Force:

Q1. S.I. unit of moment of couple is

(a) Kgf. m

(b) Nm

(c) Joule

(d) dyne cm

Ans: **(b)**

Q2. Which of the following is not an example of dynamic equilibrium

(a) An aeroplane moves at a constant height

(b) A stone tied at the end of a string when whirled in a circular path

(c) A raindrop reaching the earth surface

(d) A beam balance balanced in horizontal position.

Ans: **(d)**

Q3. **Torque is depending on**

(a) The magnitude of force applied (F)

(b) The perpendicular distance of line of action of the force from the axis of rotation

(c) Pressure on the substance

(d) Both (a) and (b)

Answer: (d) Both (a) and (b)

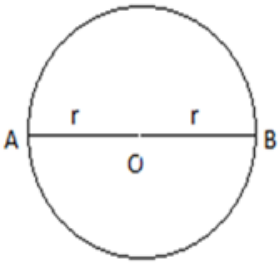
Q4. Where will be the centre of gravity of a uniform rod lies?
a) At its end
b) At its mid-point
c) At its centre of its cross sectional area
d) Depends upon its material

Ans-b

Q5. Where the centre of gravity of a circle lies?
a) At its centre
b) anywhere on its radius
c) Anywhere on its circumference
d) Anywhere on its diameter

Ans-a

Q6. A particle is moving in a circular path of radius r.



The displacement and work done after a complete circle would be:
(a) Zero , zero
(b) πr, zero
(c) 2r, zero
(d) 2πzero
Answer: (a)

Q7. Which of the following can be 'zero' for a body moving in circular path?
i. Velocity
ii. Distance travelled
iii. Speed
iv. Displacement

(a) Only (i)
(b) (i) and (ii)
(c) (i) and (iv)
(d) Only (iv)
Answer: (d)

Q8. Which of the following is most likely not a case of uniform circular motion?
(a) Motion of the earth around the sun
(b) Motion of a toy train on a circular track
(c) Motion of a racing car on a circular track
(d) Motion of hours' hand on the dial of a clock
Answer: (c)

Q9. In order to keep a body moving in a circle, there exists a force on it is directed towards the centre of the circle. This force is known as___
(a) Centrifugal force
(b) Centripetal force
(c) Gravitational force
(d) Magnetic force
Ans-A.

Q10. Object moving along a uniform circular path is
(a) In equilibrium
(b) Not in equilibrium
(c) Not moving with constant speed
(d) In random motion
Ans (a)

Q11. Which of these quantities is constant in uniform circular motion?
a. Speed
b. Velocity

c. Acceleration
d. Displacement

Ans. -a

Q12. An object is in uniform circular motion. Suppose the centripetal force was removed. In which direction would the object now travel?

a. In the direction of the centripetal force
b. In the direction opposite to the direction of the centripetal force
c. In the direction of the tangential velocity
d. In the direction opposite to the direction of the tangential velocity

Ans-c

Q13. **Along which a force act is called_____**

A. line of action of force
B. line of acting torque
C. axis of rotation
D. moment arm

Ans. A

Q14 **If 150N of farce is applied on a spanner of 10 cm to open a nut then the length of spanner when the force applied on it is 60 N is**

A. 25 cm
B. 80 cm
C. 40 cm
D. 50 cm

Ans. - A

Q15. Suppose a boy is enjoying a ride on a marry-go-round which is moving with a constant speed of 10 m/s. It implies that the boy is:

(a) At rest

(b) Moving with no acceleration

(c) In accelerated motion

(d) Moving with uniform velocity

Answer: (c)

Q16. **Moment arm is the_____**

A. parallel distance
B. perpendicular distance
C. normal distance
D. resultant force

Ans. B

Q17. The centre of gravity of a triangle is located at the point of

(a) Intersection of its altitudes
(b) Intersection of bisector of angles
(c) Intersection of diagonals

(d) Concurrence of the medians
Ans. (d)

Q18. **A simple method to find centre of gravity of a body is usage of**
(a) Stop watch
(b) Plumb line
(c) Pendulum
(d) Gauge
Ans. (b)

Q19. **What is one way you might increase the stability of an object?**
a. Lower the centre of gravity
b. Raise the centre of gravity
c. Increase the height of the object
d. Shorten the base of the object
Ans -a

Q20. **Where do you hang the plumb line when determining the CG?**
a. It doesn't matter, because it always goes through the CG
b. Only from the corners
c. From the point where you are suspending the object
d. At the right angle
Ans. A

Q21. **If we suspend lamina at different positions, its centre of gravity will still lie along the**

a. Plumb line
b. Line of force
c. Line of weight
d. Gravity line
Ans- A

Q22. **A nut has been tightened by a force of 180 N using an 8 cm long spanner. What length of a spanner is required to loosen the same nut with 150 N FORCE?**

a. 11 cm
b. 8.5 cm
c. 9.6 cm
d. 10.9 cm
Ans-C

Q23. **A force of 120 N is applied perpendicularly on a spanner at a distance of 9 cm from a nut. The torque produced by the force will be**

a. 12 Nm
b. 10.8 Nm
c. 15 Nm
d. 12.59 Nm
Ans.-B

Q24. **The steering of a car has a radius of 15 cm. The torque produced by a couple of 40 N will be**

a. 12 Nm
b. 10.8 Nm
c. 15 Nm
d. 12.59 Nm

Ans-A

Q25. **A boy tightens the nut of a car using a 16 cm long spanner by applying a force of 180 N. The torque will be**

a. 2880 N m
b. 28.8 N m
c. 30 N m
d. 11.25 N m

Ans-B

Q26. **Rotation around a fixed axis is a special case of _____ motion**

(a) Linear motion

(b) Rotational motion

(c) Both of (a) and (b)

(d) None of these

Ans: **(b)**

Q27. For the stable equilibrium of a body its centre of gravity must be

a. **Above** the base and near the geometric centre of the body.

b. Below the base and near the geometric centre of the body.

c. Above the base and away from the geometric centre of the body

d. Below the base and away from the geometric centre of the body

Ans- A

Q28. The turning effect on the body about an axis is due to_____ applied on the body.

(a) Moment of Force

(b) Force

(c) Velocity

(d) Acceleration

Ans: A

Q29. On a given spanner if the point of application of force is moved towards the axis of rotation then it will ____

a. Increase the moment of force

b. Increase the required Force

c. Decrease the moment of force

d. Decrease the required Force

Ans-B

Q30. In an atom, an electron moves around the nucleus in a circular path for which the centripetal force is obtained from

a. Magnetic force
b. Electrostatic force of attraction
c. Centrifugal force
d. Tension force
Ans- b

Work, Power and Energy

1) Work is the product of _____
   a. F x S
   b. F x V
   c. F x a
   d. F x t

   Ans: F x S

2) When the displacement is normal to the direction of applied force, work done is _____
   a. Maximum
   b. Positive
   c. Negative
   d. Zero

   Ans: Zero

3) A boy drags a load 'L' along horizontal plane AB by applying a force F. The boy does _____
   a. No work
   b. Negative work
   c. Positive work
   d. None

   Ans: No work

4) 1 J = ____ ergs
   a. 10^5

b. 10^{7}
c. 10^{-5}
d. 10^{-7}

Ans: 10^{7}

5) When a cricket ball rolling on the ground stops after covering a distance, the force of friction between the cricket ball and the ground does a _____ work.
a. Zero
b. Positive
c. Negative
d. None

Ans: Negative

6) The SI unit of work is joule. It is expressed in terms of mass, length and time as _____
a. kg $m^{3}s^{-3}$
b. kg $m^{3}s^{-2}$
c. kg^{2} $m^{2}s^{-2}$
d. kg $m^{2}s^{-2}$

Ans: kg $m^{2}s^{-2}$

7) Power spent by a source depends on _____ and _____
a. Work, time
b. Force, time
c. Force, displacement
d. Work, displacement

Ans: Work, time

8) 1 HP = _____ watts
a. 764
b. 746
c. 476
d. 467

Ans: 746

9) The SI unit of power is joule. It is expressed in terms of mass, length and time as _____
a. kg $m^{2}s^{-3}$
b. kg ms^{-3}
c. kg^{2} $m^{2}s^{-2}$
d. kg ms^{-2}

Ans: kg ms^{-3}

10) A boy of mass 55 kg runs 100m. The force acting on the boy is _____ (g = 10 ms^{-2})
a. 550 N
b. 500 N

c. 1000 N
d. 5500 N

Ans: 550 N

11) 1 J = ___ cal
a. 0.24
b. 2.4
c. 0.42
d. 4.2

Ans: 0.24

12) One kilocalorie is the amount of heat required to raise the temperature of _____
a. 1 g of water through 1^0C
b. 1 kg of water through 100^0C
c. 1 kg of water through 1^0C
d. 1 kg of water through 10^0C

Ans: 1 kg of water through 1^0C

13) A stone resting on the roof of a building has _____
a. Potential energy
b. Kinetic energy
c. Gravitational energy
d. Both a and c

Ans: Potential energy

14) A falling raindrop has _____
a. Only kinetic energy
b. Only potential energy
c. Both kinetic and potential energy
d. None of these

Ans: Both kinetic and potential energy

15) One electron volt is equal to _____
a. 1.6×10^{-17} J
b. 6.1×10^{-19} J
c. 1.6×10^{-19} J
d. 1.6×10^{-10} J

Ans: 1.6×10^{-19} J

16) Mechanical energy is divided into 2 types _____and _____
a. Kinetic, potential energy
b. Kinetic, heat energy
c. Potential, chemical energy
d. Potential, heat energy

Ans: Kinetic, potential energy

17) 1 kWh = _____ J

a. 3.6×10^6
b. 6.3×10^6
c. 3.6×10^{-6}
d. 6.3×10^{-6}

Ans: 3.6×10^6

18) A boy of mass m climbs up the stairs of vertical height 'h' the work done by the boy against the force of gravity is _____

a. mg
b. mgh
c. mh
d. mg/h

Ans: mgh

19) Law of conservation of energy states that _____

a. energy cannot be created nor destroyed
b. energy can be created but cannot be destroyed
c. energy cannot be created but can be destroyed
d. energy can be created and can be destroyed

Ans: Energy cannot be created nor destroyed

20) When a flash light is switched on the electric energy _____

a. directly changes to light energy
b. first changes to light energy and then to heat energy
c. first to heat energy and then to light energy
d. none of the above

Ans: directly changes to light energy

MACHINE

1. The opposing force to be overcome by a machine is called
A. Effort.
B. Load.
C. Fulcrum.
D. Mechanical advantage.
Ans:B

2. Force applied on a machine to overcome the load is called
A. Weight.
B. Load.
C. Effort.
D. Velocity Ratio.
Ans: C

3. The ratio of effort to the load is
A. Machanical Advantage.
B. Velocity Ratio.
C. Reciprocal of Machanical Advantage.
d. Efficiency.
Ans: C

4. A machine having M.A > 1 acts
A. As a load.
B. As speed multiplier.
C. A force multiplier.
D. None of the above.
And: C

5. A machine having M.A < 1
A. Has effort greater than the load.
B. Has load greater than the effort.
C. Acts as a force multiplier.
D. None of the above.
Ans: A

6. Velocity ratio is
A: d_L/d_E
B. d_E/d_L
C. L/d_E
D. V_L/V_E
Ans: B

7. Mechanical Advantage is
A. d_E/d_L
B. d_L/d_E
C. E/L
D. L/E
Ans: D

8.Input energy in a machine is
A. Effort x displacement of load

B. Load x displacement of load

C. Work done at the effort point

D. Work done at the load point

Ans: C

9. Output energy in a machine is

A. Load x effort

B. Work obtained at the load point

C. Effort x displacement of effort

D. work obtained at the effort point

Ans: B

10. For an ideal machine
A. Input energy < output energy
B. Input energy > output energy
C. Input energy = output energy
D. None of the above
Ans:.C

11. In actual machine
A. Output energy always > Input energy
B. Input energy always > Output energy
C. Output energy always = Input energy
d. None of the above
Ans: B

12. Efficiency η is
A. L x d_L / E x d_E
B. L x d_E / E x d_E
C. L x V.R
D. E x V.R
Ans: A

13. Efficiency of an ideal machine is
(a) 0.1
(b) 1.0
(c) 0.11
(d) 0.01
Ans: B.

14. Unit of efficiency in S.I, system
A. N
B. J
C. N m
D. None of the above
Ans: D

15. Due to friction, in a machine
A. Velocity ratio does not change
B. Mechanical advantage increases
C. Mechanical Advantage does not change
D. Velocity ratio increases
Ans: A

16. A single fixed pulley has
A. Its axis of rotation moving
B. Its axis of rotation stationary
C. No axis of rotation
D. None of the above
Ans: B.

17. In single fixed pulley in ideal case
A. E>L
B. E=L
C. E<L
D. E= 2L
Ans: B.

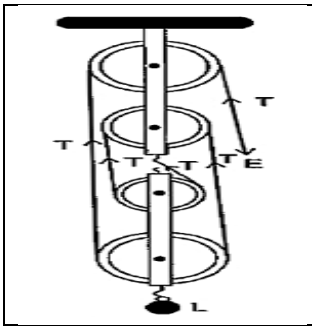
18. In single movable pulley
A: L = 4T
B. L= T
C. L= 2T

D. L= T/4
Ans: C.

19. Single movable pulley is
A. Used as a force multiplier
B. Used as a speed multiplier
C. Used to change the direction of effort
D. None of the above
Ans: A

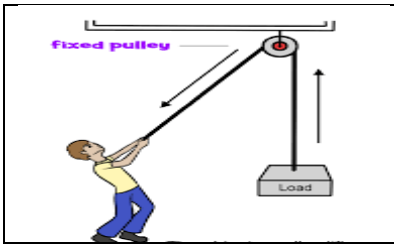
20. A block and tackle system of 3 pulleys used to raise a load of 120 kgf with an effort of 40 kgf. Calculate the Velocity ratio.
A. 0.31
B. 0.3
C. 3.0
D. 0.33
Ans: C

21. Calculate the M.A. of the block and tackle system shown in the diagram below.



A. 4
B. 6
C. 2
D. 3
Ans: A

22. A boy pulls a load of 6 kg by applying an effort of 80 N. Calculate the mechanical advantage.



A. O.47
B. O.65
C. 0.75
D. 0.71
Ans: C

23. For greater efficiency, the pulley in the lower block should be
A. as heavy as possible
B. Not light
C. as light as possible
D. None of the above
Ans: C

24. In a block and tackle of 5 pulleys
A: L = T
B. L= 5T
C. L= 3T
D. L= 4T
Ans: B.

25. In a block and tackle system
A: V.R. = number of strands of tackle
B. V.R < number of strands of tackle
C. V.R > number of strands of tackle
D. All of the above is correct
Ans: A

26. Correct relationship between M.A., V.R and η is
A. M.A. = V.R. x η
B. M.A. = V.R. / η
C. M.A. = V.R. + η
D. M.A. = V.R. - η
Ans: A.

27. The useful work done by a machine is
A. Input energy
B Effort x load
C. Output energy
D. Its mechanical advantage
Ans: C.

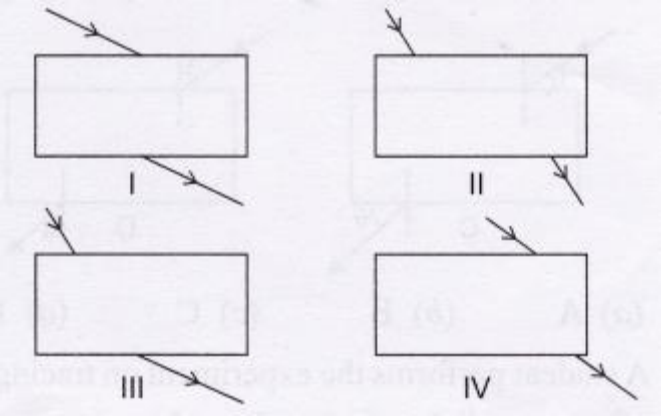
28. The point where the energy is obtained by overcoming the load is called
A: Effort point
B. Load Point
C. Fulcrum
D. All of the above
Ans: B.

29 S.I. unit of load is
A. Nm
B. N
C. J
D. Kg ms^{-1}
Ans; B.

30. In class one lever
A. Fulcrum is always between load and effort
B. Load is always between effort and fulcrum
C. Effort is always between load and fulcrum
D. None of the above.
Ans: A

Refraction at Plane Surface.

1. Four students showed the following traces of the path of a ray of light passing through a rectangular glass slab.

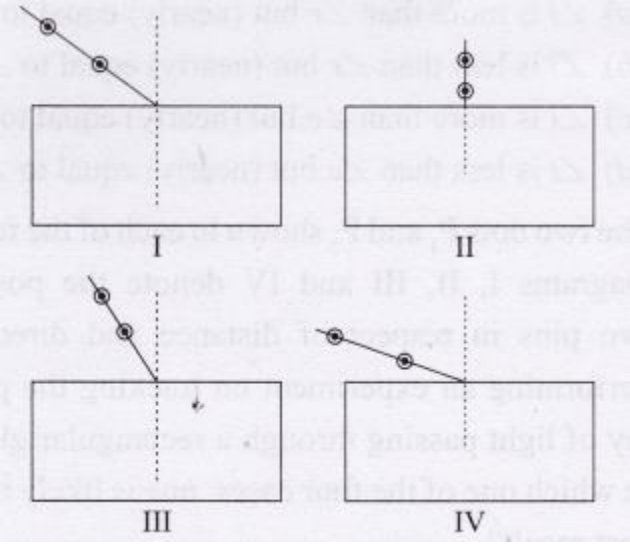


The trace most likely to be correct is that of student:

(a) I **(b)** II **(c)** III **(d)** IV

Answer (c)

2. Select from the following the best set-up for tracing the path of a ray of light through a rectangular glass slab:



(a) I **(b)** II **(c)** III **(d)** IV

Answer: (a)

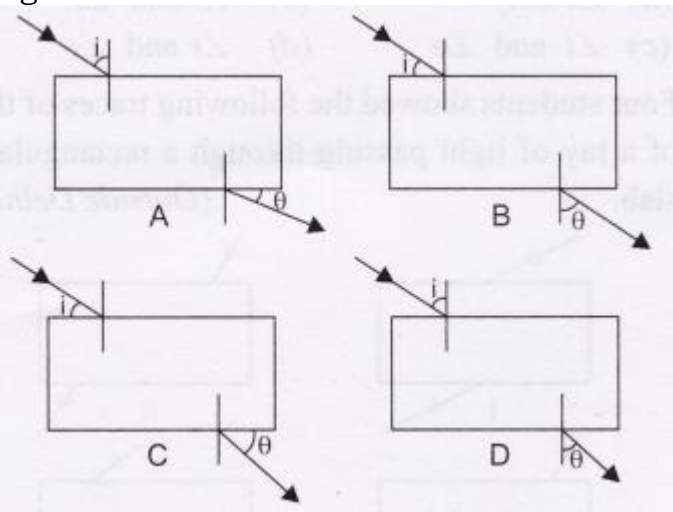
3. In an experiment to trace the path of a ray of light passing through a rectangular glass slab, four students tabulated their observations as given below:

Students	A	B	C
∠i	30°	30°	30°,
∠r	18°	20°	17°
∠e	32°	32.5°	30°

Which student performed the experiment correctly?
(a) A **(b)** B **(c)** C **(d)** D

Answer: (c)

4. A student does the experiment on tracing the path of a ray of light through a rectangular glass slab for different angles of incidence. He can get a correct measure of the angle of incidence and the angle of emergence by following the labelling indicated in figure:



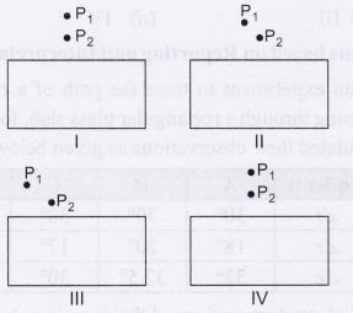
(a) A **(b)** B **(c)** C **(d)** D

Answer: (d)

5. A student performs the experiment on tracing the path of a ray of light passing through a rectangular glass slab for different angles of incidence. He measures the angle of incidence ∠i, angle of refraction ∠r and angle of emergence ∠e for all his observations. He would find that in all cases
(a) ∠i is more than ∠r but (nearly) equal to ∠e
(b) ∠i is less than ∠r but (nearly) equal to ∠e
(c) ∠i is more than ∠e but (nearly) equal to ∠r
(d) ∠i is less than ∠e but (nearly) equal to ∠r

Answer: (a)

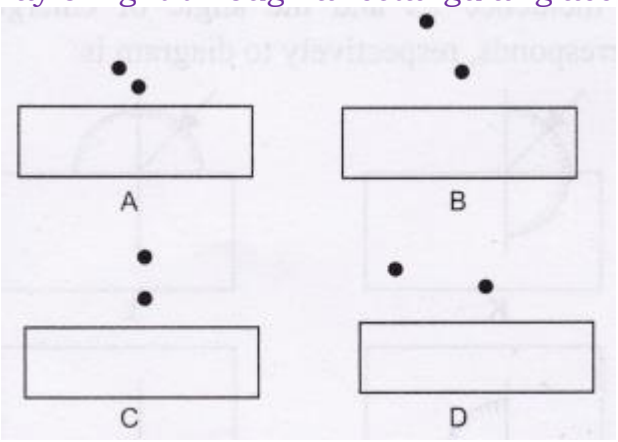
6. The two dots Pt and P2 shown in each of the following diagrams I, II, III and IV denote the position of two pins in respect of distance and direction for performing an experiment on tracking the path of a ray of light passing through a rectangular glass slab. In which one of the four cases, one is likely to get the best result?



(a) I **(b)** II **(c)** III **(d)** IV

Answer: (c)
Explanation:
Dots P_1 and P_2, should be on incident ray making an angle of 30 to 60 degree with the normal.

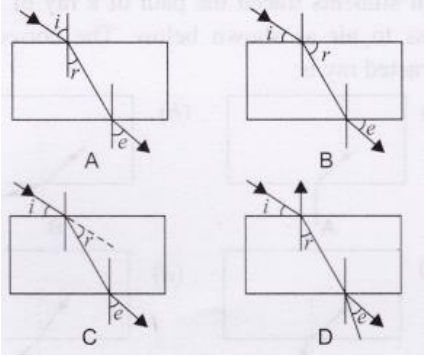
7. Out of the four set-ups shown for carrying out the experiment to trace the path of a ray of light through a rectangular glass slab, the best set-up is



(a) A **(b)** B **(c)** C **(d)** D

Answer: (b)

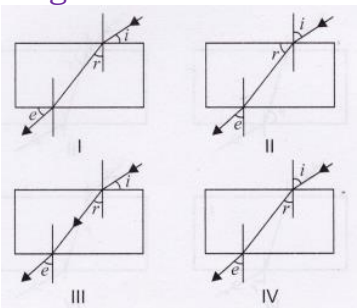
8. In an experiment to trace the path of a ray of light passing through a rectangular glass slab, the correct measurement of angles of incidence (i), refraction (r) and emergence (e) is shown in the diagrams.



(a) A **(b)** B **(c)** C **(d)** D.

Answer (a)

9. The path of a ray of light passing through a rectangular glass slab was traced and angles measured. Which one out of the following is the correct representation of an angle of incidence (i), angle of refraction (r) and angle of emergence (e) as shown in the diagrams:



(a) I **(b)** II **(c)** III **(d)** IV

Answer(d)

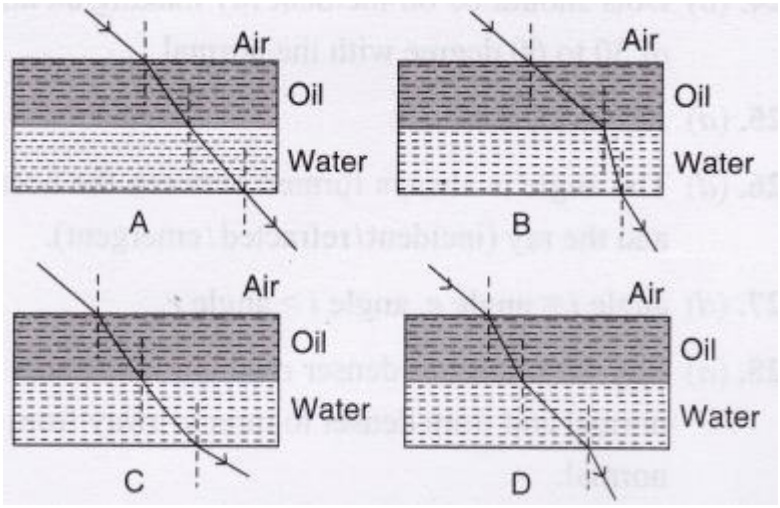
10. An experiment to trace the path of a ray of light through a glass was performed by four students A, B, C and D. They reported the following measurements of angle of incidence i, angle of refraction r and angle of emergence e.

Student	∠i	∠r
A	30°	30°
B	40°	50°
C	40°	30°
D	40°	30°

student performed the experiment correctly?
(a) A **(b)** B **(c)** C **(d)** D

Answer (d)

11. The correct path of a ray of light passing from air to kerosene oil and from kerosene oil to water is

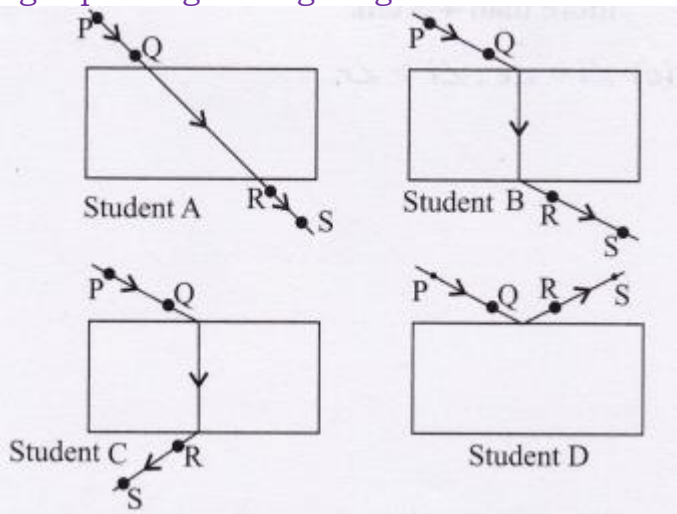


(a) A **(b)** B **(c)** C **(d)** D

Answer (d).

12. A ray of light enters air from water and experiences refraction, then
(a) ∠i = ∠r **(b)** ∠i < ∠r
(c) ∠i > ∠r **(d)** ∠i / ∠r = 0°.
Answer (b)

13. Four students A, B, C and D traced the paths of incident ray and the emergent ray by fixing pins P and Q for incident ray and pins R and S for emergent ray for a ray of light passing through a glass slab.

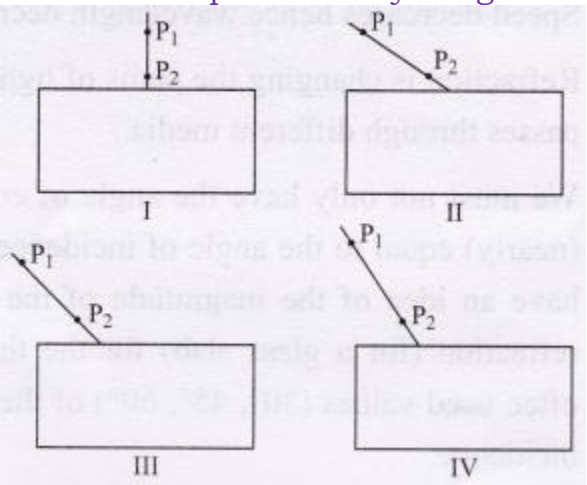


The correct emergent ray was traced by the student:

(a) A **(b)** B **(c)** C **(d)** D

Answer (b)

14. Study the following four experimental set-ups I, II, III and IV for the experiment, "To trace the path of a ray of light through a rectangular glass slab".



Which of the marked set-ups is likely to give best results (P_1 and P_2 are the positions of pins fixed on the incident ray)?

(a) I **(b)** II **(c)** III **(d)** IV

Answer (d).

15. After tracing the path of a ray of light passing through a rectangular glass slab for four different values of the angle of incidence, a student reported his observations in tabular form as given below:

S.No.	∠i	∠r
I	30°	19°
II	40°	28°
III	50°	36°
IV	36°	40°

The best observation is:
(a) I **(b)** II **(c)** III **(d)** IV

Answer: (c)

16. **A ray of light traveling in air falls on the surface of a transparent glass slab at an angle of 90°. The angle of refraction will be**
A. 90.
B60.
C. 0.
D.30.
Ans: 0

17. When a beam of light moves from a rarer medium to a denser medium:
a) It goes undeviated
b) It bends towards the normal
c) It bends away from the normal
d) It bends at 90°
Ans c

18. Fish anticipates the presence of hunter farther due to
a) Scattering of light
b) Reflection of light
c) Dispersion of light
d) Refraction of light
Ans d

19. The bending of a beam of light when it passes obliquely from one medium to another is known as _____.
a) Reflection
b) Refraction
c) Dispersion
d) Deviation
Ans b

20. You are given kerosene, turpentine and water. In which of these does the light travel fastest?
The values of refractive index of given substances are:
For kerosene n = 1.44
For turpentine n = 1.47
Water n = 1.33.

a) Turpentine
b) Water
c) Data given is insufficient
d) Kerosene

Answer b

21. If the refractive index of two media are equal, then

a) No refraction will occur
b) It will bend away from the normal
c) Interface will absorb the light
d) Light will reflect in the same medium

Ans a

22. Light is refracted when it travels at an angle from water into air because

a) Its speed remains the same
b) It is moving from a less dense medium to a denser medium
c) Its speed is increased
d) Its speed is decreased

Ans C

23. According to Snell's law, the relation between angle of incidence and angle of refraction is

a) Angle of incidence is always equal to the angle of refraction.
b) The ratio of sine of angle of incidence to the sine of angle of refraction is defined as refractive index
c) The ratio of sine of angle of refraction to the sine of angle of incidence is equal to refractive index.
d) Angle of incidence is always greater than the angle of refraction.

Ans b

24. The bending of light ray due to change in its speed is

a) Absorption
b) refraction
c) diffraction
d) reflection

Ans b

25. A ray of light travelling in air falls on the surface of a rectangular slab of a plastic material whose refractive index is 1.6. If the incident ray makes an angle of 53° with the normal, find the angle made by the refracted ray with the normal (sin 530 = 4/5)

a) 35°

b) 30°
c) 20°
d) 25°
Ans: b

+4-1

26. If the speed of light in medium 1 and medium 2 are 2.5 x 10^2 m/s and 2 x 10^2 m/s respectively then the refractive index of medium 1 with respect to medium 2 is _____.

a. 3/2.5
B.2.5/3
c 2/2.5
D.2.5/2

Ans: C

27. The ratio of sine of angle of incidence to the sine of angle of refraction equals refractive index is called

- a. Newton's law
- b. Bernoulli's principle
- c. Archimedes' principle
- d. Snell's law

Ans: D

28. When a ray of light passes from a denser medium to a rarer medium,

A.it bends towards the normal
B.it bends away from the normal
C.it goes undeviated
d. It bends at 900

Ans: B

29. Light changes its path as the medium changes during the transit. This is because of

a) Change of wavelength
b) Change of speed
c) Change of intensity
d) Change of frequency

Ans B.

30. When a glass prism produces the spectrum of white light, the following process is involved -

1. **Reflection and Dispersion**
2. **Refraction and Diffusion**
3. **Refraction and Dispersion**
4. **Dispersion and Diffusion**

Ans: C

31. The critical angle between an equilateral prism and air is 45. If the incident ray is perpendicular to the refracting surface, then
(a) It is reflected totally from the second surface and emerges perpendicular from the third surface.
(b) It gets reflected from second and third surfaces and emerges from the first surface
(c) It keeps reflecting from all the three sides of the prism and never emerges out
(d) After deviation, it gets refracted from the second surface

Answer. A

32. If the angle of prism is 60 ° and the angle of minimum deviation is 40 °, the angle of refraction will be

a) 30 °
b) 60 °
c) 100 °
d) 120 °

Ans A

33. Dispersion of light is due to

a) Wavelength
b) Intensity of light
c) Density of medium
d) None of these

Ans: A

34. Which ray is least deviated by a prism?
(a) Violet ray
(b) Green ray
(c) Red ray
(d) Yellow ray

Answer: (c)

Refraction through Lens:

Q.1. A lens is a refracting medium with_____ refracting surfaces.
a) One
b) Two
c) Three
d) Four
Ans. b)

Q.2. A virtual, upright and enlarged image can be obtained by using a _____lens:
a) Converging lens
b) Diverging lens
c) Both of the above
d) None of the above
Ans. a)

Q.3. A converging lens with its refracting surfaces having equal radius of curvature will be known as _____-
a) Bi-convex lens
b) Plano-convex lens
c) Concavo-convex lens
d) Equi-convex lens
Ans. d)

Q.4. What is the other name of principal axis for a convex lens:
a) X-axis
b) Optical axis
c) Y-axis
d) None of these
Ans. b)

Q.5. what will be the nature of image formed by a concave lens
a) Virtual, erect and diminished.
b) Real, upright and diminished for all the three positions of the object
c) Virtual, erect and diminished at focus and centre of curvature
d) Both a) and c)
Ans. A.

Q.6. How will the image formed by a convex lens be affected if the upper half of the lens is wrapped with a black paper?
a) The size of the image is reduced to one-half
b) The upper half of the image will be absent
c) The brightness of the image is reduced
d) There will be no effect.
And. c)

Q.7. The distance 'v' of the real image formed by a convex lens for various object distances 'u'. A graph is plotted between 1/v and 1/u. Which of the graphs given below is approximately correct?

Ans. d)

Q.8. A pencil dipped in water at a angle appears to be broken due to _____ of light.

a) Reflection
b) Refraction
c) Dispersion
d) None of these
Ans. b)

Q.9. The power of a lens is -2D. What is its focal length?
a) -50 cm
b) 50 cm
c) 5 cm
d) -5 cm
Ans. a)

Q.10. An object is placed in front of a convex lens. The characteristics of the image obtained can be:
I. Virtual, upright and diminished
II. Real, inverted and same in size as the object
III. Real and inverted and greater in size than the object
IV. Virtual, upright and enlarged
a) I, II and III
b) II, III and IV
c) I, III and IV
d) I, II and IV
Ans. b)

Q.11 The focal length of a lens is -0.4 cm. The lens is
a) Convex
b) Concave
c) Cylindrical
d) None of these
Ans. b)

Q.12. An object is placed at a distance of 10 cm in front of a concave lens of focal length 10 cm. The size of the image in relation to the object will be:
a) Same size as the object
b) One- third of the size of the object
c) Half the size of the object
d) One-fourth of the size of the object.
Ans. c)

Q.13. on reducing the focal length of a lens, its power:
a) Decreases
b) Increases
c) Does not change
d) First increases then decreases
Ans. b)

Q.14. The focal length of a lens is i) positive, ii) negative. What will be the nature of lens in each case.
a) i) convex lens: ii) concave lens
b) i) concave lens: ii) convex lens
c) Both will be convex lens
d) Both will be concave lens
Ans. a)

Q.15. A lens produces a magnification of + 0.5.

a) It is a concave lens and v=0.5u
b) It is a convex lens and v=0.5u
c) It is a concave lens and v= -0.5u
d) It is a convex lens and v= -0.5u

Ans. a)

Q.16. For an object placed at a distance of 20 cm in front of a convex lens, the image is at a distance 20 cm behind the lens. The focal length of the convex lens is:

a) 20 cm
b) 10 cm
c) 15 cm
d) 40 cm

Ans. b)

Q.17. A ray of light incident on a lens parallel to its principal axis, after refraction passes Through or appears to come from:

a) Its first focus
b) Its optical centre
c) Its second focus
d) The centre of curvature of its second surface

Ans. c)

Q.18. A beam of light is incident through the holes on side A and emerges out of the hole on the other face of the box as shown in the figure. Which of the following could be inside the box?

(a) Concave lens
(b) Rectangular glass slab
(c) Prism
d) Convex lens

Ans. d)

Q.19. When the object is placed between f and 2f of a convex lens, the image formed is

(a) At f
(b) At 2f
(c) Beyond 2f
(d) Between O and f

Ans. c)

Q.20 Observe the following figure. What will the type of the lens used? What will be the position of the object?

a) Concave lens: At Focus
b) Convex lens: At Focus
c) Concave lens: Between Focus and centre of curvature
d) Convex lens: Between Focus and centre of curvature

Ans. d)

Q.21. A converging lens is used in the collimator of a spectrometer with the following Condition for the position of the object:

a) u>2f
b) u<f
c) u=f

d) f<u<2f

Ans. c)

Q.22. A person suffering from myopia will use a _____ lens in his spectacles.

a) Converging
b) Diverging
c) Cylindrical
d) None of these

Ans. b)

Q.23. Is it possible to burn a piece of paper using a convex lens in daylight without using a match-box or any direct flame? How?

a) Yes: By keeping the object beyond Focus of the lens
b) Yes: By keeping the object in the focal plane of the lens
c) Yes: By keeping the object above the lens
d) No, it is not possible

Ans. b)

Q.24 If the magnification of a lens has a negative value, the image is:

a) Virtual
b) Erect
c) Real and inverted
d) None of these

Ans. c)

Q.25.The SI unit if power of a lens is:

a) Dioptre
b) Metre
c) Metre per second
d) Watt

Ans. a)

Q.26. The diagrams showing the correct path of the ray after passing through the

(a) II and III only
(b) I and II only
(c) I, II and III
(d) I, II and IV

Ans. c)

Q. 27. Which of the following statement is not correct with respect to a lens:

a) A convex lens has a convergent action and a concave lens has a divergent action.
b) A concave lens, if kept at a proper distance from an object, can form its real image.
c) A ray of light incident at the optical centre of a lens, passes undeviated after refraction.
d) A concave lens forms a diminished image of an object placed in front of it.

Ans. b)

Q.28. The power of a lens is a measure of its degree of

a) Convergence only
b) Divergence only
c) Convergence or divergence
d) None of these

Ans. c)

Q.29. If 'f' is focal length of the lens , then power of a lens is equal to

a) 100/f (cm) b) 10/f (cm) c) 100/f(m) d) 1/100f(cm)

Ans. a)

Q.30. The correct lens formula (where the symbols have their usual meanings) is:

a) $1/v = 1/u + 1/f$

b) $1/u = 1/v - 1/f$

c) $1/f = 1/v - 1/u$

d) $1/f = 1/u + 1/v$

Ans. c)

Spectrum:

1. The factor on which the deviation produced by a prism does not depend

A. The angle of incidence.
B. The angle of prism.
C. The Refractive index of the prisms.
D. The air pressure.
Ans: D.

2. Angle of deviation by the prism increases with the

A. Decrease in wavelength of light.
B. Increase in wavelength of light.
C. Does not depend on the wavelength.
D. Compressing of the wavelength of the same colour.
Ans: A.

3. For a given angle of incidence, the prism with a higher refractive index produces a

A. Greater deviation
B. Lesser deviation.
C. Both lesser and greater depending upon the humidity.
D. None of the above.
Ans: A.

4. The deviation produced by a prism is maximum for

A. Blue.
B. Red.
C. Violet.
D. Indigo.
Ans: C.

5. The deviation produced by a prism is minimum for

A. Blue.
B. Red.
C. Violet.
D. Indigo.
Ans: B.

6. As the wavelength increases

A. The speed of the light decreases.
B. The speed remains constant.

C. The speed of light in glass also increases.
D. None.
Ans: C.

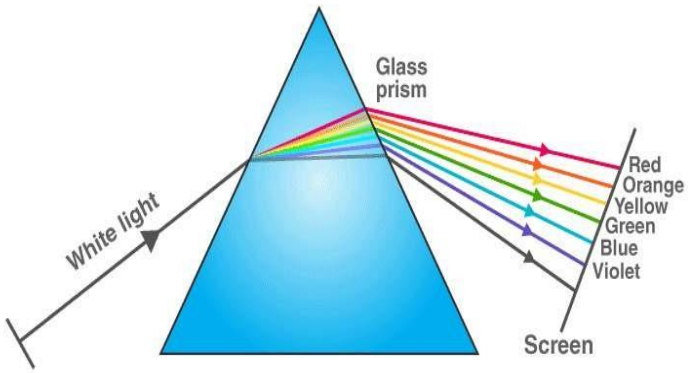
7. The wavelengths for the light of red and blue colours are nearly 7.8 x 10^{-7}m and 4.8x 10^{-7} m respectively. Which of the following statement is correct?
A: Red travels faster than blue.
B. Blue travels faster than red.
B. Both the colours have same speeds in vacuum.
D. None of the above.
Ans: C.

8. The wavelengths for the light of red and blue colours are nearly 7.8 x 10^{-7}m and 4.8x 10^{-7} m respectively. In glass
A. Red colour has a greater speed in glass.
B. Blue light travels faster.
C. Both travel with the same velocity.
D. Their velocities fluctuate.
Ans: A.

9. Dispersion of light is the phenomenon of
A. Combining of a beam of white light into its seven constituent colours when passed through a transparent medium.
B. Splitting of a beam of white light into its seven constituent colours when passed through a transparent medium.
C. Deviation of a beam of white light into its seven constituent colour.
D. Reflection of a beam of white light into its seven constituent colours when passed through a transparent medium.
Ans: B.

10. On passing white light through a prism, the band of colours seen on a screen is called the
A. Rainbow.
B. Colour band.
C. Spectrum.
D. All the above.
Ans: C.

11. The colour that has deviated the most is



A. White.
B. Red.
C. Violet.
D. Equal deviation.
Ans: C

12. When a white light ray falls on a prism, the ray at its first surface suffers:
(a) No refraction

(b) Only dispersion
(c) Only deviation
(d) Both deviation and dispersion.
Ans: D.

13. In the spectrum of white light by a prism, the colour at the extreme end opposite to the base of prism is:
(a) Violet
(b) Yellow
(c) Red
(d) Blue.
Ans: C.

14. In the spectrum of white light by a prism, the colour at the extreme end opposite to the angle of the prism is:
(a) Violet
(b) Yellow
(c) Red
(d) Blue.
Ans: A.

15. The wavelength range of white light is
(a) 4000 nm to 8000 nm
(b) 40 nm to 80 nm
(c) 400 nm to 800 nm
(d) 4 nm to 8 nm.
Ans: C.

16. Calculate the frequency of yellow light of wavelength 550 nm. The speed of light is 3 × 108 m s-1.
A: 5.4×10^{14} Hz
B. 6.4×10^{14} Hz
C. 4.4 × 1014 Hz
D. 5.5×10^{14} Hz.
Ans: A.

17. The complete electromagnetic spectrum in the increasing order of their wavelength are
A: Visible light, X – rays, Ultraviolet rays, gamma light.
B. Gamma rays, X – rays, Ultraviolet rays, visible light.
C. X rays, Gamma – rays, Ultraviolet rays, visible light.
D. UV rays, X – rays, Gamma rays, visible light.
Ans: B.

18. A wave has a wavelength of 10^{-3} nm. Name the wave.
A. UV rays.
B. Radio waves.
C. Gamma rays.
D. Visible light.
Ans: C.

19.___are used in the study of crystals.
A. X rays.
B. Radio waves.

C. Gamma rays.
D. UV rays.
Ans: A

20. Beyond the red end of the spectrum lies the region known as
A. Ultra violet.
B. Ultra red.
C. Infrared.
D. Magenta Red
Ans: C.

21. _____radiations can be detected by thermopile.
A. Ultra violet.
B. Ultra red.
C. Infrared.
D. Magenta Red.
Ans: C.

22. _____can be detected by silver chloride because in their presence silver chloride becomes dark.
A. Ultra violet.
B. Infrared.
C. Gamma rays.
D. X rays.
Ans: A.

23. _____radiations are used for detecting purity of gems, eggs, ghee etc.
A. Ultra violet.
B. Infrared.
C. Gamma rays.
D. X rays.
Ans: A.

24. A _____prism is required for obtaining the spectrum of the ultraviolet light.
A. Rock salt.
B. Quartz.
C. Glass.
D. All the above.
Ans: C.

25. The most energetic electromagnetic radiations are:
(a) Microwaves
(b) Ultraviolet waves
(c) X- rays
(d) Gamma rays.
Ans: D.

26. The source of ultraviolet light is:
(a)Electric bulb
(b) Red hot iron ball
(c) Sodium vapour lamp
(d) Carbon arc-lamp.

Ans: D.

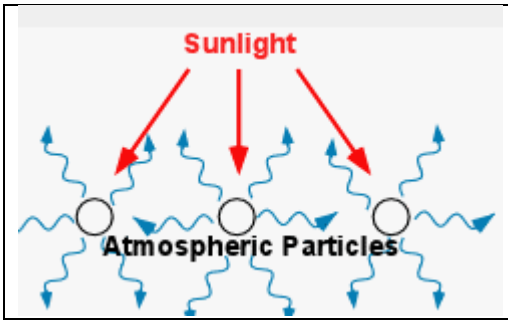
27. A radiation P is focused by a proper device on the bulb of a thermometer. Mercuryin the thermometer shows a rapid increase. The radiation P is
(a) infrared radiation
(b) visible light
(c) ultraviolet radiation
(d)X-rays.
Ans: A.

28. Which of the following statement is correct?
A. As the intensity of scattered light is inversely proportional to the fourth power of wavelength of light. Hence red colour is scattered the most while violet the least.
B. As the intensity of scattered light is inversely proportional to the fourth power of wavelength of light. Hence blue colour is scattered the most while red the least.
C. As the intensity of scattered light is inversely proportional to the fourth power of wavelength of light. Hence violet colour is scattered the most while blue the least.
D. As the intensity of scattered light is inversely proportional to the fourth power of wavelength of light. Hence violet colour is scattered the most while red the least.
Ans: D.

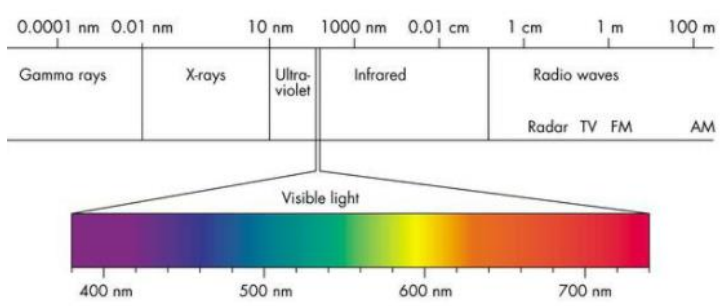
29. In the white light of sun, maximum scattering by the air molecules present in the Earth's atmosphere is for:
(a) Red colour
(b) Yellow colour
(c) Green colour
(d) Blue colour.
Ans: D.

30. To an astronaut in a space-ship, the earth appears:
(a) Black.
(b) Red
(c) Blue
(d) White
Ans: A

31

<table>
<tr>
<td> 
</td>
<td>The phenomenon seen here is
A. Dispersion of light.
B. Spectrum.
C. Scattering of light.
D. None of the above.
Ans: C</td>
</tr>
</table>

32.

	The name given to this is diagram is A. Spectrum. B. Electromagnetic spectrum. C. Disprsion. D. Scateering of liht. Ans: B

Sound:

1. The waves used in a radar are
A. Infrasonic waves.
B. Ultrasonic waves.
C. Radio waves.
D. Light waves.
Ans: C.

2. The minimum time for reflected sound to reach after the original sound is heard to hear an echo is:
A. 0.2 s
B. 0.1 s
C. 0.4 s
D. 0.3 s
Ans: B.

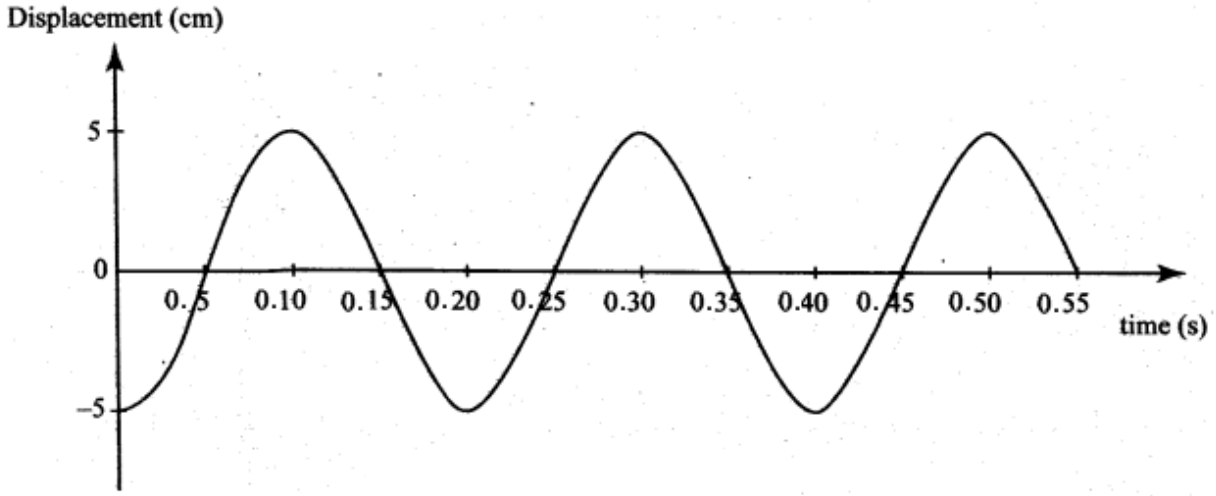
OR

2. Sound waves emitted from a listener and received back in the form of an echo then time interval is equal to:
A.0.33 s.
B.0.34 s.
C. 0.1 s.
D. none of these.
Ans: C.

OR

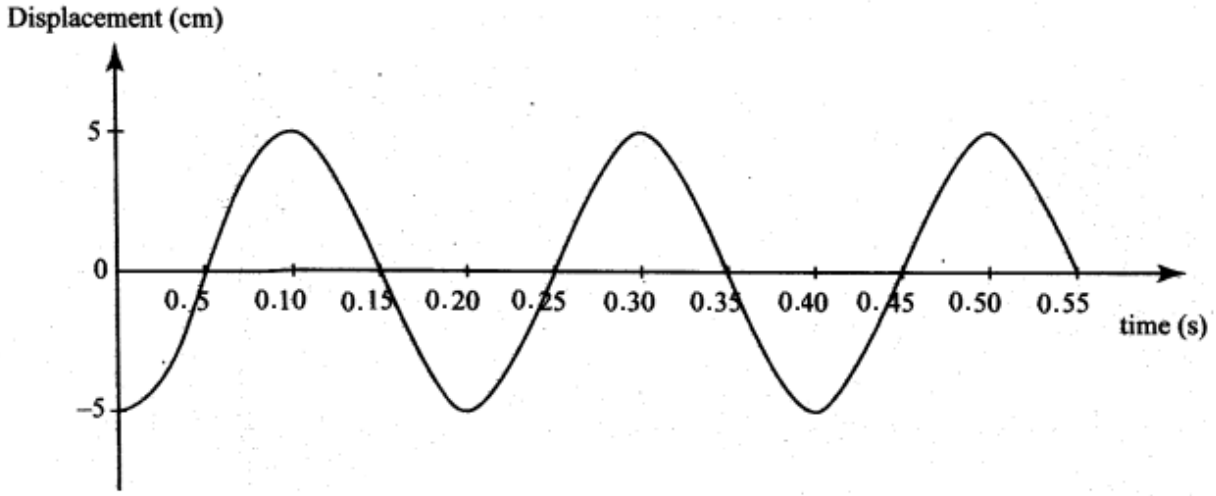
2. The sensation of sound persists in our ears for about:
A. 1 s
B. 0.1 s
C. 0.01 s
D. 0.001 s
Ans: B.

3. Observe the graph below and choose the option stating the correct values.



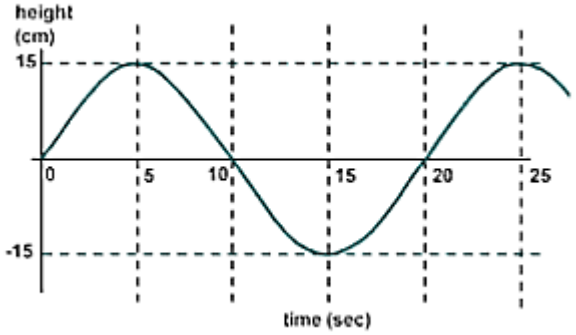
A. Period = 0.15 s
B. Period = 0.20 s
C. Period = 0.25 s.
D. Period = 0.30 s
Ans:B.

4. Observe the graph below and choose the option stating the correct value.



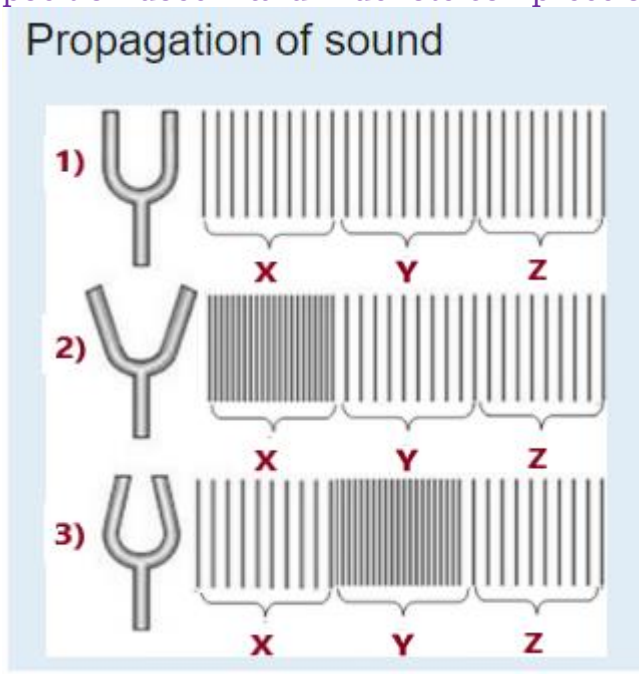
A. Frequency = 0.5 Hz.
B. Frequency = 0.15 Hz.
C. Frequency = 5 Hz.
D. Frequency = 10 Hz.
Ans: C.

5. Observe the graph below and choose the option stating the correct values.



A. Period = 20 s; Amplitude = 15 cm.
B. Frequency = 0.05 Hz; Amplitude = 30 cm.
C. Period = 10 s; Wavelength = 15 cm .
D. Amplitude = 15 cm; Wave velocity = 20 m s^{-1} .
Ans: A.

6. In the diagram below three positions of a vibrating tuning fork is shown. In which position does Y and X denote compression and rarefaction respectively.



A. Position 1).
B. Position 2).
C. Position 3).
D. None of the above.
Ans:C.

7. A person standing between two cliffs, claps and hears two echoes at 4 s and 6 s. Calculate the distance between the two cliffs. (v= 340 m s^{-1}).
A. 680 m.
B. 1020 m.
C. 340 m.
D. 1700 m.
Ans: D.

8. In a SONAR, ultrasonic waves are received after reflection from a sunken ship after 2 seconds. Find the depth of ship (v = 140 ms-1)
A. 700 m.

B. 1.4 km.
C. 7 km.
D. 2800 m.
Ans: B.

9. To detect the obstacles in their path, Dolphins produce:
A. Infrasonic waves.
B. Ultrasonic waves.
C. Radio waves.
D. Light waves.
Ans: B.

10. When we compare the speed of ultrasonic waves and the speed of audible sound waves in a given medium, we find that:
A. speed of ultrasonic waves is greater than the speed of audible sound waves
B. speed of ultrasonic waves is lower than the speed of audible sound waves
C. speed of ultrasonic waves is the same as the speed of audible sound waves
D. Cannot determine (not sufficient information)
Ans: C.

11. Bats produce:
A. Infrasonic waves.
B. Electromagnetic waves
C. Radio waves.
D. Ultrasonic waves.
Ans: D.

OR

11. Bats detect obstacles in their path by receiving the reflected:
A. Ultrasonic waves.
B. Electromagnetic waves
C. Radio waves.
D. Infrasonic waves
Ans: A.

12. Multiple echoes are also called:
A. reflecting sound.
B. echolocation.
C. reverberations.
D. ultrasonics.
Ans: C.

13. When a wave travels through a medium:
A. particles are transferred from one place to another.
B. energy is transferred in a periodic manner.
C. energy is transferred at a constant speed.
D. particles do not leave their place.
Ans: C.

14. Which one of the following describes sound waves best?
A. Longitudinal waves which need a medium.
B. Transverse wave which need a medium.

C. Transverse wave which do not need a medium.
D. Longitudinal waves which do not need a medium.
Ans: A.

15. A boy hears an echo from a distant hill after one second. If the speed of sound in air is 350 m s^{-1}, the distance of the hill from the boy is:
A. 175 m.
B. 350 m.
C. 87.5 m.
D. 700 m.
Ans: A.

16. The amplitude of the wave is the:
A. distance the wave moves in one second.
B. distance the wave moves in one-time period.
C. maximum distance moved by a medium particle on either side of its mean position.
D. distance equal to one wavelength.
Ans: C.

17. Which of the following statement best describes frequency?
A. the maximum disturbance caused by a wave.
B. the number of complete vibrations per second.
C. the distance between one crest of a wave and the next one.
D. the distance travelled by a wave per second.
Ans: B.

18. If the speed of a wave is 340 m s^{-1} and its frequency is 1700 Hz, then for this wave in cm will be:
A. 2
B. 0.2
C. 20
D.200
Ans: C.

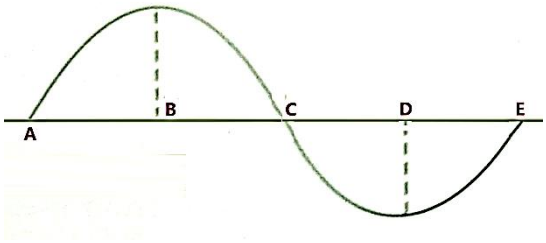
19. A musical instrument is producing a continuous note. This note cannot be heard by a person having a normal hearing range. This note must be passing through:
A. water.
B. wax.
C. vacuum.
D. empty vessel.
Ans: C.

20.Sound travels in air:
A. if particles of the medium travel from one place to another.
B. if there is no moisture in the atmosphere.
C. if the disturbance moves.
D. if both, the particles as well as the disturbance move from one place to another.
Ans: C.

21. Which one of the following does not consist of a transverse waves?
A. light emitted by CFL.

B. TV signals from a satellite.
C. ripples on the surface of a pond.
D. musical notes of an orchestra.
Ans: D.

22. In a sound wave produced by a vibrating tuning fork shown in the adjacent diagram, half wavelength is represented by:



A. AB.
B. BD.
C. DE.
D. AE.
Ans:B.

23. The maximum speed of vibrations which produce audible sound will be in:
A. dry air.
B. sea water.
C. ground glass.
D. human blood.
Ans:.

24. One of the following can hear infrasound. This one is:
A. dog.
B. bat.
C. rhinoceros.
D. human.
Ans: C .

25. An echo-sounder in a trawler (fishing boat) receives an echo from a shoal of fish 0.4 s after it was sent. If the speed of sound in water is 1500 m s^{-1}, how deep is the shoal?
A. 150 m.
B. 300 m.
C. 600 m.
D. 7500 m.
Ans: B.

26. The speed of highly penetrating ultrasonic waves is:
A. lower than those of audible sound waves.
B. higher than those of audible sound waves.
C. much higher than those of audible sound waves.
D. same as those of audible sound waves.
Ans: D.

27. To hear an echo clearly, the minimum distance between the source of sound and reflector is
A. 17 m.
B. 17 cm.
C. 17 mm.
D.17 km.
Ans: A.

28. Product of frequency and time period is equal to
A. three.

B. four.
C. one.
D. two.
Ans: C.

29. The distance between a source and a reflecting surface is 0.34 km. The echo will reach the source after reflection after approximately:
A. 2 s.
B. 0.5 s.
C. 1 s.
D. 0.25 s.
Ans: A.

30. Our ears are sensitive only to a limited range of frequencies from:
A. 2 kHz to 200 kHz.
B. 2Hz to 20 kHz.
C. 20 Hz to 20 kHz.
D. 20 Hz to 200,000 Hz.
Ans: C.

---

1. Which of the following vibrates when a musical note is produced by the cymbals in an orchestra
A. stretched string.
B. stretched membranes.
C. metal plates.
D. air columns..
Ans: D.

2. When we change a feeble sound to a loud sound, we increase its:
A. frequency.
B. amplitude.
C. velocity.
D. wavelength.
Ans: B.

3. When a body vibrates with its natural frequency the force acting on the body is:
A. zero.
B. proportional to its velocity.
C. proportional to its displacement.
D. a constant force.
Ans: C.

4. Which of the following is/are characteristic(s) of a musical sound?
A. Pitch.
B. Loudness.
C. Quality.
D. All of these.
Ans: D.

5. The quality of the note from a particular string on a guitar is determined by the:
A. frequency of vibration.
B. amplitude of vibration.
C. length of string.
D. waveform of the sound.
Ans: D.

6. The loudness of sound produced by a tuning fork can be increased by increasing:
A. wavelength.
B. pitch.
C. amplitude.
D. frequency.
Ans: C.

7. A Wire stretched between two fixed supports is plucked exactly at the middle and released. It executes (neglect resistance of the medium)
A. resonant vibrations with decreasing amplitude.
B. free vibrations.
C. damped vibrations.
D. forced vibrations.
Ans: B.

8. The frequency of four notes is A = 256 Hz., B = 120 Hz, C= 512 Hz, D = 400 Hz. Which of these notes have the lowest pitch?
A. A.
B. B.
C. C.
D.D.
Ans: B.

9. Quality of sound of two notes of same frequency depends upon their:
A. amplitude.
B. waveforms.
C. pitch.
D. intensity.
Ans: B.

10. The property by virtue of which a deep sound can be distinguished from a sharp sound is
A. loudness.
B. pitch.
C. quality.
D. None of these.
Ans: B.

11. If the amplitude of a sound wave is reduced o half, its loudness will:
A. increase by four times.
B. increase by two times.
C. decrease by four times.
D. decrease by two times.
Ans: C.

12. A guitar of frequency 400 Hz will resonate with another guitar of frequency:
A. 100 Hz.
B. 200 Hz.
C. 400 Hz.
D. 800 Hz.
Ans: C.

13. Resonance is a special case of.
A: Free vibrations.
B. Damped vibrations.
C. Forced vibrations.
D. None of these.
Ans: C.