IB Physics Mock Paper 1 (SL & HL)

Year: 2025

Instructions:

- Do not open this examination paper until instructed to do so.
- Answer all questions.
- Paper 1 is non-calculator.
- You have 45 minutes (SL) / 1 hour (HL).
- Use a pencil for multiple-choice answers.

SL Paper 1 – Questions 1-15

1. A car travels at a constant speed of 20 m/s for 10 seconds. What is the distance covered?

a) 100 m

b) 200 m

c) 150 m

d) 250 m

2. A block of mass 2 kg is on a frictionless surface. A constant force of 10 N is applied. What is the acceleration of the block?

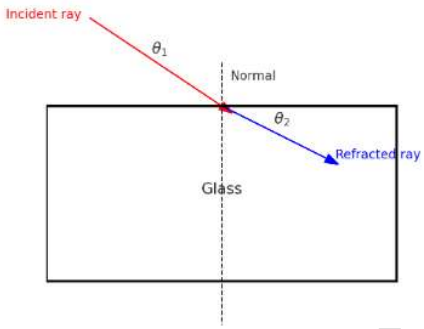
a) 2 m/s²

b) 5 m/s²

c) 10 m/s²

d) 20 m/s²

3. The diagram shows a ray of light entering a glass block at angle θ□. Which ray correctly represents the refraction inside the block?



a) Ray bends away from normal

b) Ray bends towards normal

c) No bending

d) Reflects back

4. A capacitor of 10 μF is connected to a 12 V battery. What is the charge stored?

a) 1.2×10^{-4} C

b) 1.2×10^{-3} C

c) 1.2×10^{-5} C

d) 1.2×10^{-2} C

5. A 0.5 kg mass oscillates with a period of 2 s on a spring. What is the angular frequency?

a) π rad/s

b) 2π rad/s

c) π/2 rad/s

d) 4π rad/s

6. A particle moves along a straight line with velocity v = 3t m/s. What is the displacement after 4 s?

a) 12 m

b) 24 m

c) 16 m

d) 32 m

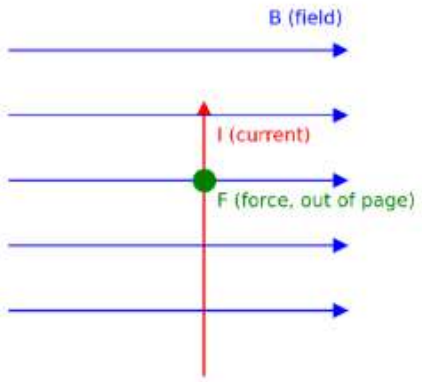
7. The diagram shows a current-carrying wire in a magnetic field. Which force acts on the wire?

a) Zero

b) Parallel to wire

c) Perpendicular to wire

d) Opposite to B



8. Two resistors of 6 Ω and 12 Ω are connected in series. The total resistance is:

a) 18 Ω

b) 2 Ω

c) 72 Ω

d) 8 Ω

9. Which graph shows velocity vs. time for uniform acceleration?

a) Horizontal line

b) Diagonal line through origin

c) Exponential curve

d) Parabola

10. The half-life of a radioactive isotope is 10 min. What fraction remains after 30 min?

a) 1/2

b) 1/4

c) 1/8

d) 1/16

11. A lens forms an image twice the size of the object. What is the magnification?

a) 0.5

b) 1

c) 2

d) -2

12. A body is moving in uniform circular motion. The direction of acceleration is:

a) Tangential

b) Centripetal

c) Centrifugal

d) Zero

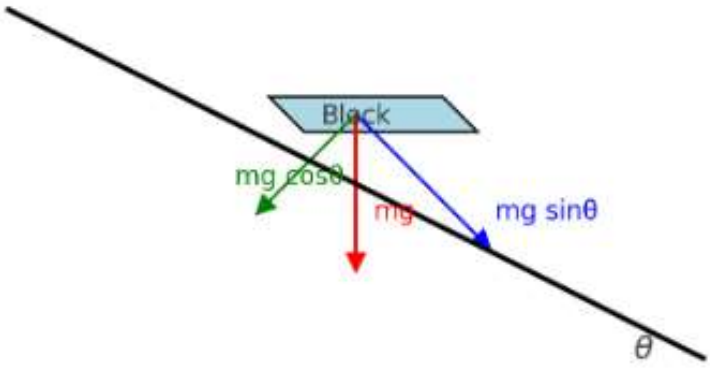
13. The diagram shows a block sliding down an inclined plane. Friction is negligible. What is the acceleration?

a) g sin θ

b) g cos θ

c) g tan θ

d) g



14. Energy of a photon is 3×10^{-19} J. What is its wavelength? ($h = 6.63 \times 10^{-34}$ J·s, $c = 3 \times 10^8$ m/s)

a) 662 nm

b) 331 nm

c) 553 nm

d) 1000 nm

15. Two waves of equal amplitude interfere destructively. The resultant amplitude is:

a) Zero

b) Twice amplitude

c) Half amplitude

d) Same amplitude

SL Paper 1 – Questions 16-30

16. A spring of force constant 200 N/m is stretched by 0.1 m. What is the potential energy stored?

a) 0.5 J

b) 1 J

c) 2 J

d) 5 J

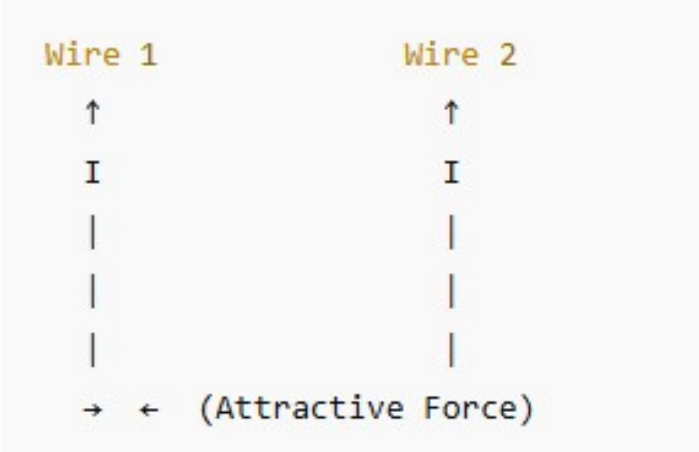
17. The diagram shows two parallel wires carrying current in the same direction. What is the force between them?

a) Zero

b) Attractive

c) Repulsive

d) Depends on distance



18. A 5 Ω resistor carries 2 A of current. The power dissipated is:

a) 10 W

b) 15 W

c) 20 W

d) 25 W

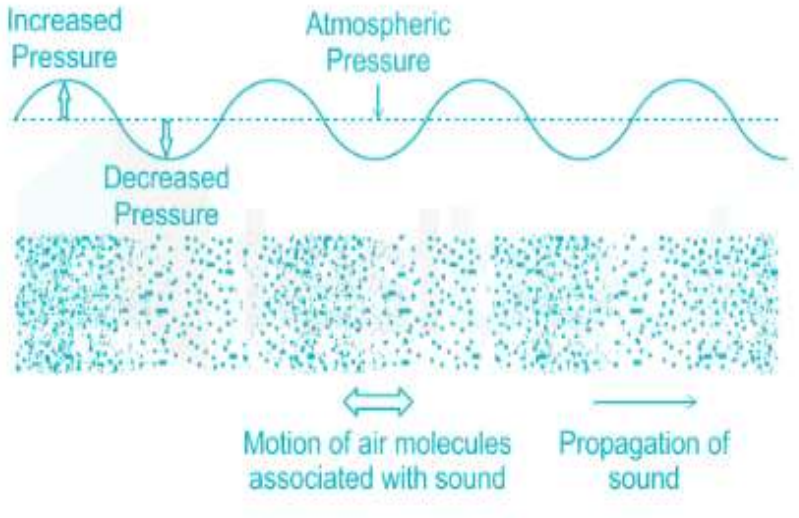
19. The diagram shows a sound wave traveling through a medium. Which type of wave is it?

a) Transverse

b) Longitudinal

c) Surface

d) Electromagnetic



20. A block of mass 3 kg is acted upon by a 15 N force. What is the work done after moving 4 m?

a) 30 J

b) 45 J

c) 60 J

d) 75 J

21. A photoelectric experiment shows electrons emitted when light of wavelength 400 nm hits a metal. Which statement is correct?

a) Electrons emitted regardless of intensity

b) Threshold frequency exceeded

c) Photon energy too low

d) Emission independent of wavelength

22. A 12 V battery is connected to a circuit with R = 4 Ω. Current in the circuit is:

a) 1 A

b) 2 A

c) 3 A

d) 4 A

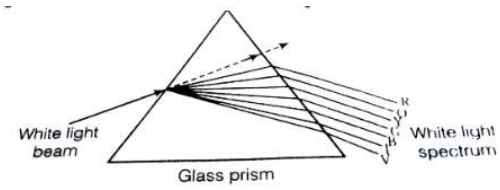
23. The diagram shows a ray of light passing through a prism. Which phenomenon is shown?

a) Diffraction

b) Refraction

c) Dispersion

d) Reflection



24. A wheel rotates with angular velocity 5 rad/s. Its angular acceleration is 2 rad/s². What is the angular velocity after 3 s?

a) 5 rad/s

b) 6 rad/s

c) 11 rad/s

d) 15 rad/s

25. Two waves interfere constructively. The resultant amplitude is:

a) Sum of individual amplitudes

b) Zero

c) Product of amplitudes

d) Half the amplitude

26. A block slides down a frictionless incline of 30° from rest. What is its velocity at the bottom? (Height h)

a) √(2gh)

b) √(gh)

c) √(3gh)

d) √(gh/2)

27. A lens forms a real image. Which statement is correct?

a) Image is upright and virtual

b) Image is inverted and real

c) Image is magnified and upright

d) Image cannot form

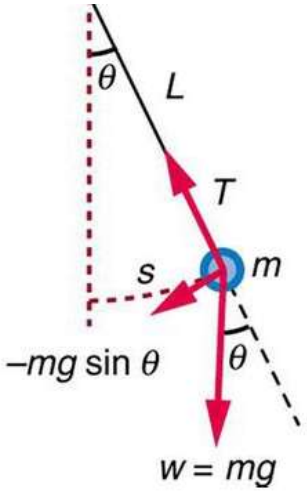
28. The diagram shows a simple pendulum displaced to an angle θ. Which force restores it to equilibrium?

a) Tension

b) Weight component along arc

c) Weight perpendicular to string

d) Centripetal



29. The energy stored in an inductor of 0.5 H carrying 2 A is:

a) 1 J

b) 2 J

c) 0.5 J

d) 4 J

30. A particle moves with velocity v = 5i + 3j m/s. Its speed is:

a) 8 m/s

b) √34 m/s

c) √19 m/s

d) 2 m/s

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HL Extra Section – Questions 1-10

1. A particle in a quantum box has energy levels E□, E□, E□. Which transition emits the highest energy photon?

a) $E_3 \rightarrow E_2$

b) $E_2 \rightarrow E_1$

c) $E_3 \rightarrow E_1$

d) $E_1 \rightarrow E_2$

2. A spaceship travels close to the speed of light. According to Einstein's theory of special relativity, which of the following increases as observed from a stationary frame?

a) Mass

b) Length

c) Time interval

d) Electric charge

3. A metal absorbs photons and emits electrons. If photon energy doubles, what happens to the kinetic energy of emitted electrons?

a) Doubles

b) Halves

c) Remains same

d) Zero

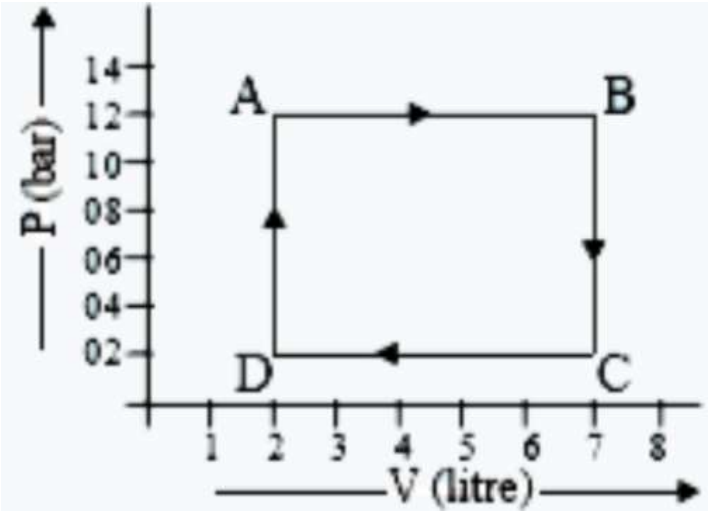
4. The diagram shows a PV graph of an ideal gas undergoing expansion. What is the work done by the gas?

a) Area under curve

b) $\Delta P/\Delta V$

c) $\Delta V/\Delta P$

d) Zero



5. A particle has wavelength λ. According to de Broglie, momentum is:

a) h/λ

b) λ/h

c) hλ

d) λh²

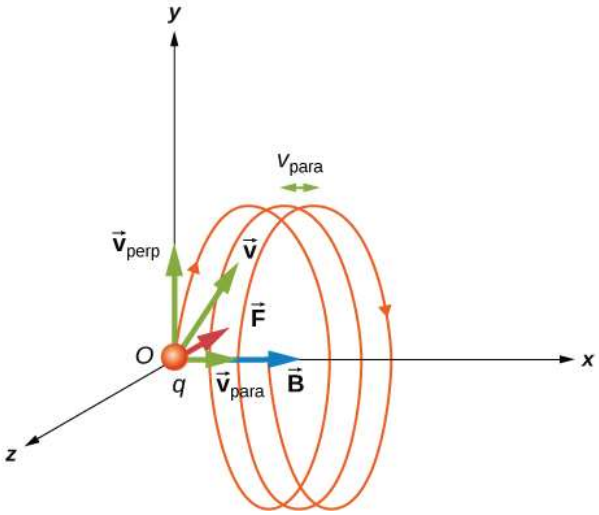
6. The diagram shows an electron in uniform magnetic field. Which path does it follow?

a) Straight

b) Circular

c) Spiral

d) Zig-zag



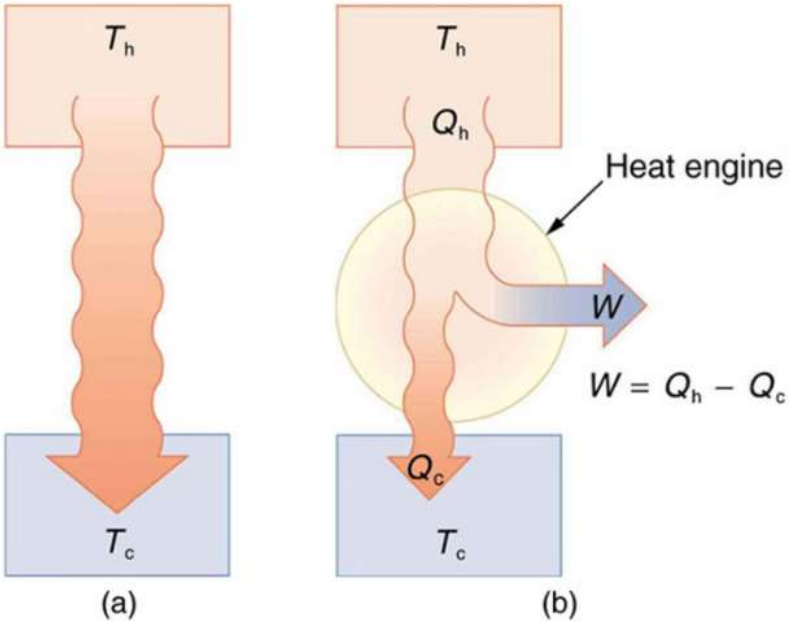
7. The diagram shows two thermal reservoirs and a heat engine. Which quantity represents efficiency?

a) W/Qh

b) Qh/W

c) Qc/Qh

d) Qc/W



8. Photon energy in photoelectric effect exceeds work function. What is the maximum KE of emitted electrons?

a) hf – Φ

b) Φ – hf

c) hf + Φ

d) KE = 0

9. A capacitor discharges through a resistor. Which graph shows Q vs. t?

a) Exponential decay

b) Linear

c) Parabola

d) Sinusoidal

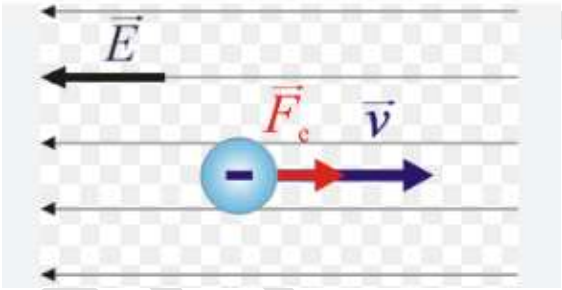
10. The diagram shows an electron moving in an electric field. Which force acts on it?

a) Zero

b) Along E

c) Opposite E

d) Perpendicular to E



Answer Key

SL Paper 1 Answers:

b, a, b, a, a, b, c, a, b, c, c, b, a, a, a, b, b, a, b, b, b, b, b, c, a, a, b, b, b, b

HL Extra Section Answers:

c, a, a, a, a, b, a, a, a, b