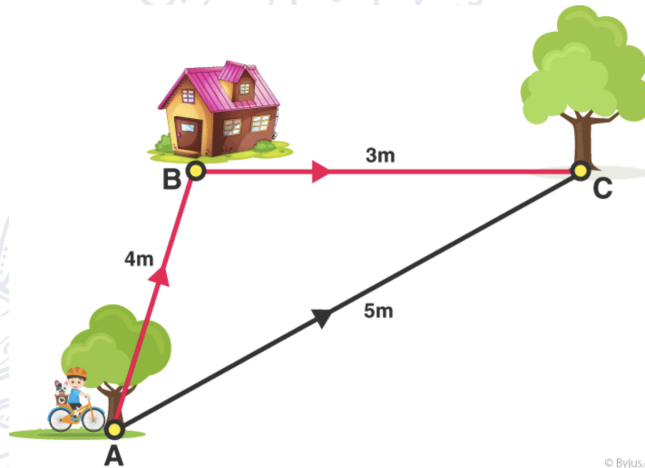


COPERNICUS OLYMPIAD
Physics and Astronomy Discipline
Category 1 - Sample Questions

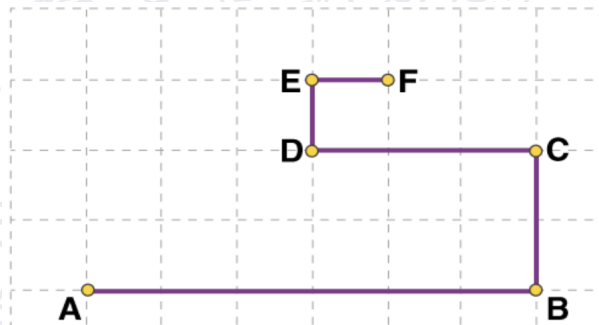
- Which measures the change in the position of an object?
 - Displacement
 - Distance
 - Speed
 - Time
- Refer to the given diagram below.



What is the total distance covered by the boy if he cycles from point A to B, then to C, and back to A?

- 4 m
- 7 m
- 10 m
- 12 m

- An object moves along the grid through points A, B, C, D, E, and F as shown below. The side of square tiles measures 0.5 km.



What is the magnitude of the displacement of the object?

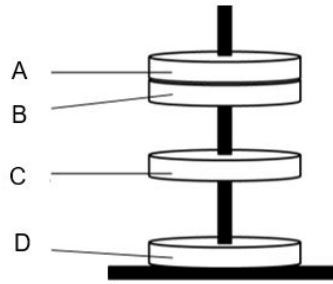
- 2.5 km
- 4.5 km
- 6.5 km
- 8.5 km

- What does it mean when an object is decelerating?
 - The object is speeding up.
 - The acceleration is positive.
 - The magnitude of the velocity is decreasing.
 - The acceleration and velocity point are in the same direction.

5. Which of the following substances is a magnetic metal used in making blue paint and jet engines?

- A. Cobalt
- B. Copper
- C. Nickel
- D. Steel

6. Jonathan places four ring magnets A, B, C, and D onto a wooden stand as shown in the image below.



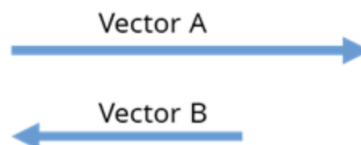
If he wants the four ring magnets to be attracted to each other, which magnet should he flip?

- A. Magnet A
- B. Magnet B
- C. Magnet C
- D. Magnet D

7. What is the primary difference between a scalar quantity and a vector quantity?

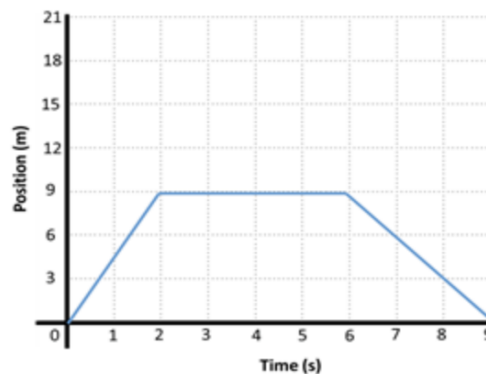
- A. A vector is just a scalar with direction.
- B. A vector can be either positive or negative while a scalar is always positive.
- C. A scalar is described by both magnitude and direction while a vector is described by magnitude alone.
- D. A vector is described by both magnitude and direction while a scalar is described by magnitude alone.

8. Which vector has a larger magnitude?



- A. Vector A since it is longer than vector B
- B. Vector B since it is shorter than vector A
- C. Vector A since it points on the positive direction
- D. Vector B since it points on the negative direction

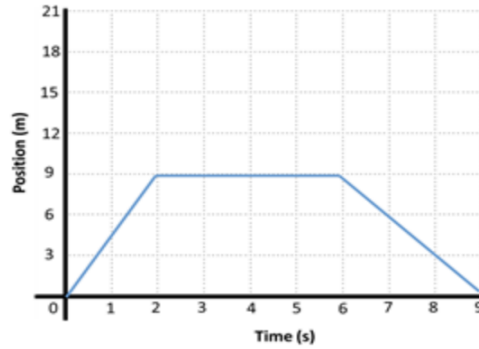
9. Consider the graph below.



What is the position of the object at $t = 6\text{s}$?

- A. 0 m
- B. 3 m
- C. 6 m
- D. 9 m

10. Refer to the position-time graph below.



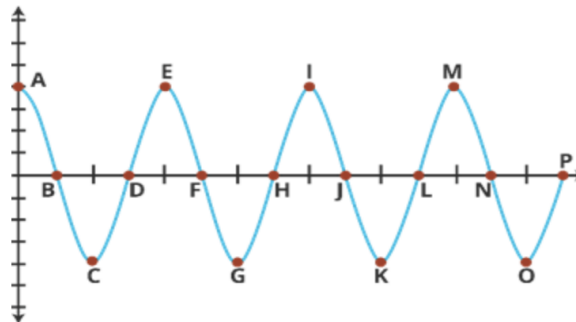
What is the displacement of the object during the entire 9s interval?

- A. 0 m
- B. 3 m
- C. 6 m
- D. 9 m

11. Which of the following statements correctly describes a rope stretched horizontally before moving it up and down?

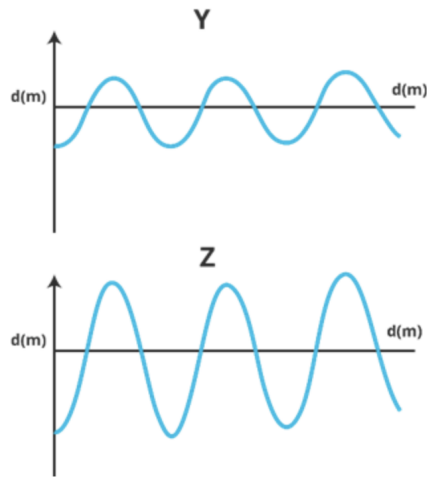
- A. The rope is vibrating.
- B. The rope is transferring energy.
- C. The rope is creating a disturbance.
- D. The rope is at an equilibrium position.

12. Which pair correctly represents one wavelength?



- A. Point G to point O
- B. Point I to point M
- C. Point A to point D
- D. Point E to point G

13. Which of the following statements are true about the waves below?



- (1) Wave Z has larger amplitude than wave Y.
- (2) Wave Z and Y have the same wavelength.
- (3) Wave Z has greater number of crests and troughs than wave Y.
- (4) Wave Z is a transverse wave while wave Y is a longitudinal wave.

- A. 1 and 2 only
- B. 1 and 4 only
- C. 2 and 3 only
- D. 3 and 4 only

14. If the velocity of a particular wave is constant, what happens to its frequency when wavelength is doubled?

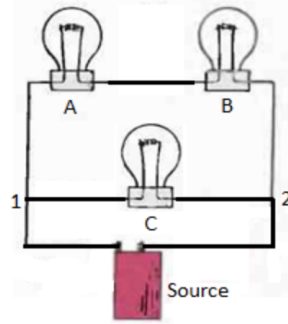
- A. It is tripled.
- B. It is halved.
- C. It is doubled.
- D. It remains the same.

15. A raw egg starts to fry as it hits a heated frying pan. What heat transfer method is evident in this situation?



- A. Conduction
- B. Convection
- C. Insulation
- D. Radiation

16. Consider the following circuit.

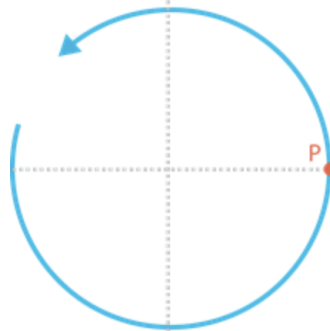


What type of connection is Bulb A associated with Bulb B?

17. Two identical bulbs are connected in series with a 120 V source. If each bulb has a resistance of 90Ω , how much is the current flowing in each of it?

- A. 0.25 A
- B. 0.33 A
- C. 0.67 A
- D. 1.00 A

18. The figure below shows the motion of an object moving in a uniform circular motion.



What is the direction of its velocity at point P?

- A. \uparrow
- B. \leftarrow
- C. \rightarrow
- D. \downarrow

19. What is the angle of the tilt of Earth's axis?

- A. 9°
- B. 21.7°
- C. 23.5°
- D. 25.4°

20. Which of the following statements describes the heliocentric model of the universe?

- A. The sun rotates around the Earth.
- B. Earth is the center of the universe.
- C. The sun is the center of the universe.
- D. The sun and Earth are fixed points in the universe.

21. How does each type of star compare to others based on size? Arrange the stars from smallest to the biggest.

- (1) Giant
- (2) Neutron star
- (3) White dwarf

(4) Supergiant

- A. 1 → 3 → 2 → 4
- B. 2 → 1 → 3 → 4
- C. 2 → 3 → 1 → 4
- D. 4 → 1 → 3 → 2

22. How many constellations are recognized by the International Astronomical Union?

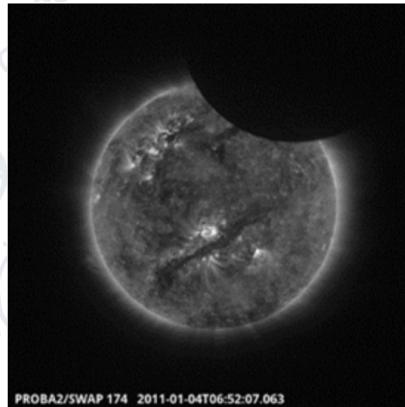
- A. 48
- B. 75
- C. 88
- D. 109

23. What asterism is found in the Ursa Major constellation?



- A. Aquila
- B. Big Dipper
- C. Little Dipper
- D. Scorpius

24. Which part of the sun is **not** visible in the photo below?



- A. Chromosphere
- B. Corona
- C. Hydrogen core
- D. Photosphere

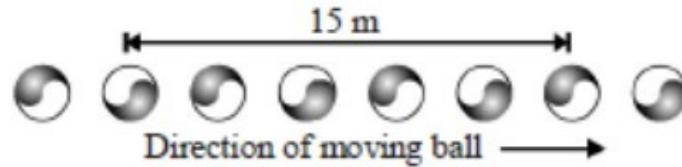
25. Which of the following statements best explains why it is warmer at the equator than at the North Pole?

- A. The equator has a larger area than the North Pole.
- B. The equator is closer to the Sun than the North Pole.
- C. The equator receives more direct sunlight than the North Pole.
- D. The equator has more hours of daylight per year than the North Pole.

26. Four children were asked to arrange forces due to rolling, static and sliding frictions in an increasing order. Their arrangements are given below. Choose the correct arrangement.

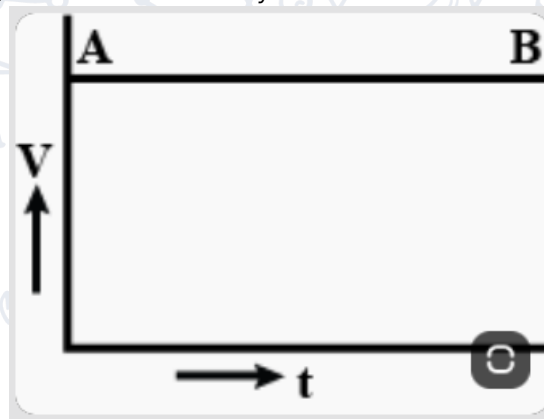
- A. Rolling, Static, Sliding
- B. Static, Rolling, Sliding
- C. Rolling, Sliding, Static
- D. Sliding, Static, Rolling

27. The ball was moving at a constant speed and the images were taken at a constant rate of 10 per second.



What is the speed of the ball?

- A. 30 m/s
 - B. 20 m/s
 - C. 45 m/s
 - D. 15 m/s
28. The temperature at which no more energy can be removed from matter is called?
- A. Absolute zero
 - B. Boiling point
 - C. 32° F
 - D. 32° C
29. Which of the following exert pressure?
- A. Solids
 - B. Liquids
 - C. Gases
 - D. All of the above.
30. The atmospheric pressure is due to the?
- A. Sky above our head.
 - B. Air mass surrounding Earth.
 - C. Gravitational force of sun and other planets.
 - D. Mass of the Earth.
31. In the given velocity-time graph, AB shows that the body has



- A. Uniform acceleration.
- B. Uniform retardation.

- C. Uniform velocity throughout its motion and has zero initial velocity.
D. None of these.

32. Which of the following minimizes the transference of heat in a thermos flask?

- (1) Conduction
(2) Convection
(3) Radiation

- A. 2 and 3
B. 1 and 2
C. 1, 2, and 3
D. 1 and 3

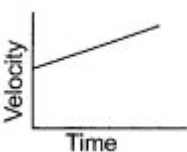
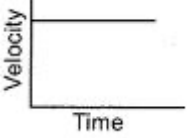
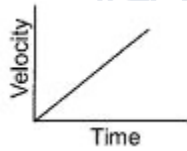
33. If a body moves with uniform velocity, then

- A. Its initial velocity is zero.
B. Its final velocity is zero.
C. Its acceleration is non-zero.
D. Its change in velocity is zero.

34. A car traveling with a speed of 20 km/hr comes into rest in 0.5 hrs. What will be the value of its retardation in km/hr²?

- A. 40
B. 50
C. 34
D. 32

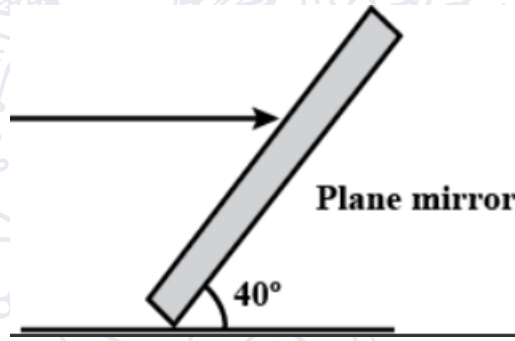
35. A body moves with uniform velocity. Which of the graphs shown here is a graph of velocity against time for this motion?



36. The increase in area of the solid on heating is called what?

- A. Superficial expansion
B. Linear expansion
C. Cubical expansion
D. Quadra expansion

37. A plane mirror is inclined at 40° to the floor. An incident ray parallel to the floor strikes the mirror and a reflected ray is formed.



What is the angle of reflection?

- A. 40°
- B. 50°
- C. 60°
- D. 70°

38. When a glass rod is rubbed with a piece of silk cloth, the rod

- A. And the cloth both acquire positive charge.
- B. Becomes positively charged while the cloth has a negative charge.
- C. And the cloth both acquire negative charge.
- D. Becomes negatively charged while the cloth has a negative charge.

39. Arrange the following planets in increasing order of time required to complete one revolution around Sun.

- (1) Earth
- (2) Uranus
- (3) Mars
- (4) Jupiter

- A. 1, 2, 3, 4
- B. 1, 3, 4, 2
- C. 4, 3, 2, 1
- D. 2, 3, 1, 4

40. When you heat a system, its temperature _____ depending on the heat.

- A. Always increases
- B. Sometimes decreases
- C. May stay the same
- D. Always goes up or down

41. Choose the alternative which is closely resembles the mirror image of the given combination.

ANS43Q12

- (1) AN24E01S
- (3) 2NAE4Q01

- (2) S1Q3E2NA
- (4) 2NA3Q01

- A. 1
- B. 2
- C. 3
- D. 4

42. A temperature at which the substance burns is called what?

- A. Melting
- B. Boiling temperature
- C. Kindling temperature
- D. Evaporation

43. During the formation of rain, when water vapours change back to liquid in the form of rain drops,

- A. Heat is absorbed.
- B. Heat is released.
- C. Heat is first absorbed and then released.
- D. There is no exchange of heat.

44. A negatively charged rod is brought close to two metal spheres which are in contact with each other, and the spheres are separated in the presence of the rod. Then,

- A. The sphere close to the rod acquires a negative charge and the other sphere acquires a positive charge.
- B. The sphere close to the rod acquires a positive charge and the other sphere acquires a negative charge.
- C. Both the spheres will acquire positive charge.
- D. Both the spheres will acquire negative charge.

45. Wind currents are generated due to

- A. Shape of the Earth
- B. Change in atmospheric pressure
- C. Thunderstorm
- D. Cyclone

46. The amount of heat energy produced on complete combustion of 1 kg of a fuel is called

- A. Calorific value
- B. Significant value
- C. Heat value
- D. Internal energy

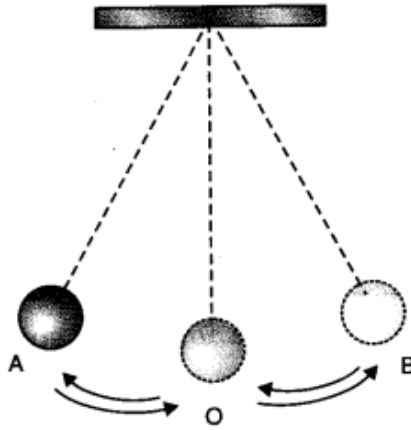
47. Name the process in which a solid directly changes into gas on heating.

- A. Vapourism
- B. Condensation
- C. Sublimation
- D. Deposition

48. Acid rain contains mainly

- A. Oxygen and nitrogen gas
- B. Fluorine and chlorine gas
- C. Magnesium oxide
- D. Nitrogen oxide and sulphur dioxide

49. Observe the figure given below.



The time period of a simple pendulum is the time taken by it to travel from

- A. A to B and back to A
- B. O to A, A to B, and B to A
- C. B to A, A to B, and B to O
- D. A to B

50. A simple pendulum takes 42 sec. to complete 20 oscillations. What is its time period?

- A. 2.1 s
- B. 4.2 s
- C. 21 s
- D. 8.40 s

51. The hearing range of human ear is

- A. 20 Hz to 20,000 Hz
- B. Less than 20 Hz
- C. More than 20,000 Hz
- D. 20 Hz to 25,000 Hz

52. 1 Hertz is equal to

- A. 1 vibration per minute
- B. 10 vibrations per minute
- C. 60 vibrations per minute
- D. 600 vibrations per minute

53. Michael walks to his school which is at a distance of 3 km from his home in 30 minutes. On reaching he finds that the school is closed and comes back by a bicycle with his friend and reaches home in 20 minutes. His average speed in km/h is

- A. 8.3
- B. 7.2
- C. 5
- D. 3.6

54. Which of the following cannot be used for measurement of time?

- A. A leaking tap
- B. Simple pendulum
- C. Shadow of an object during the day
- D. Blinking of eyes

55. Loudness of sound is determined by

- A. Pitch
- B. Frequency

- C. Amplitude
- D. Time period

56. The velocity of sound at 20°C is approximately

- A. 3400 m/s
- B. 340 m/s
- C. 430 m/s
- D. 304 m/s

57. The Halley's Comet is seen after every

- A. 76 months
- B. 76 years
- C. 56 months
- D. 56 years

58. Conduction is the method of transfer of heat in

- A. Liquids
- B. Solids
- C. Gases
- D. Vacuum

59. A beggar wrapped himself with a few layers of newspaper on a cold winter night. This helped him to keep himself warm because

- A. Friction between the layers of newspaper produces heat.
- B. Air trapped between the layers of newspaper is a bad conductor of heat.
- C. Newspaper is a conductor of heat.
- D. Newspaper is at a higher temperature than the temperature of the surrounding.

60. Which small objects revolve between the orbits of Mars and Jupiter?

- A. Satellites
- B. Comets
- C. Asteroids
- D. Meteorites

61. 1 kilogram weight is equal to

- A. 98 N
- B. 9.8 N
- C. 0.98 N
- D. 0.098 N

62. Two boys A and B are applying force on a block. If the block moves towards the boy A, which one of the following statements is correct?

- A. Magnitude of force applied by A is greater than that of B.
- B. Magnitude of force applied by A is smaller than that of B.
- C. Net force on the block is towards B.
- D. Magnitude of force applied by A is equal to that of B.

63. A book of mass 20 g is placed on a table. Find the thrust exerted by the book on the table. (Take acceleration due to gravity as 10 m/s²)

- A. 0.2 N
- B. 200 N
- C. 8 N
- D. 10 N

64. Jennet and Michael measured their body temperature. Jennet found hers to be 98.6°F and Michael recorded 37°C. Which of the following statement is true?

- A. Jennet has a higher body temperature than Michael.
- B. Jennet has a lower body temperature than Michael.
- C. Both have normal body temperature.
- D. Both are suffering from fever.

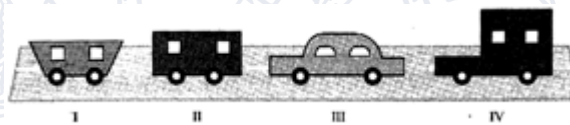
65. Static friction is less than

- A. Sliding friction
- B. Rolling friction
- C. Both A and B
- D. None of these

66. Whenever the surfaces in contact tend to move or move with respect to each other, the force of friction comes into play

- A. Only if the objects are solid.
- B. Only if one of the two objects is liquid.
- C. Only if one of the two objects is gaseous.
- D. Irrespective of whether the objects are solid, liquid, or gaseous.

67. A car designer designed four cars labelled as I, II, III, and IV. The shapes of the cars are shown in given figure. On a test drive, these cars are moving with the same speed on a highway. The tank of each car is filled with the same quantity of fuel.



In covering equal distances, least fuel is consumed by car

- A. I
- B. II
- C. III
- D. IV

68. In a cycling race, it is observed that a cyclist normally bends his body forward as shown in the given figure.



The cyclist bends in order to

- A. Feel comfortable
- B. Reduce his weight
- C. Reduce the air drag
- D. Increase the energy consumption

69. Nichrome is an alloy of

- A. Chromium
- B. Iron
- C. Nickel
- D. All of the above.

70. Which of the following will rise the highest in the atmosphere?

- A. Air at 10° C
- B. Air at 40° C
- C. Air at 20° C
- D. Air at -50° C

71. Which of the following is true of the 'eye' of a cyclone?

- A. It is an area of high pressure.
- B. It is an area of low pressure.
- C. It has lots of clouds and rains.
- D. It has high temperature.

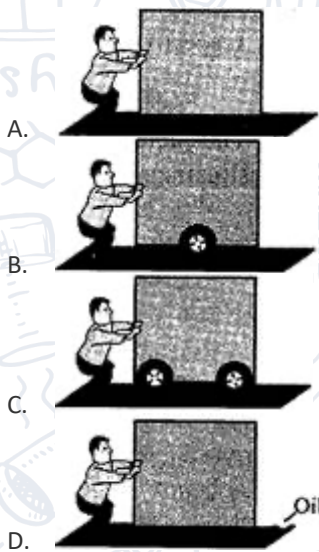
72. If freezing point of ice is 32° F, then find the freezing point of ice in Kelvin.

- A. 0 K
- B. 273.15 K
- C. 272 K
- D. 373 K

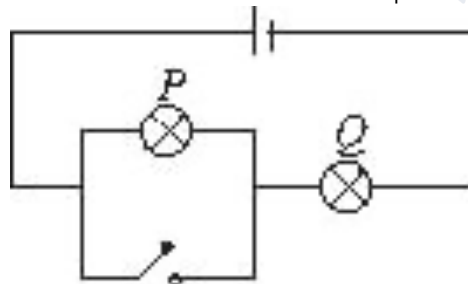
73. If we apply oil on door hinges, the friction will

- A. Increase
- B. Decrease
- C. Disappear altogether
- D. Will remain unchanged

74. Which of the following mechanical systems will produce the maximum amount of heat because of friction?



75. The given figure shows a circuit which contains two identical lamps.

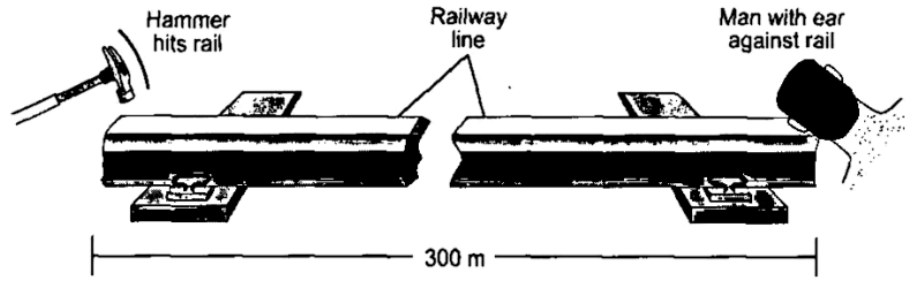


When the switch is closed, which of the following statements best describes what happened to lamps P and Q?

- A. P is brighter than before, but Q does not light up.
 B. P does not light up, but Q is brighter than before.
 C. Both P and Q are brighter than before.
 D. P and Q both will not light up.
- 76.** Magnet is also known as
 A. Lode stone
 B. Grey stone
 C. Black stone
 D. None of these.
- 77.** The force of friction can be reduced by the help of
 A. Ball bearing
 B. Lubricants
 C. Cushion surfaces
 D. All of them
- 78.** The word 'SI' in units stands for
 A. Standard International
 B. System International
 C. System Integrated
 D. Standard Integrated
- 79.** 1 cm^3 is equal to
 A. $1 \times 10^{-9} \text{ m}^3$
 B. $1 \times 10^{-6} \text{ m}^3$
 C. $1 \times 10^3 \text{ m}^3$
 D. $1 \times 10^6 \text{ m}^3$
- 80.** Frequency of oscillation is
 A. The number of oscillations per minute
 B. The number of oscillations per hour
 C. The number of oscillations per second
 D. The number of oscillations
- 81.** Afshan completed her science chapter where she wrote some statements. She wants to know whether the statements are correct or not. Afshan wants to take help from you
 A. When an object moves along a straight-line path, it is called rectilinear motion.
 B. When an object moves along a circular path, it is called circular motion.
 C. When an object turns or spins about a fixed axis, it is called rotational motion.
 D. The motion which repeats itself after regular intervals of time is called oscillatory motion.
- 82.** A bus travels 54 kilometers in 90 minutes. The speed of the bus is
 A. 0.6 m/s
 B. 10 m/s
 C. 5.4 m/s
 D. 3.6 m/s
- 83.** The slow process of conversion of dead vegetation into coal is called
 A. Decomposition
 B. Evolution
 C. Carbonification
 D. Carbonization

- 84.** Assertion: Coal gas is a mixture of methane, hydrogen, and carbon monoxide.
Reason: It is obtained when coal is burnt in excess of air.
- Assertion is incorrect but the reason is correct.
 - Assertion is correct but the reason is incorrect.
 - Both assertion and reason are correct, but the reason is not the correct explanation of assertion.
 - Both assertion and reason are correct, and the reason is the correct explanation of assertion.
- 85.** The process of transferring of heat without any contact between the source of heat and the heated object is called
- Conduction
 - Convection
 - Radiation
 - Induction
- 86.** Ruth and Ara measured their body temperature. Ruth found his to be 98.6° F and Ara recorded 37° C. Which of the following statements is true?
- Ruth has a higher body temperature than Ara.
 - Ruth has a lower body temperature than Ara.
 - Both have normal body temperature.
 - Both are suffering from fever.
- 87.** The suspended particles released by combustion of coal in air may lead to a health disease. Which of the following is the diseased caused by it?
- Goiter
 - Arthritis
 - Asthma
 - Bone cancer
- 88.** What is the main chemical component present in striking surface of a matchbox?
- Potassium chlorate
 - Phosphorus
 - Potassium
 - Graphite
- 89.** A rocket has been fired upwards to launch a satellite in its orbit. Name the two forces acting on the rocket immediately after leaving the launching pad.
- Frictional force and force of gravity
 - Force of gravity and nuclear force
 - Force of gravity and electrical force
 - None of these.
- 90.** Which one of the following forces is a contact force?
- Force of gravity
 - Force of friction
 - Magnetic force
 - Electrostatic force
- 91.** Electromagnets usually have a core of
- Aluminum
 - Alnico
 - Gold
 - None of these.

92. Cyan, yellow, and magenta are
- Primary colors
 - White colors
 - Secondary colors
 - Tertiary colors
93. A snail crawls at the speed of
- 1.7 m/s
 - 0.03 m/s
 - 25 m/s
 - 10 m/s
94. The name of the physicist who discovered the nucleus of atom was
- Democritus
 - John Dalton
 - Ernest Rutherford
 - Vander Waals
95. When "Uranium-238" is bombarded with neutrons, it produces
- Heat
 - Electricity
 - Nuclear energy
 - Light
96. The denser the liquid, the
- Slower the speed of sound
 - Faster the speed of sound
 - More distance covered by sound
 - Less distance covered by sound
97. The SI unit of calorific value of a fuel is
- N/kg
 - kJ/kg
 - kW/kg
 - J/kg
98. 1800 milligram is equal to how many grams?
- 1.8
 - 180
 - 0.18
 - 0.0018
99. A bicycle has a speed of 6 m/s. What is its speed in km/h?
- 21.6
 - 16.67
 - 2.16
 - 1.67
100. A disused railway line has a length of 300 meters. A man puts his ear against one end of the rail and another man hits the other end with a metal hammer as shown in the figure below.



State and approximate value for the speed of sound in air.

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Physics and Astronomy Category 1 - Sample Questions

ANSWER KEY

No	Answer	No	Answer	No	Answer	No	Answer
1	A	26	C	51	A	76	A
2	D	27	A	52	C	77	D
3	A	28	A	53	B	78	B
4	C	29	D	54	D	79	B
5	A	30	A	55	C	80	C
6	C	31	D	56	B	81	D
7	D	32	C	57	B	82	B
8	A	33	D	58	B	83	D
9	D	34	A	59	B	84	B
10	A	35	B	60	C	85	C
11	D	36	A	61	B	86	C
12	B	37	B	62	B	87	C
13	A	38	B	63	A	88	B
14	B	39	B	64	C	89	A
15	A	40	C	65	D	90	B
16	Series circuit	41	B	66	D	91	D
17	C	42	C	67	C	92	C
18	A	43	B	68	C	93	B
19	C	44	C	69	D	94	C
20	C	45	A	70	B	95	C
21	C	46	A	71	B	96	B
22	C	47	C	72	B	97	D
23	B	48	D	73	B	98	A
24	C	49	A	74	A	99	A
25	C	50	A	75	C	100	344 m/s