

External assessment 2025

Multiple choice question book

Physics

Paper 1

General instruction

- Work in this book will not be marked.

Section 1

Instruction

- Respond to these questions in the question and response book.
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QUESTION 1

Normal force is the force that always

- (A) opposes the total weight of an object vertical to a surface.
- (B) acts along an imaginary line perpendicular to a surface.
- (C) works on an object in a direction parallel to a surface.
- (D) resists the motion of an object along a surface.

QUESTION 2

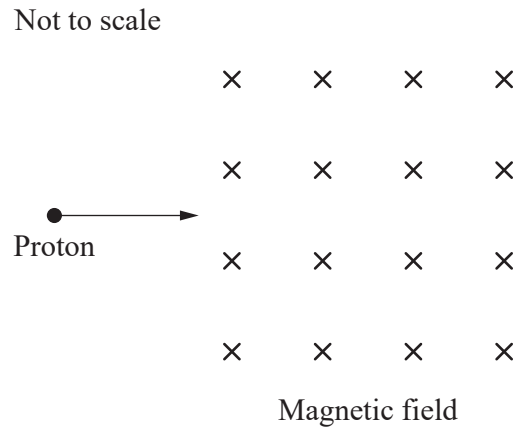
Newton's Law of Universal Gravitation can be described by the formula

- (A) $F_g = mg$
- (B) $F = \frac{4\pi^2}{GM}$
- (C) $F = \frac{GMm}{r^2}$
- (D) $F_{net} = \frac{mv^2}{r}$

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QUESTION 3

A proton travelling to the right enters a region with a magnetic field, as shown.



In which direction will the proton be deflected as it passes through the magnetic field?

- (A) up the page
- (B) into the page
- (C) down the page
- (D) out of the page

QUESTION 4

Electromagnetic waves always

- (A) require a medium to propagate.
- (B) move at a speed of $3 \times 10^8 \text{ m s}^{-1}$.
- (C) travel parallel to the direction of oscillation of charge.
- (D) have an electric field and a magnetic field that are perpendicular to each other.

QUESTION 5

A satellite orbits around a planet.

If the radius of the satellite's orbit were to increase by a factor of 4, its period would increase by a factor of

- (A) 4
- (B) 8
- (C) 16
- (D) 64

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QUESTION 6

Which moving object has an inertial frame of reference?

- (A) a ball dropping off a balcony
- (B) a boat slowing down to dock
- (C) a plane travelling at a constant velocity
- (D) a car driving at 150 km h^{-1} around a circular racetrack

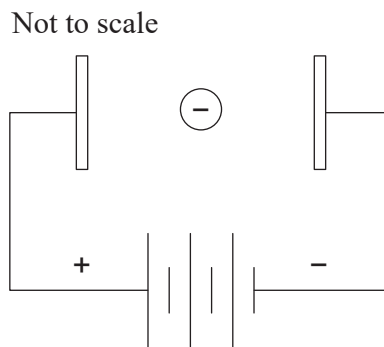
QUESTION 7

What key feature differentiates the Bohr model of the atom from the Rutherford model?

- (A) a high-density nucleus
- (B) neutrons in the nucleus
- (C) electrons in specific orbitals
- (D) a low-density cloud of electrons around the nucleus

QUESTION 8

A uniform electric field was produced in a vacuum using a set of parallel plates. A stationary electron was placed between the plates and then released, as shown.



If all gravitational effects are ignored, the stationary electron between the plates will

- (A) move at a constant velocity toward the positive plate.
- (B) travel in the same direction as the magnetic field lines.
- (C) accelerate in the opposite direction to the electric field lines.
- (D) remain stationary, as it is equally attracted and repelled by the plates.

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QUESTION 9

The W boson mediates

- (A) the gravitational force between masses.
- (B) interactions of the strong force in the nucleus.
- (C) repulsive forces in electromagnetic exchanges.
- (D) the weak force responsible for the decay of particles.

QUESTION 10

A string with a length of 0.60 m is connected to a small mass of 0.50 kg. The mass is swung in a horizontal circle and the tension in the string is 4.8 N.

Calculate the speed of the mass.

- (A) 2.0 m s^{-1}
- (B) 2.4 m s^{-1}
- (C) 4.0 m s^{-1}
- (D) 5.8 m s^{-1}

QUESTION 11

Electromotive force is produced when a magnet is pushed into a solenoid.

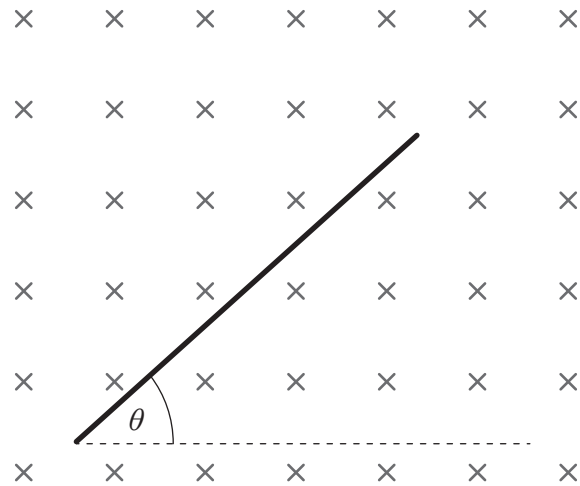
The magnitude of the electromotive force is inversely proportional to the

- (A) area of the solenoid.
- (B) strength of the magnet.
- (C) number of coils in the solenoid.
- (D) time taken for the magnet to move into the solenoid.

QUESTION 12

A wire with a length of 0.2 m and a current of 2.4 A is placed in an external uniform magnetic field of 1.5 mT, as shown. Its angle, θ , is varied from 0° to 90° .

Not to scale



As the angle θ changes from 0° to 90° , the magnetic force will

- (A) remain zero.
- (B) remain 7.2×10^{-4} N.
- (C) start at zero and increase to 7.2×10^{-4} N.
- (D) start at 7.2×10^{-4} N and decrease to zero.

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QUESTIONS 13–14

Questions 13–14 refer to the following scenario.

A projectile was launched with a velocity of 31 m s^{-1} at an angle of 28° to the horizontal.

QUESTION 13

Calculate the horizontal component of the launch velocity of the projectile in the forward direction.

- (A) 15 m s^{-1}
- (B) 17 m s^{-1}
- (C) 24 m s^{-1}
- (D) 27 m s^{-1}

QUESTION 14

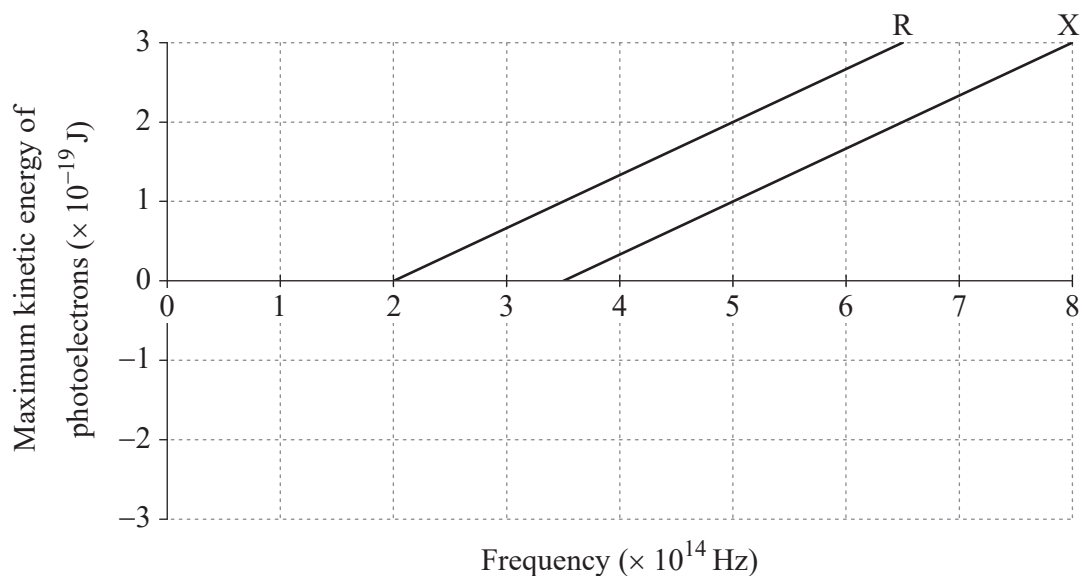
Calculate the maximum height the projectile reached above its starting point.

- (A) 11 m
- (B) 22 m
- (C) 37 m
- (D) 49 m

QUESTIONS 15–16

Questions 15–16 refer to the following scenario.

Researchers conducted a photoelectric effect experiment in which light was shone on two unknown metals, R and X. The results were analysed to produce the graph shown.



QUESTION 15

The graph for metal X has a theoretical gradient equivalent to

- (A) 6.6×10^{-34} J s
- (B) 1.3×10^{-19} J
- (C) 6.7×10^{-1} J Hz⁻¹
- (D) 2.0×10^{14} Hz

QUESTION 16

The work function for metal R is

- (A) zero.
- (B) less than metal X.
- (C) equal to metal X.
- (D) greater than metal X.

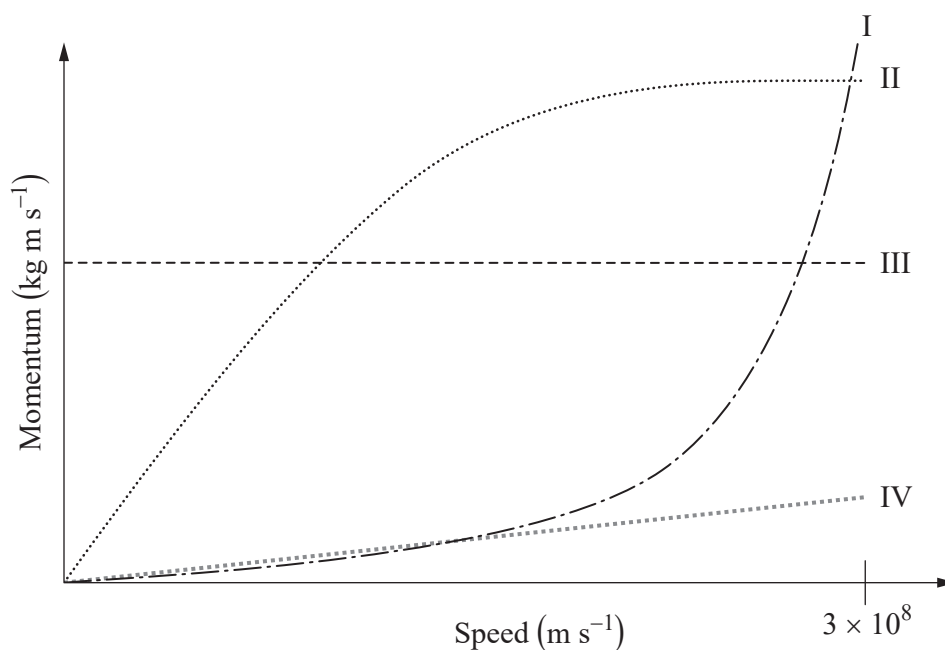
QUESTION 17

Mesons and baryons

- (A) are elementary particles.
- (B) contain quarks and antiquarks.
- (C) consist of three elementary particles.
- (D) are composite particles containing at least one quark.

QUESTION 18

The graph shows four possible representations of the relationship between relativistic momentum and the speed of an object.



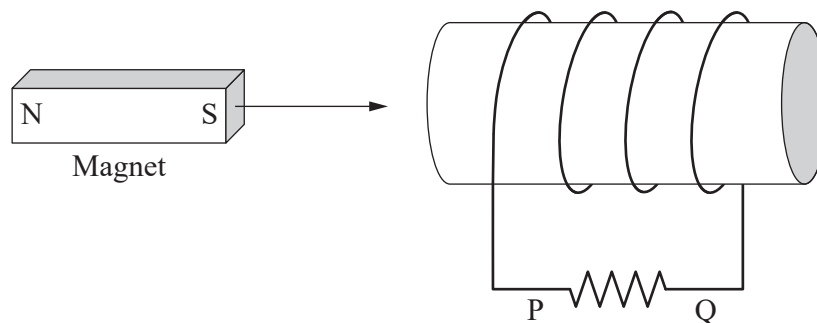
Identify the trendline that is a true representation of this relationship.

- (A) I
- (B) II
- (C) III
- (D) IV

QUESTION 19

A magnet moves right towards a stationary coil, as shown.

Not to scale



The table shows possible scenarios for the direction of the induced current across the resistor and the change in the flux inside the coil as the magnet moves towards it.

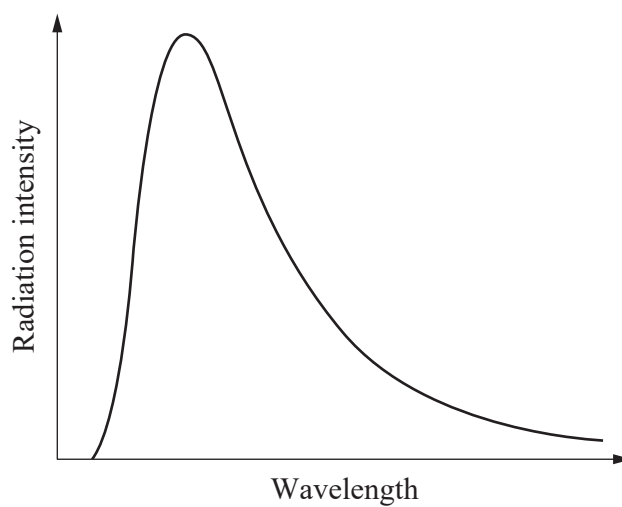
Which row is correct?

	Current flow across resistor	Flux inside coil
(A)	P to Q	increases
(B)	P to Q	decreases
(C)	Q to P	increases
(D)	Q to P	decreases

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QUESTION 20

When a black body is heated, a graph with a distinctive peak is produced, as shown.



This black body curve can be used to demonstrate that

- (A) light behaves as a wave.
- (B) the frequency of light is constant.
- (C) light is quantised into discrete values.
- (D) the peak wavelength is proportional to the temperature of the object.

