External assessment

Multiple choice question book

Physics Alternative Sequence

Paper 1

General instruction

- Work in this book will not be marked.

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

Section 1

QUESTION 1

What is the frequency of light with a wavelength of 537 nm?

(A) 5.59×10^{5} Hz

(B) 1.61×10^{11} Hz

(C) 5.59×10^{14} Hz

(D) 1.79×10^{15} Hz

QUESTION 2

An ammeter records a current of 3 A passing through a point in a circuit for 3 minutes. How much charge has passed this point in the time indicated?

(A) 4.8×10^{-19} C

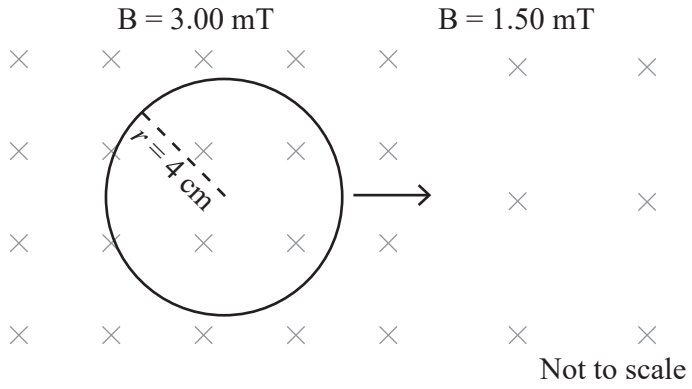
(B) 1.7×10^{-2} C

(C) 9.0×10^{0} C

(D) 5.4×10^{2} C

QUESTION 3

The diagram shows a current-carrying loop moving from one magnetic field to another magnetic field in 0.600 seconds.



Calculate the magnitude of the EMF produced in the current-carrying loop.

(A) 1.26×10^{-6} V

(B) 1.26×10^{-5} V

(C) 1.26×10^{-1} V

(D) 1.26×10^{2} V

QUESTION 4

A student conducted an experiment to determine the specific heat capacity of a block made from an unknown metal. They added 340 J of heat energy to the block and recorded the following data:

Initial temperature of the block (°C)	Final temperature of the block (°C)	Mass of the block (g)
21	84	10.2

What is the specific heat capacity of the block of metal?

(A) 3.97×10^{-1} J kg^{-1} K^{-1}

(B) 5.29×10^{-1} J kg^{-1} K^{-1}

(C) 3.97×10^{2} J kg^{-1} K^{-1}

(D) 5.29×10^{2} J kg^{-1} K^{-1}

QUESTION 5

Which of the following is Lenz's Law?

(A) The total electric charge of an isolated system remains constant regardless of changes within the system.

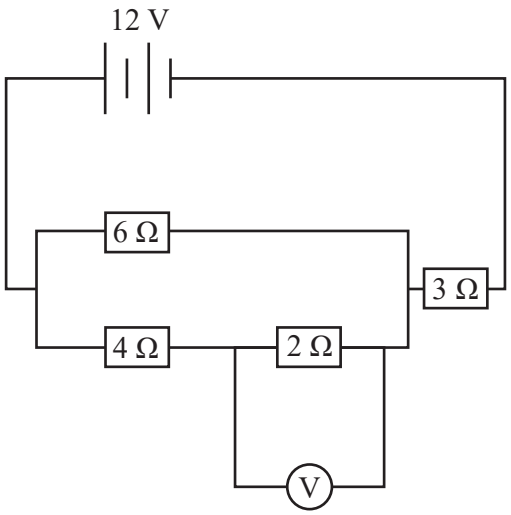
(B) The magnetic flux around a current-carrying wire changes in proportion to the rate of change of the current.

(C) The direction of an induced electric current always opposes the change in the circuit or magnetic field that produces it.

(D) The ratio of the sines of the angles of incidence and refraction of a wave is constant when the wave passes between two given media.

QUESTION 6

What is the voltage measured by the voltmeter in the circuit diagram shown?



(A) 2 V

(B) 3 V

(C) 4 V

(D) 6 V

QUESTION 7

A quantum of any form of electromagnetic radiation is also known as

(A) a photon.

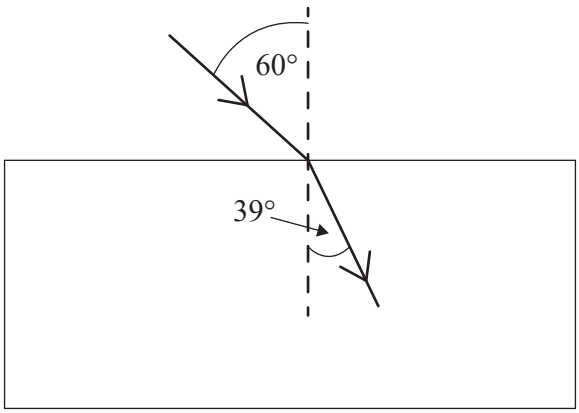
(B) an X-ray.

(C) a positron.

(D) an electron.

QUESTION 8

This diagram shows the refraction of light from air into a second medium. The refractive index of air is 1.00.



What is the refractive index of the second medium?

(A) 0.32

(B) 0.73

(C) 1.37

(D) 1.53

QUESTION 9

Ice at –20 °C is heated until it becomes water at 10 °C.

In this system, which is the only energy that continually increases during heating?

(A) kinetic

(B) internal

(C) potential

(D) chemical

QUESTION 10

Thermal equilibrium of a system is defined as the condition of a system in which there is

(A) a net increase in average kinetic energy of any of its components.

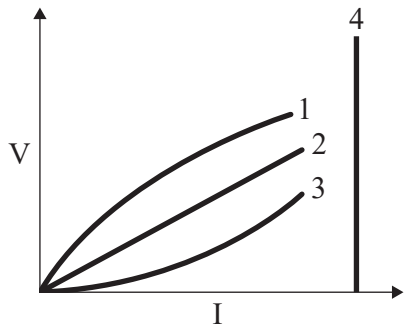
(B) no net exchange of thermal energy between any of its components.

(C) a decrease in net exchange of thermal energy between any of its components.

(D) an equal net exchange of thermal energy and kinetic energy between any of its components.

QUESTION 11

This graph shows the potential difference across four resistors (1, 2, 3 and 4) with respect to the current flowing through each.



Which line on the graph represents an ohmic resistor?

(A) 1

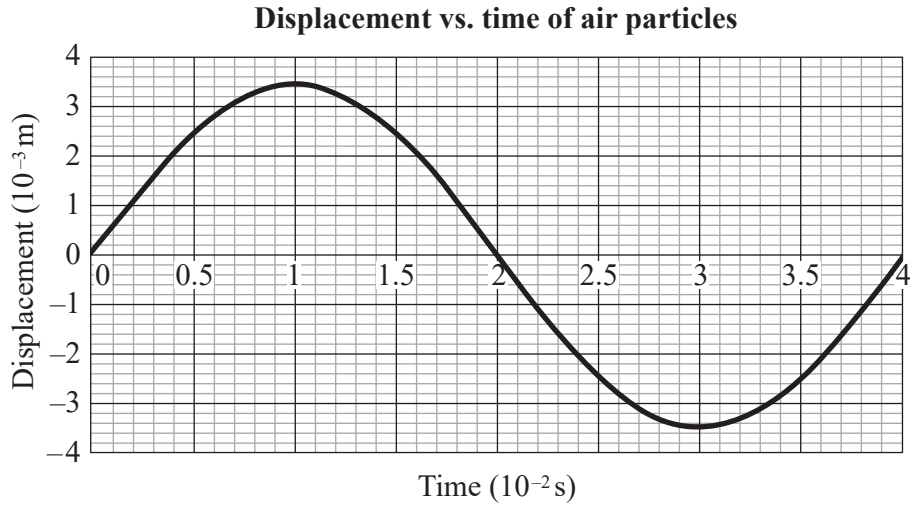
(B) 2

(C) 3

(D) 4

QUESTION 12

Select the option that represents the amplitude of the sound wave shown in the graph.



(A) 3.5×10^{-3} m

(B) 7×10^{-3} m

(C) 2×10^{-2} s

(D) 4×10^{-2} s

QUESTION 13

The Rutherford atomic model describes an atom

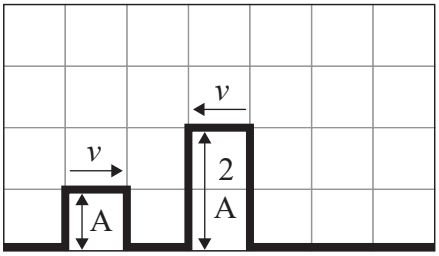
(A) as the smallest particle of any substance.

(B) with a small, dense nucleus surrounded by orbiting electrons.

(C) consisting of electrons scattered throughout a sphere of positively charged fluid.

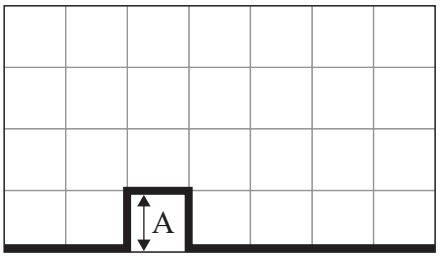
(D) consisting of a small positive nucleus surrounded by negative electrons in set orbits of fixed energy.

QUESTION 14

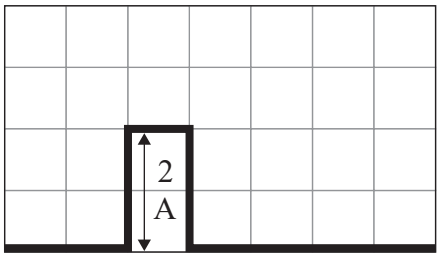


Determine the resultant displacement of the string when the two waves shown are completely superimposed.

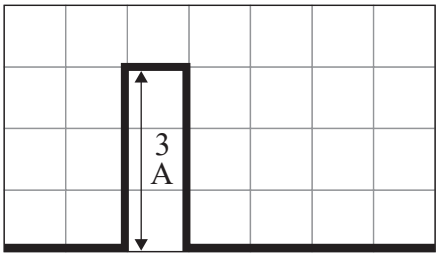
(A)



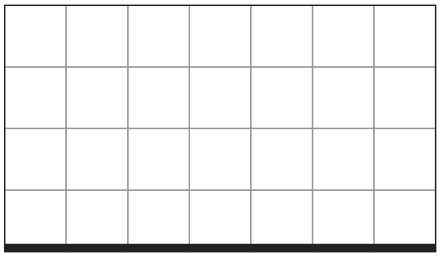
(B)



(C)



(D)



QUESTION 15

Identify which option best describes the type of wave behaviour displayed by particles of air as sound passes through them.

(A) surface

(B) transverse

(C) longitudinal

(D) electromagnetic

QUESTION 16

The efficiency of an appliance is 43%. Calculate the energy put into the appliance if the output energy is 1290 J.

(A) 300 J

(B) 555 J

(C) 3000 J

(D) 55 470 J

QUESTION 17

The definition of *magnetic field* is

(A) a region of space through which the total magnetic flux is measured.

(B) a region of space surrounding a body in which another body experiences a force of attraction.

(C) a region of space around an electrically charged particle or object within which a force would be exerted on other electrically charged particles or objects.

(D) a region of space near a magnet, electric current or moving electrically charged particle in which a magnetic force acts on any other magnet, electric current or moving electrically charged particle.

QUESTION 18

The rate of movement of electric charge carriers from one part of a conductor to another was measured to be 13 C s^{-1}. What is this value equivalent to?

(A) 13 A

(B) 13 V

(C) 13 Ω

(D) 13 W

QUESTION 19

A solenoid with 24 loops of wire produces an EMF of 36 V during a magnetic flux change of 0.3 Wb.

Calculate the period during which the magnetic flux varied.

(A) 0.2 s

(B) 0.5 s

(C) 2.2 s

(D) 5.0 s

QUESTION 20

Calculate the frequency of light that would be required to eject a photoelectron at a velocity of 1.90×10^6 m s^{-1} from a metal plate with a work function of 4.73 eV.

(A) 1.14×10^{15} Hz

(B) 1.34×10^{15} Hz

(C) 2.48×10^{15} Hz

(D) 3.62×10^{15} Hz

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