NDA-CDS 2 2024

GS

LIVE

PHYSICS

REVISION

CLASS 5

NAVJYOTI SIR

SSBCrack EXAMS

09 August 2024 Live Classes Schedule

8:00AM	09 AUGUST 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	09 AUGUST 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

9:00AM	INTRODUCTION OF SRT & SDT	ANURADHA MA'AM

AFCAT 2 2024 ANSWERKEY SESSIONS

12:00PM	AFCAT 2 2024 ANSWER KEYS - SHIFT 1	
5:00PM	AFCAT 2 2024 ANSWER KEYS - SHIFT 2	

NDA 2 2024 LIVE CLASSES

11:00AM	GK - POLITY REVISION - CLASS 2	RUBY MA'AM
12:00PM	PHYSICS REVISION - CLASS 5	NAVJYOTI SIR
1:00PM	MATHS REVISION - CLASS 5	NAVJYOTI SIR
2:00PM	BIOLOGY REVISION - CLASS 5	SHIVANGI MA'AM
5:30PM	ENGLISH - MATCHING LIST - CLASS 2	ANURADHA MA'AM

CDS 2 2024 LIVE CLASSES

11:00AM	GK - POLITY REVISION - CLASS 2	RUBY MA'AM
12:00PM	PHYSICS REVISION - CLASS 5	NAVJYOTI SIR
2:00PM	BIOLOGY REVISION - CLASS 5	SHIVANGI MA'AM
3:00PM	MATHS REVISION - CLASS 5	NAVJYOTI SIR
5:30PM	ENGLISH - MATCHING LIST - CLASS 2	ANURADHA MA'AM

SSBCrack EXAMS

TODAY's REVISION TOPICS :

- Work,Energy and Power
- Gravitation and Hydrostatics

The potential energy of an object is directly proportional to:

a) its velocity

b) its mass and height

c) its speed

d) its kinetic energy

PE = mass x acclⁿ. due to gravity x height

The potential energy of an object is directly proportional to:

a) its velocity

b) its mass and height

c) its speed

d) its kinetic energy

Answer: B

A space station orbits Earth at an altitude of $300\,\text{km}$. How does the acceleration due to gravity at this altitude compare with that on the Earth's surface?

a) It is the same as on Earth.

b) It is slightly less than on Earth.

c) It is about half of what it is on Earth.

d) It is zero because the station is in orbit.

earth's surface — g

At 300 km altitude,

$$g\left(1-\frac{2h}{R}\right) = g\left(1-\frac{2\times 300}{6400}\right)$$

h — height from surface of earth

R — radius of earth,

A space station orbits Earth at an altitude of $300\,\mathrm{km}$. How does the acceleration due to gravity at this altitude compare with that on the Earth's surface?

a) It is the same as on Earth.

b) It is slightly less than on Earth.

c) It is about half of what it is on Earth.

d) It is zero because the station is in orbit.

Answer: B

A spring with a spring constant $k = 200\,\mathrm{N/m}$ is compressed by 0.1 m. If the spring is released, what is the maximum kinetic energy the mass attached to the spring can attain?

a) $0.5\,\mathrm{J}$
b) $1.0\,\mathrm{J}$
c) $2.0\,\mathrm{J}$
d) $10.0\,\mathrm{J}$

k - Spring constant = 200 Nm⁻¹

x - displacement = 0.1 m

Potential energy gained = $\frac{1}{2}kx^2$

$= \frac{1}{2}(200)(0.1)^2$

$= 100 \times 0.01$

$= 1\,\mathrm{J}$

Total energy (as kinetic energy = 0)

max. kinetic energy = Potential energy gained

$= 1.0\,\mathrm{J}$

A spring with a spring constant $k = 200\,\mathrm{N/m}$ is compressed by 0.1 m. If the spring is released, what is the maximum kinetic energy the mass attached to the spring can attain?

a) $0.5\,\mathrm{J}$

b) $1.0\,\mathrm{J}$

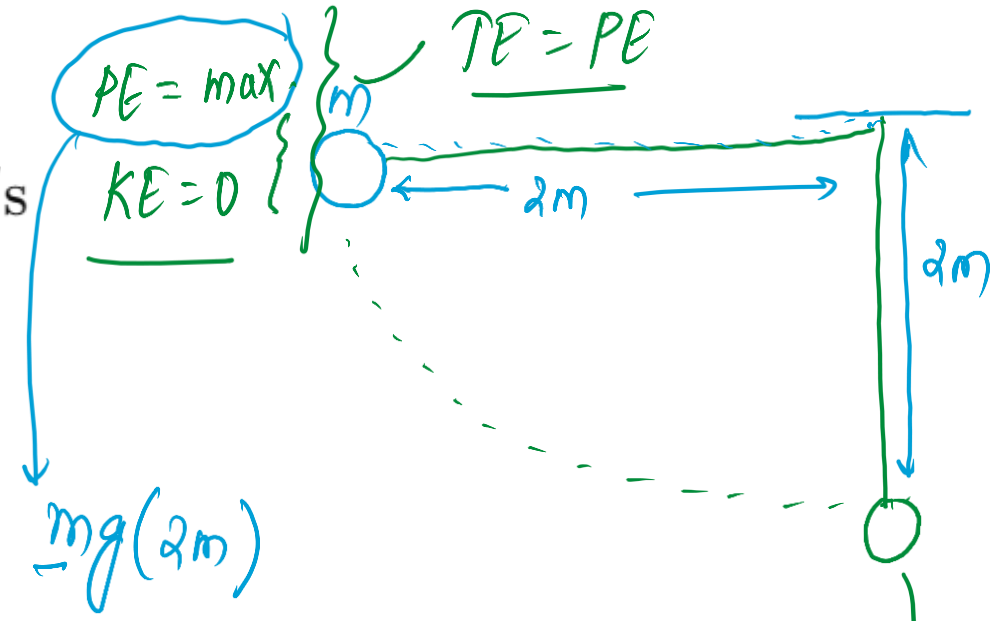
c) $2.0\,\mathrm{J}$

d) $10.0\,\mathrm{J}$

Answer: B

A pendulum bob is released from a height where the string is horizontal. If the length of the pendulum is $2\,\mathrm{m}$, what is the speed of the bob at the lowest point of its swing? (Assume $g = 9.8\,\mathrm{m/s^2}$)

a) $4\,\mathrm{m/s}$
b) $6.26\,\mathrm{m/s}$
c) $5.6\,\mathrm{m/s}$
d) $3.2\,\mathrm{m/s}$



TE = PE

$mg(2m)$

$m(9.8)(2)$ J

$m(19.6)$ J

$\frac{1}{2}mv^2$

PE = 0
KE = max

TE = KE

PE + KE = constant
(Law of conservation of energy)

$(PE)_{max} = (KE)_{max}$ = Total energy

$m(19.6) = \frac{1}{2}mv^2$

$v^2 = 2 \times 19.6$

$v^2 \approx 38.$

A pendulum bob is released from a height where the string is horizontal. If the length of the pendulum is $2\,\mathrm{m}$, what is the speed of the bob at the lowest point of its swing? (Assume $g = 9.8\,\mathrm{m/s^2}$)

a) $4\,\mathrm{m/s}$

b) $6.26\,\mathrm{m/s}$

c) $5.6\,\mathrm{m/s}$

d) $3.2\,\mathrm{m/s}$

Answer: B

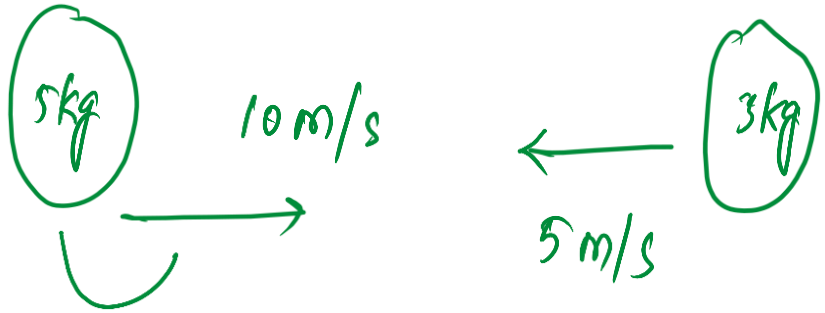
A block of mass 5 kg is moving on a frictionless surface with a speed of 10 m/s. It collides with another block of mass 3 kg moving in the opposite direction with a speed of 5 m/s. After the collision, the blocks stick together. What is the speed of the combined mass after the collision?

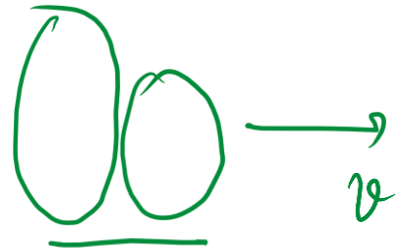
a) 2.5 m/s

b) 4.375 m/s

c) 3.5 m/s

d) 1.25 m/s





Law of conservation of Momentum

$$(5 \times 10) + 3(-5) = (5+3)v$$

$$v = \frac{35}{8} = 4.375 \text{ m/s}$$

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a) 2.5 m/s

b) 4.375 m/s

c) 3.5 m/s

d) 1.25 m/s

1. The SI unit of Power is

A. Js

B. J/s

C. s/J

D. J/s^2

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A. Js

B. J/s

C. s/J

D. J/s^2

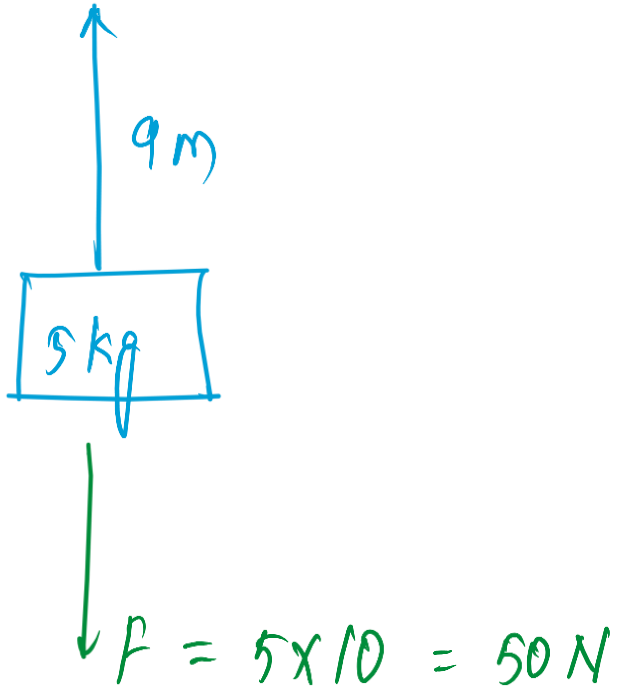
2. What is the work done in lifting a body of mass 5 kg vertically through 9 m ?

A. - 450 J

B. 450 J

C. 45 J

D. 540 J



Negative work,

$-(50\,N)(9\,m)$

$= -450\,J$

2. What is the work done in lifting a body of mass 5 kg vertically through 9 m ?

A. - 450 J

B. 450 J

C. 45 J

D. 540 J

3. Fundamental laws of physics require

(a) conservation of energy and non-conservation of charge.

(b) conservation of charge and non-conservation of linear momentum.

(c) conservation of charge and non-conservation of energy.

(d) conservation of energy, momentum and charge.

3. Fundamental laws of physics require

(a) conservation of energy and non-conservation of charge.

(b) conservation of charge and non-conservation of linear momentum.

(c) conservation of charge and non-conservation of energy.

(d) conservation of energy, momentum and charge.

Answer: D

4. A lamp consumes 1000 J of electrical energy in 10 s. What is its power ?

A. 10 W

B. 100 W

C. 1000 W

D. 500 W

watt (J/s)

$\frac{1000\ J}{10\ s} = 100\ J/s$ or $100\ W$

4. A lamp consumes 1000 J of electrical energy in 10 s. What is its power ?

A. 10 W

B. 100 W

C. 1000 W

D. 500 W

5. A pair of bullocks exerts a force of 140 N on a plough. The field being ploughed is 15 m long. Find the work done ?

A. 210 J

B. 2100 J

C. 21000 J

D. 210000 J

5. A pair of bullocks exerts a force of 140 N on a plough. The field being ploughed is 15 m long. Find the work done ?

A. 210 J

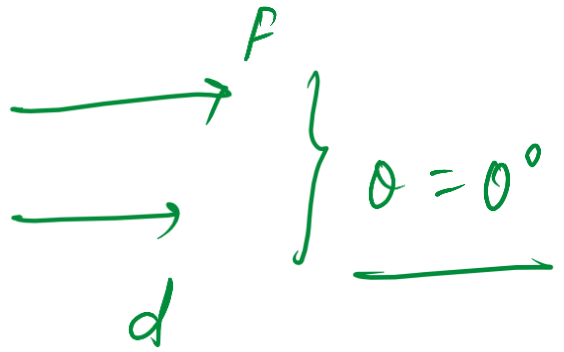
B. 2100 J

C. 21000 J

D. 210000 J

$140\ N \times 15\ m$

$W = F d \cos\theta$



6. A weightlifter lifts a weight off the ground and holds it up then :

A. Work is done in lifting as well as holding the weight

B. No work is done in both lifting and holding the weight

C. Work is done in lifting the weight but no work is done in holding it up

D. No work is done in lifting the weight but work is done in holding it up

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B. No work is done in both lifting and holding the weight

C. Work is done in lifting the weight but no work is done in holding it up

D. No work is done in lifting the weight but work is done in holding it up

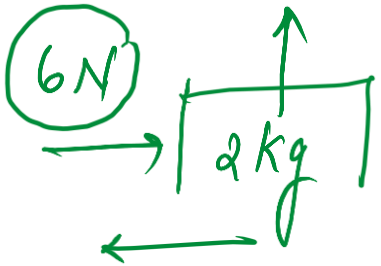
7. A block of mass 2 kg initially at rest moves under the action of an applied horizontal force of 6 N on a rough horizontal surface. The coefficient of friction between block and surface is 0.1. The work done by applied force in 10 s is (Take g = 10 m/s²)

A. 200 J

B. - 200 J

C. 600 J

D. - 600 J



$W = F \times \text{disp.}$

$F = \mu W$

$= 0.1(2 \times 10)$

$= 2N$

Net force on block $= 6N - 2N = 4N$

$a = \frac{F}{m} = \frac{4}{2} = 2\ m/s^2$

$s = ut + \frac{1}{2}at^2$

$s = 0 + \frac{1}{2}(2)(10)^2$

$s = 100\ m$

$W = 6N \times 100\ m$

$= 600\ J$

7. A block of mass 2 kg initially at rest moves under the action of an applied horizontal force of 6 N on a rough horizontal surface. The coefficient of friction between block and surface is 0.1. The work done by applied force in 10 s is (Take g = 10 m/s^2)

A. 200 J

B. - 200 J

C. 600 J

D. - 600 J

8. The work done by a body against friction always results in

A. Loss of Kinetic Energy

B. Loss of potential Energy

C. Gain of Kinetic Energy

D. Gain of Potential Energy

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A. **Loss of Kinetic Energy**

B. Loss of potential Energy

C. Gain of Kinetic Energy

D. Gain of Potential Energy

9. Which of the following is an incorrect statement

A. Kinetic Energy may be zero , positive or negative

B. Power , Energy and Work are all scalars

C. Potential Energy may be zero , positive or negative

D. Ballistic pendulum is a device used for measuring speed of bullets

9. Which of the following is an incorrect statement

A. **Kinetic Energy may be zero , positive or negative**

B. Power , Energy and Work are all scalars

C. Potential Energy may be zero , positive or negative

D. Ballistic pendulum is a device used for measuring speed of bullets

10. For a moving particle (mass m , velocity v) having a momentum p , which one of the following correctly describes the kinetic energy of the particle ?

A. $p/2m$

B. $v/2m$

C. $v^2/2m$

D. $p^2/2m$

10. For a moving particle (mass m , velocity v) having a momentum p , which one of the following correctly describes the kinetic energy of the particle ?

A. $p/2m$

B. $v/2m$

C. $v^2/2m$

D. $p^2/2m$

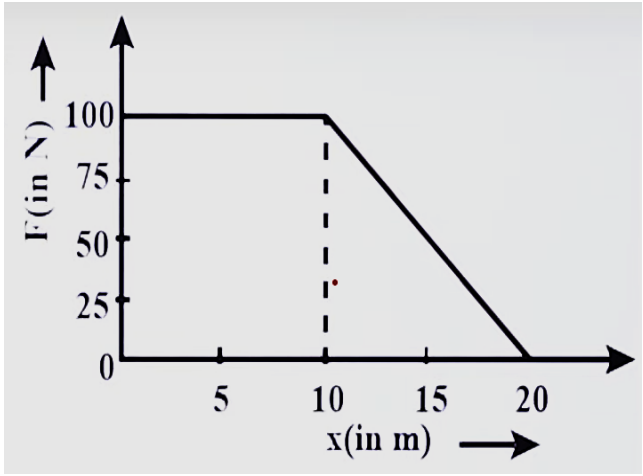
11. A force F acting on an object varies with distance x as shown in the figure. The work done by the force in moving the object from x = 0 to x = 20 m is :

A. 500 J

B. 1000 J

C. 1500 J

D. 2000 J



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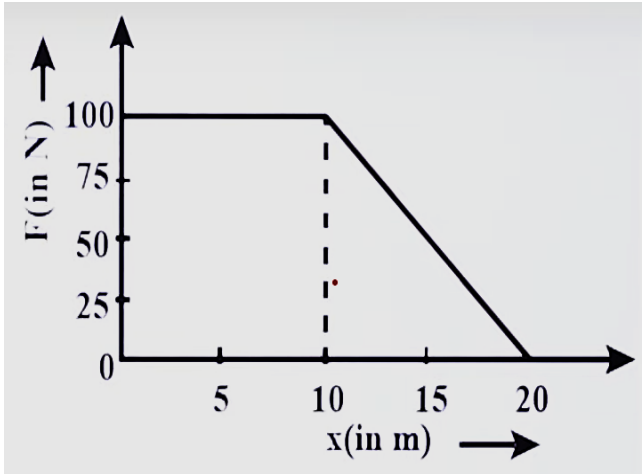

12. A ball bounces to 80% of its original height. What fraction of its potential energy is lost in each bounce ?

A. 2/5

B. 4/5

C. 1/5

D. None of the above

12. A ball bounces to 80% of its original height. What fraction of its potential energy is lost in each bounce ?

A. 2/5

B. 4/5

C. 1/5

D. None of the above

13. An object of mass 40 kg is raised to a height of 5 m above the ground. If the object is allowed to fall , find its Kinetic Energy midway.

A. 2000 J

B. 4000 J

C. 1000 J

D. 1500 J

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A. 2000 J

B. 4000 J

C. 1000 J

D. 1500 J

14. A simple pendulum of length 1 m has a wooden bob of mass 1 kg. It is struck by a bullet of mass 0.01 kg moving with a speed of 200 m/s. The height to which the bob rises before swinging back is (Take g = 10 m/s^2)

A. 0.2 m

B. 0.6 m

C. 8 m

D. 1 m

14. A simple pendulum of length 1 m has a wooden bob of mass 1 kg. It is struck by a bullet of mass 0.01 kg moving with a speed of 200 m/s. The height to which the bob rises before swinging back is (Take g = 10 m/s^2)

A. 0.2 m

B. 0.6 m

C. 8 m

D. 1 m

15. When a long spring is stretched by 2 cm , its potential energy is U. If the spring is stretched by 10 cm , then the potential energy now becomes

A. 10 U

B. 5 U

C. U / 5

D. 25 U

15. When a long spring is stretched by 2 cm , its potential energy is U. If the spring is stretched by 10 cm , then the potential energy now becomes

A. 10 U

B. 5 U

C. U / 5

D. 25 U

16. One man takes 1 minute to raise a box of height of 3 m while another man takes 1/2 minute to do so. The energy gained by box in both cases is

A. Same

B. Different

C. Energy for first is more

D. Energy for second is more

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A. **Same**

B. Different

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D. Energy for second is more

17. A man weighing 60 kg climbs up a staircase carrying a load of 20 kg on his head. The staircase has 20 steps each of height 0.2 m. If he takes 10 s to climb , find his power.

A. 320 W

B. 120 W

C. 80 W

D. 160 W

17. A man weighing 60 kg climbs up a staircase carrying a load of 20 kg on his head. The staircase has 20 steps each of height 0.2 m. If he takes 10 s to climb , find his power.

A. 320 W

B. 120 W

C. 80 W

D. 160 W

18. An object of mass 2000 g possesses 100 J kinetic energy. The object must be moving with a speed of

(a) 10·0 m/s

(b) 11·1 m/s

(c) 11·2 m/s

(d) 12·1 m/s

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(a) 10·0 m/s

(b) 11·1 m/s

(c) 11·2 m/s

(d) 12·1 m/s

Answer: A

19. A negative work is done when an applied force **F** and the corresponding displacement **S** are

(a) perpendicular to each other.

(b) parallel to each other.

(c) anti-parallel to each other.

(d) equal in magnitude.

19. A negative work is done when an applied force **F** and the corresponding displacement **S** are

(a) perpendicular to each other.

(b) parallel to each other.

(c) anti-parallel to each other.

(d) equal in magnitude.

Answer: C

20. A mass of 10 kg is at a point A on table. It is moved to a point B horizontally , what is the work done on the object by the Gravitational force ?

A. 0 J

B. 10 J

C. 100 J

D. 1000 J

20. A mass of 10 kg is at a point A on table. It is moved to a point B horizontally , what is the work done on the object by the Gravitational force ?

A. 0 J

B. 10 J

C. 100 J

D. 1000 J

21. The energy possessed by a body due to its change in position or shape is called

(a) thermal energy

(b) potential energy

(c) kinetic energy

(d) electric energy

21. The energy possessed by a body due to its change in position or shape is called

(a) thermal energy

(b) potential energy

(c) kinetic energy

(d) electric energy

Answer : B

22. Which one of the following forces is non-central and non-conservative ?

(a) Frictional force

(b) Electric force

(c) Gravitational force

(d) Mechanical force

22. Which one of the following forces is non-central and non-conservative ?

(a) Frictional force

(b) Electric force

(c) Gravitational force

(d) Mechanical force

Answer : A

GRAVITATION

The acceleration due to gravity on the surface of the Earth is approximately:

a) 9.8 m/s^2

b) 10.2 m/s^2

c) 8.9 m/s^2

d) 12.5 m/s^2

The acceleration due to gravity on the surface of the Earth is approximately:

a) 9.8 m/s^2

b) 10.2 m/s^2

c) 8.9 m/s^2

d) 12.5 m/s^2

Answer: A

According to Archimedes' principle, the upward buoyant force that is exerted on a body immersed in a fluid is equal to:

a) The weight of the fluid displaced by the body

b) The volume of the body

c) The density of the fluid

d) The weight of the body

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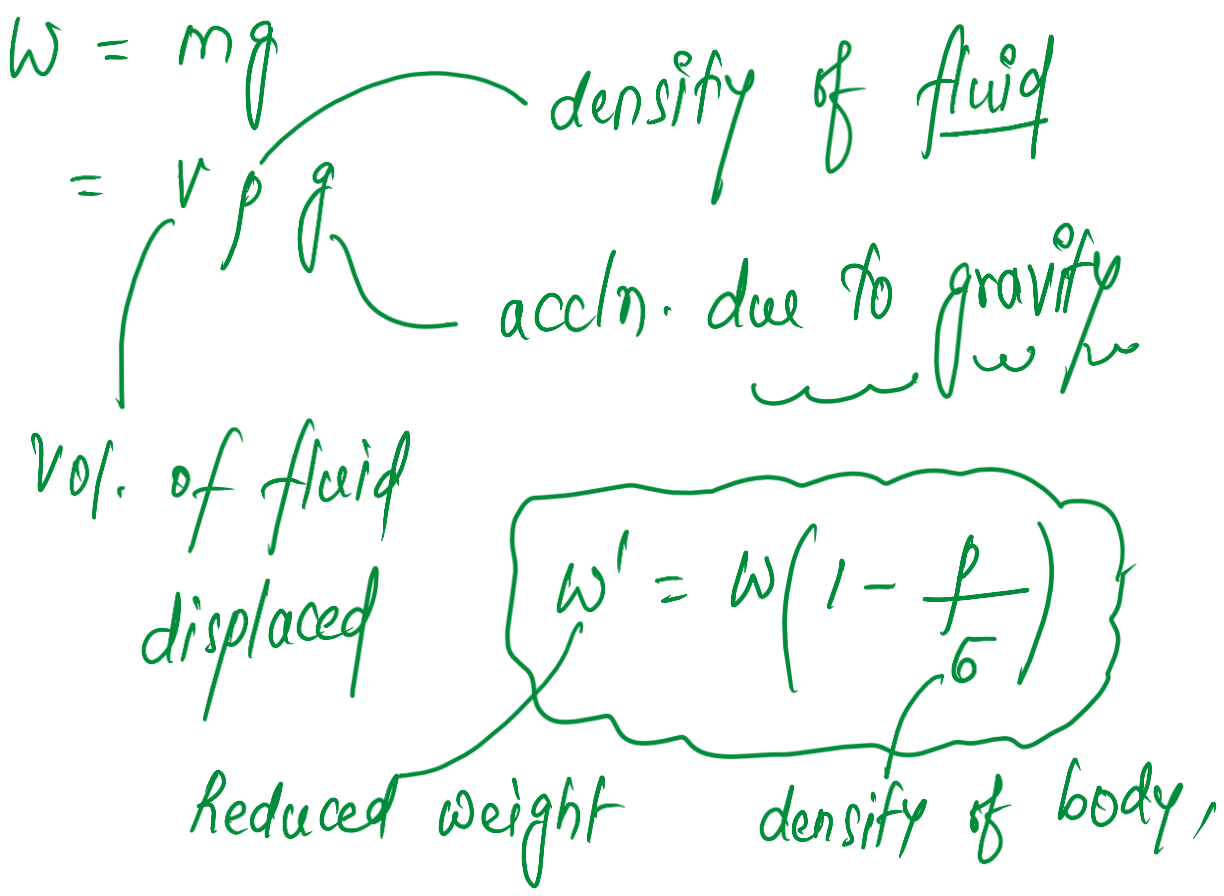

Answer: A

Which of the following instruments is used to measure atmospheric pressure?

a) Hydrometer

b) Barometer

c) Thermometer

d) Manometer

Which of the following instruments is used to measure atmospheric pressure?

a) Hydrometer

b) Barometer

c) Thermometer

d) Manometer

Answer: B

1. The SI unit of specific gravity is

A. gcm^{-3}

B. kgm^{-3}

C. No units

D. None of the Above

ratio of densities.

1. The SI unit of specific gravity is

A. gcm^{-3}

B. kgm^{-3}

C. No units

D. None of the Above

2. An object is put one by one in three liquids having different densities. The object floats with $\frac{1}{9}$, $\frac{2}{11}$ and $\frac{3}{7}$ parts of their volumes outside the liquid surface in liquids of densities d_1, d_2 and d_3 respectively. Which of the following statement is correct?

(a) $d_1 > d_2 > d_3$

(b) $d_1 > d_2 < d_3$

(c) $d_1 < d_2 > d_3$

(d) $d_1 < d_2 < d_3$

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(b) $d_1 > d_2 < d_3$

(c) $d_1 < d_2 > d_3$

(d) $d_1 < d_2 < d_3$

Answer: (D)

3. The working of Hydraulic Breaks and Lifts is based on

A. Archimedes Principle

B. Law of Floatation

C. Bernoulli’s Principle

D. Pascal’s Law

3. The working of Hydraulic Breaks and Lifts is based on

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D. Pascal’s Law

4. An object is made of two equal parts by volume; one part has density ρ_0 and the other part has density $2\rho_0$. What is the average density of the object?

(a) $3\rho_0$

(b) $\frac{3}{2}\rho_0$

(c) ρ_0

(d) $\frac{1}{2}\rho_0$

4. An object is made of two equal parts by volume; one part has density ρ_0 and the other part has density $2\rho_0$. What is the average density of the object?

(a) $3\rho_0$

(b) $\frac{3}{2}\rho_0$

(c) ρ_0

(d) $\frac{1}{2}\rho_0$

Answer: (B)

5. If an object mass on the Moon surface is 40 kg then what will be the mass of the same object on the Earth's surface ?

A. 40 kg

B. 20 kg

C. 6.66 kg

D. 10 kg

5. If an object mass on the Moon surface is 40 kg then what will be the mass of the same object on the Earth's surface ?

A. 40 kg

B. 20 kg

C. 6.66 kg

D. 10 kg

6. The weight of an object at the centre of the earth of radius R is

A. Zero

B. Infinite

C. R times the weight at the surface of the Earth

D. $1/R^2$ times the weight at surface of Earth

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A. Zero

B. Infinite

C. R times the weight at the surface of the Earth

D. $1/R^2$ times the weight at surface of Earth

7. Law Of Gravitation Gives The Gravitational Force Between

A. The Earth and a point Mass only

B. The Earth and Sun only

C. Any Two Bodies Having Some Mass

D. Two charged bodies only

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A. The Earth and a point Mass only

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8. In the relation $F = GMm/d^2$, the quantity G is

A. Depends on the value of g at the place of observation

B. Is used only when the Earth is one of the two masses

C. Is greatest at the surface of Earth

D. Is universally constant

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A. Depends on the value of g at the place of observation

B. Is used only when the Earth is one of the two masses

C. Is greatest at the surface of Earth

D. Is universally constant

9. The time period of a 1 m long pendulum approximates to

(a) 6 s

(b) 4 s

(c) 2 s

(d) 1 s

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(a) 6 s

(b) 4 s

(c) 2 s

(d) 1 s

Answer: (C)

10. All objects experience a buoyancy when they are immersed in a fluid. Buoyancy is

(a) a downward force

(b) a downward pressure

(c) an upward force

(d) an upward pressure

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(a) a downward force

(b) a downward pressure

(c) an upward force

(d) an upward pressure

Answer: (C)

11. An apple falls from a tree because of gravitational attraction between the Earth and the Apple. If F1 is the magnitude of the Force exerted by the Earth on the apple and F2 is the magnitude of Force exerted by the Apple on the Earth , then

A. F1 > F2

B. F1 < F2

C. F1 = F2

D. Can’t say

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A. F1 > F2

B. F1 < F2

C. F1 = F2

D. Can’t say

12. Two planets orbit the Sun in circular orbits, with their radius of orbit as $R_1 = R$ and $R_2 = 4R$. Ratio of their periods (T_1/T_2) around the Sun will be

(a) 1/16

(b) 1/8

(c) 1/4

(d) 1/2

12. Two planets orbit the Sun in circular orbits, with their radius of orbit as $R_1 = R$ and $R_2 = 4R$. Ratio of their periods (T_1/T_2) around the Sun will be

(a) 1/16

(b) 1/8

(c) 1/4

(d) 1/2

Answer: (B)

13. A liquid is kept in a glass beaker. Which one of the following statements is correct regarding the pressure exerted by the liquid column at the base of the beaker ?

(a) The pressure depends on the area of the base of the beaker

(b) The pressure depends on the height of liquid column

(c) The pressure does not depend on the density of the liquid

(d) The pressure neither depends on the area of the base of the beaker nor on the height of liquid column

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Answer: (B)

14. A planet has a mass M_1 and radius R_1. The value of acceleration due to gravity on its surface is g_1. There is another planet 2, whose mass and radius both are two times that of the first planet. Which one of the following is the acceleration due to gravity on the surface of planet 2?

(a) g_1

(b) $2g_1$

(c) $g_1/2$

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Answer: (C)

15. Whether an object will float or sink in a liquid, depends on

(a) mass of the object only

(b) mass of the object and density of liquid only

(c) difference in the densities of the object and liquid

(d) mass and shape of the object only

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(a) mass of the object only

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(d) mass and shape of the object only

Answer: (C)

16. Which one of the following statements about gravitational force is NOT correct ?

(a) It is experienced by all bodies in the universe

(b) It is a dominant force between celestial bodies

(c) It is a negligible force for atoms

(d) It is same for all pairs of bodies in our universe

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Answer: (D)

17. Suppose there are two planets, 1 and 2, having the same density but their radii are R_1 and R_2 respectively, where $R_1 > R_2$. The accelerations due to gravity on the surface of these planets are related as

(a) $g_1 > g_2$

(b) $g_1 < g_2$

(c) $g_1 = g_2$

(d) Can't say anything

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(d) Can't say anything

Answer: (B)

18. The Force Of Attraction Between Two Unit Point Masses Separated By A Unit Distance Is Called

A. Gravitational Potential
B. Acceleration Due To Gravity
C. Gravitational Field
D. Universal Gravitational Constant

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19. Two bodies of mass M each are placed R distance apart. In another system, two bodies of mass 2M each are placed $\frac{R}{2}$ distance apart.

If F be the gravitational force between the bodies in the first system, then the gravitational force between the bodies in the second system will be

(a) 16 F

(b) 1 F

(c) 4 F

(d) None of the above

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(c) 4 F

(d) None of the above

Answer: (A)

20. A pendulum clock is lifted to a height where the gravitational acceleration has a certain value g. Another pendulum clock of same length but of double the mass of the bob is lifted to another height where the gravitational acceleration is g/2. The time period of the second pendulum would be :
(in terms of period T of the first pendulum)

(a) $\sqrt{2}\,T$

(b) $\frac{1}{\sqrt{2}}T$

(c) $2\sqrt{2}\,T$

(d) T

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Answer: (A)

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