External assessment

Multiple choice question book

Physics

Paper 1

General instruction

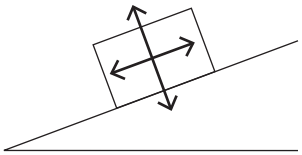
- Work in this book will not be marked.

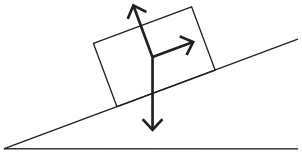
Queensland Government | QCAA Queensland Curriculum & Assessment Authority

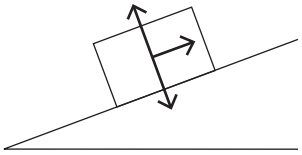
Section 1

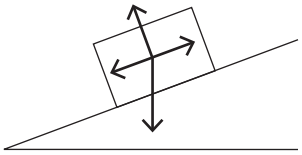
QUESTION 1

Which of the diagrams correctly represents the forces acting on an object resting on an inclined plane?

(A) 

(B) 

(C) 

(D) 

QUESTION 2

The definition of *average speed* is the rate of change of

(A) velocity.

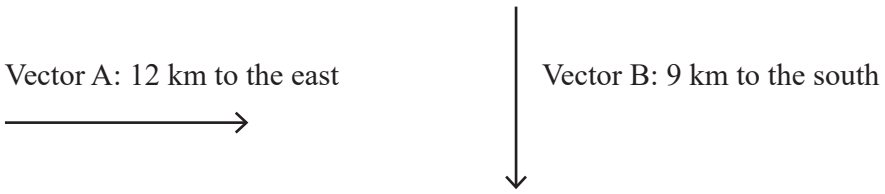
(B) distance.

(C) acceleration.

(D) displacement.

QUESTION 3

The diagram shows two vectors.



Calculate the magnitude of the resultant vector when Vector A is added to Vector B.

(A) 15 km

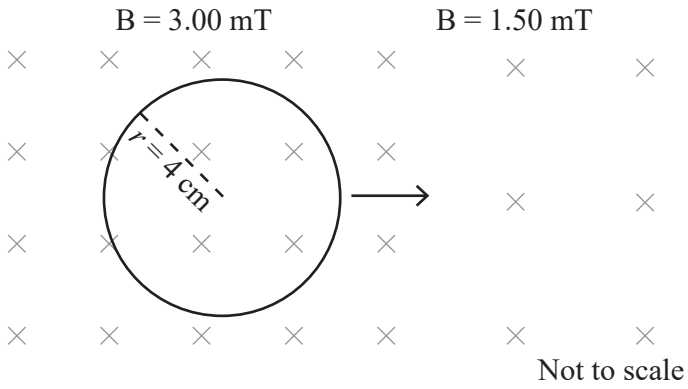
(B) 16.5 km

(C) 21 km

(D) 108 km

QUESTION 4

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 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

The definition of *relativistic momentum* is the

(A) momentum of an object when measured in a Newtonian frame of reference.

(B) momentum of an object when measured regardless of its frame of reference.

(C) momentum of an object when measured in the frame of reference in which the object is in motion.

(D) momentum of an object when measured in the frame of reference in which the object is stationary.

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

An object 46 m above the ground is projected horizontally, with an initial velocity of 25 m s^{-1}.

Calculate the horizontal displacement of the object at the time it reaches the ground.

(A) 77 m

(B) 120 m

(C) 190 m

(D) 240 m

QUESTION 9

Select the list containing the six types of quarks.

(A) in, out, up, down, top and bottom

(B) right, left, charm, strange, in and out

(C) up, down, charm, strange, top and bottom

(D) charm, strange, right, left, top and bottom

QUESTION 10

The force that quarks experience that leptons do not is the

(A) weak force.

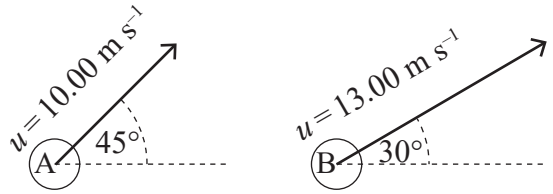
(B) strong force.

(C) normal force.

(D) electromagnetic force.

QUESTION 11

The diagram shows object A and object B being projected at different velocities.



Which of the following statements is true?

(A) Object A has a shorter flight time than object B.

(B) Object A has a smaller maximum height than object B.

(C) Object A has a larger horizontal velocity than object B.

(D) Object A has a smaller horizontal displacement than object B.

QUESTION 12

Which of the following is one of Kepler's laws of planetary motion?

(A) The laws of physics are the same in all inertial frames of reference.

(B) All planets move about the Sun in elliptical orbits, having the Sun as one of the foci.

(C) The speed of light in a vacuum has the same value, c, in all inertial frames of reference.

(D) The force of attraction between each pair of point particles is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

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

Select the list that contains only gauge bosons.

(A) gluon, photon, meson and hadron

(B) lepton, baryon, meson and hadron

(C) gluon, photon, Z boson and W boson

(D) Z boson, W boson, photon and lepton

QUESTION 15

Calculate the orbital period of a satellite travelling on a 3.00×10^{8} m radius orbit around the Earth.

(A) 1.44×10^{-2} hours

(B) 4.54×10^{2} hours

(C) 1.64×10^{6} hours

(D) 7.44×10^{8} hours

QUESTION 16

According to the theory of special relativity, the concept of *simultaneity* is best described as

(A) when two events occur at the same time.

(B) when an observer sees two events occurring at the same time.

(C) two events observed to happen at the same time in a particular frame of reference.

(D) the relation between two events assumed to happen at the same time when observed from any frame of reference.

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

Calculate the initial vertical velocity of a projectile with an initial velocity of 68 m s^{-1} at an angle of 51° up from the horizontal.

(A) 43 m s^{-1}

(B) 51 m s^{-1}

(C) 53 m s^{-1}

(D) 68 m s^{-1}

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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