 20 N

B. 40 N

C. 12 N

D. 45 N

Answer: B

Watch Video Solution

5. You want to apply a force on a box so that it moves with constant speed across a horizontal floor. The coefficient if kinetic friction between the box and the floor is μ_k. Of the flur following cases, the force you apply on the box will be smallest when you

A. push it with a force applied horizontally at an angle $0 < \theta < 90^\circ$ in downword direction.

B. pull it with a force applied horizontally at the same angle as in (A), in upward direction.

C. do either (A) or (B) since the applied force is the same.

D. push or pull with a force applied horizontally.

Answer: B

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6. A block of mass M is pulled along a horizontal surface by applying a force at angle θ with the horizontal. The friction coefficient between the block and the surfasce is μ. If the block travels at a uniform velocity, find the work donen by this applied force during a displacement d of the blcok.

A. $\dfrac{\mu g s}{\cos\theta + \sin\theta}$

B. $\dfrac{\mu m g s \cos\theta}{\cos\theta + \mu \sin\theta}$

C. $\dfrac{\mu g s \sin\theta}{\cos\theta + \mu \sin\theta}$

D. $\dfrac{\mu g s \cos\theta}{\cos\theta - \mu \sin\theta}$

Answer: B

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7. Consider a car moving along a straight horizontal road with a speed of 36 km/h. If the coefficient of static friction between road and tyers is $0.4,$ the shortest distance in which the car can be stopped is (Take $g = 10m / s2$)

A. $33.8m$

B. $12.5m$

C. $58.6m$

D. $20m$

Answer: B

Watch Video Solution

8. A U-tube containing a liquid moves with a horizontal acceleration a along a direction joining the two vertical limbs. The separation between these limbs is d. The difference in their liquid levels is

A. xyg

B. $\frac{xg}{y}$

C. $\frac{yg}{x}$

D. $\frac{xy}{g}$

Answer: D

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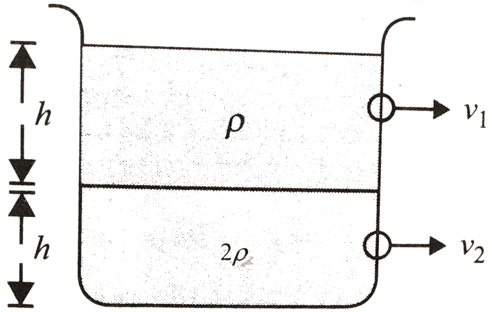
9. Equal volume of two immiscible liquids of densities ρ and 2ρ are filled in a vessel as shown in the figure. Two small holes are punched at depths $h/2$ and $3h/2$ from the surface of lighter liquid. If v_1 and v_2 are the velocities of efflux at these two holes, then

v_1 / v_2 is



A. $\dfrac{1}{2\sqrt{2}}$

B. $\sqrt{2}$

C. $1/4$

D. $\dfrac{1}{\sqrt{2}}$

Answer: B

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10. Assertion : A horse has to pull a cart harder during the first few steps of his motion.

Reason: The first few steps are always difficult.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reaosn is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer: C

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11. Digboi mine in Assam is the deepest in India. In this mine the conditions as compared to those at the suface are,

A. lower air pressure, higher acceleration due to gravity.

B. higher air pressure, lower acceleration due to gravity.

C. higher air pressure, higher acceleration due to gravity.

D. lower air prassure, lower acceleration due to gravity.

Answer: B

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12. Consider a liquid at rest in a container which opens into atmosphere. At any point A at a depth h below the surface of the liquid,

(i) the gauge pressure at point A is $\rho g h.$

(ii) the gauge pressure at point a is $P_a + \rho g h.$

(iii) The pressure at point A is $\rho g h.$

(iv) The pressure at point A is Pa $+ \rho g h.$

The correct alternative is

A. `(i) and (iii)

B. (ii) and (iv)

C. (iii) and (iv)

D. (i) and (iv)

Answer: D

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13. At two points on a horizontal tube of varying cross section carrying water, the radii are 1 cm and $0.5cm$. The pressure difference between these points is 6 cm of water. How much liquid flows through the tube per second ?

A. $100c.\ c.$ per s

B. $98c.\ c.$ per s

C. $88c.\ c.$ per s

D. $70c.\ c.$ per s

Answer: C

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14. An aquarium is filled with water. The lateral wall of the aquarium is 50 cm long and 40 cm high. Using $10g / cm^2$ for the acceleration due to gravity, and 1 g/cm^2 for the density of water, the force on the lateral wall of the aqurium is

A. 36 N

B. 400 N

C. 180 N

D. 1500 N

Answer: B

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15. The fire fighters have a jet attached to the held of their water pipes

A. to increase the velocity of water flowing out of the pipe.

B. to decrease the velocity of water flowing out of the pipe.

C. to have a streamline flow of water.

D. to have a turbulent flow of water.

Answer: A

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16. The nature of graph between terminal velocity of spherical body vs the square of its radius is

A. expoentially increasin curve

B. staight line

C. parabola

D. exponentially decreasing curve

Answer: B

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17. For a freely falling body

A. constnat

B. unity

C. zero

D. variable as function of height

Answer: C

Watch Video Solution

18. Assertion: The accumulation of snow on the wings of an acroplane reduces the lift.

Reason: Pressure difference depends upon the curvature.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reaosn is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer: A

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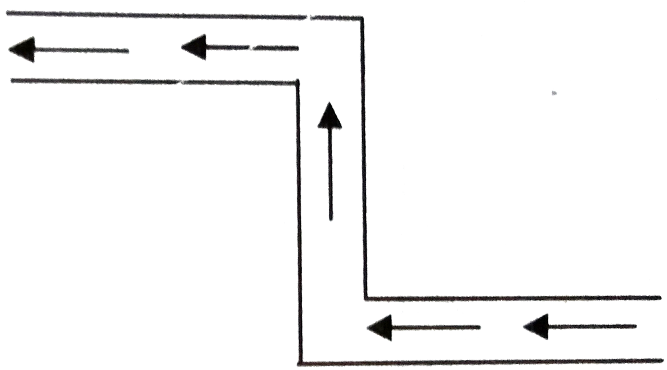
19. The figure bwlow indicates flow of water through a tube of uniform cross-section with a constant speed in the direction as shown by the arrows. On the tube, water exerts



A. a net force to the left.

B. a net force to the right.

C. an anticllockwise torque.

D. a clockwise torque.

Answer: D

Watch Video Solution

20. A water bgarrel having water up to a depth d is placed on a table of height H. A small hole is made on the wall of the barrel at its bollom.

If the stream of water comiong out of the hole falls on the ground at a horizontal distance r from the barrel, then the value of d is

A. $\frac{4H}{r^2}$

B. $4Hr^2$

C. $\frac{r^2}{4H}$

D. $\frac{H}{4r^2}$

Answer: C

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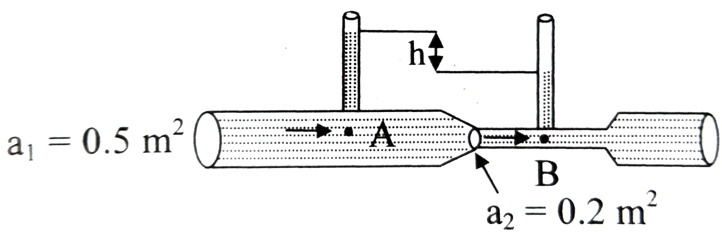
21. An incompressible, non-viscous liquis of density r flows through a horizontal tube as shown below. The flow condition is steady. Area of cross section at A and B are a_1 and a_2 respectively. The height difference of liquid in two tubes inserted at A and B is h.



A. Pressure at A is more that at B by hrg.

B. The diagr4am has an error as the height

of liquid in tube at B will be higher than in tube at A.

C. For the given data, if flow is steamlined Bernoulli's principle can be applied.

D. Both (A) and (C)

Answer: D

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