External assessment 2022

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

Electromotive force is

(A) the production of voltage across an electrical conductor due to its dynamic interaction with a magnetic field.

(B) a difference in potential that tends to give rise to an electric current.

(C) the repulsion experienced by two negatively charged particles.

(D) one of the four fundamental forces.

QUESTION 2

A photon is described as

(A) a continuous wave of light energy.

(B) a particle that can only propagate in a medium.

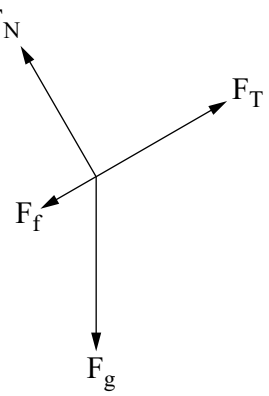
(C) a quantum of all forms of electromagnetic energy.

(D) a particle that mediates the forces between protons.

QUESTION 3

Which free body diagram best represents an object being pulled at a constant speed up an inclined plane?

(A)



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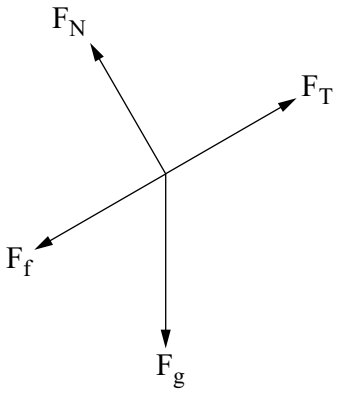

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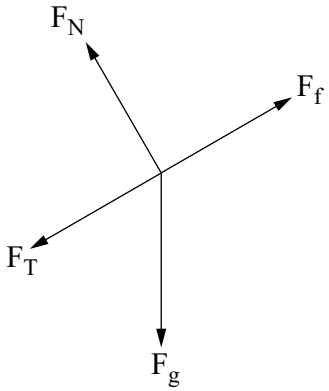

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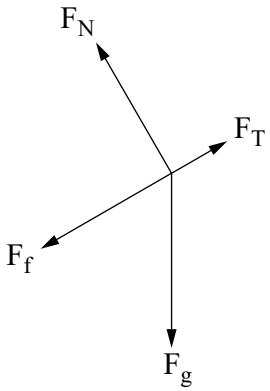


QUESTION 4

An object orbiting Earth has an orbital period of 5.6×10^3 s.

What is the object's orbital radius?

(A) 3.8×10^5 m

(B) 6.8×10^6 m

(C) 1.8×10^{10} m

(D) 1.3×10^{12} m

QUESTION 5

Tau particles are classified as

(A) bosons.

(B) leptons.

(C) mesons.

(D) baryons.

QUESTION 6

After coherent light has been passed through a double slit, the observation of an interference pattern on a screen is explained by the

(A) wave nature of light.

(B) equal width of the slits.

(C) discrete packets of photons.

(D) distance from the slits to the screen.

QUESTION 7

Which change would produce the greatest increase in magnetic field strength inside a current-carrying solenoid?

(A) decreasing the thickness of the wire

(B) increasing the length of the solenoid

(C) adding more turns of wire to the solenoid

(D) using an alternating current instead of a direct current

QUESTION 8

Determine the wavelength of an electromagnetic wave with an energy of 2.4×10^{-23} J.

(A) 7.2×10^{-15} m

(B) 2.8×10^{-11} m

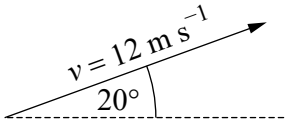
(C) 8.3×10^{-3} m

(D) 1.2×10^{2} m

QUESTION 9

Which diagram would result in the furthest horizontal distance travelled?

(A)



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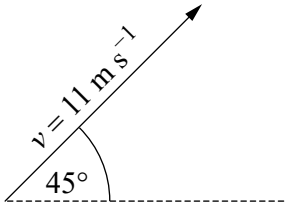

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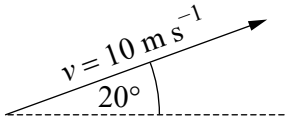

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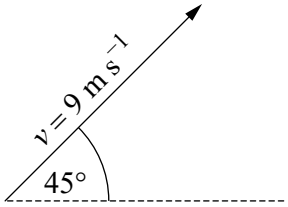

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QUESTION 10

Electric field strength refers to the

(A) intensity of an electric field at a particular location.

(B) change in electrical potential energy between two defined points.

(C) sum of electrically charged particles passing a point in a given time.

(D) physical property of an object experiencing a force in an electromagnetic field.

QUESTION 11

The maximum kinetic energy of an electron ejected from a metallic surface can be increased by

(A) using a positively ionised metal.

(B) using a metal with a larger work function.

(C) increasing the intensity of the incident light.

(D) decreasing the wavelength of the incident light.

QUESTION 12

An object experiencing uniform circular motion in a horizontal plane travels at an average speed of 8.0 m s^{-1}. Calculate the radius of the object's path if it takes 0.3 s to complete a full rotation.

(A) 3.8×10^{-1} m

(B) 2.6×10^{0} m

(C) 1.5×10^{1} m

(D) 1.7×10^{2} m

QUESTION 13

A rectangular coil of 3000 turns and dimensions 0.1 m × 0.2 m is rotated in a uniform magnetic field of 2 mT. Calculate the minimum number of revolutions per second required to produce an average EMF of 6 V.

(A) 1

(B) 3

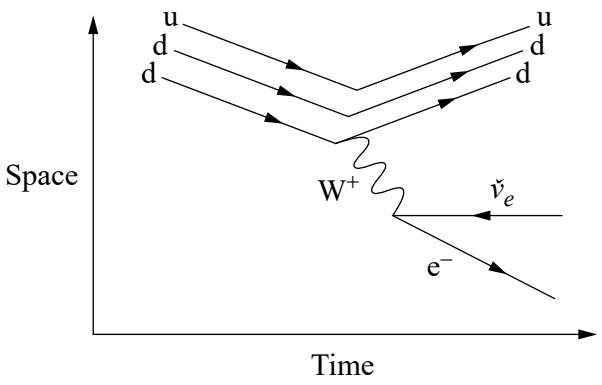
(C) 13

(D) 50

QUESTION 14

Which Feynman diagram correctly depicts neutron decay?

(A)



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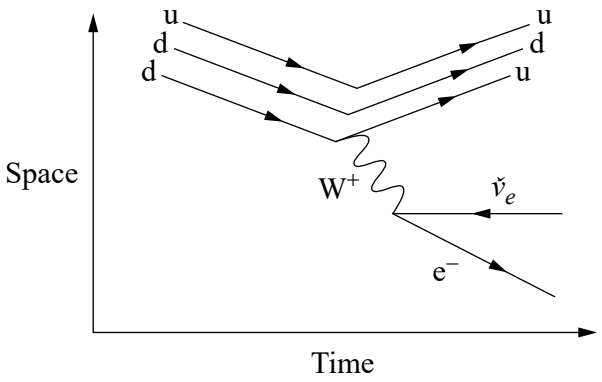

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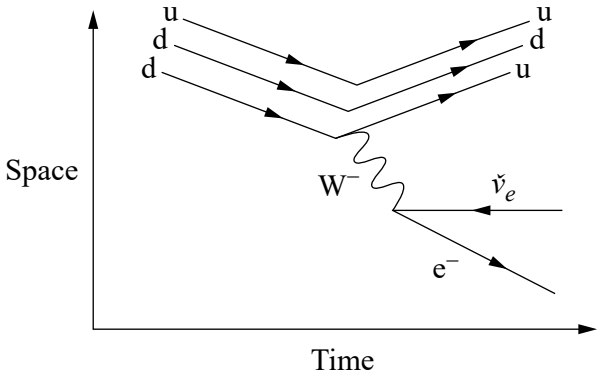

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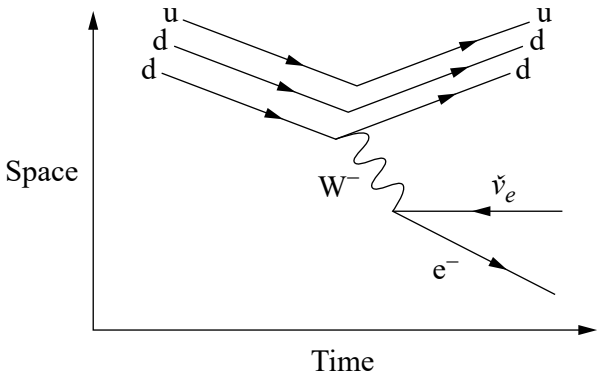


QUESTION 15

An object's velocity can only be measured relative to

(A) a fixed reference frame.

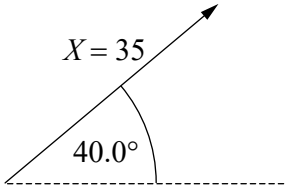
(B) the speed of light.

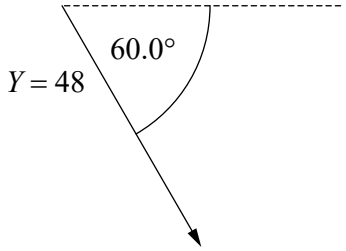
(C) an object at rest.

(D) an observer.

QUESTION 16

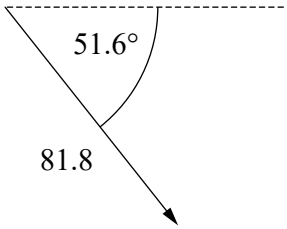
Two vectors are shown.





Which option represents the resultant vector of $X + Y$?

(A)



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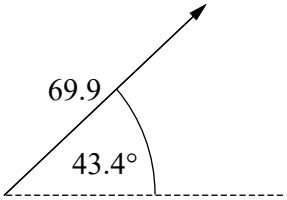

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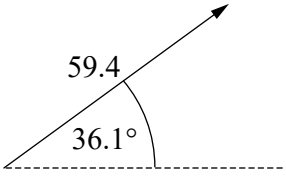

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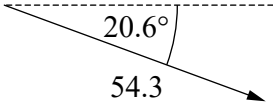

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QUESTION 17

An object is in orbit 400 km above the surface of the Earth. The Earth has a radius of 6.4×10^6 m.

What is the magnitude of the gravitational field strength experienced by the object?

(A) 8.6×10^0 m s^{-2}

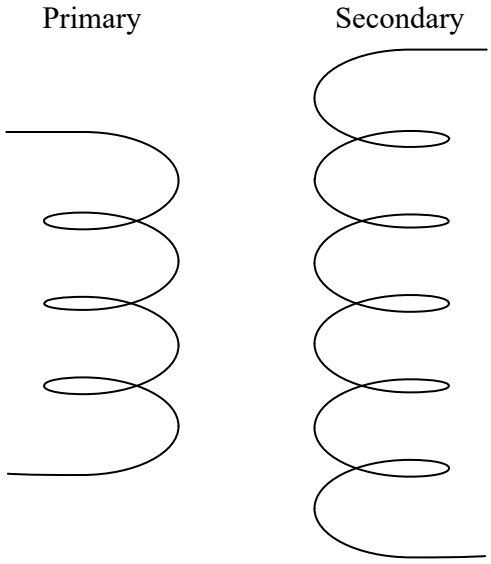
(B) 9.7×10^0 m s^{-2}

(C) 2.5×10^3 m s^{-2}

(D) 5.9×10^7 m s^{-2}

QUESTION 18

The primary and secondary coils from a lossless transformer are shown.



Compared to the primary coil, the secondary coil will experience decreased

(A) power.

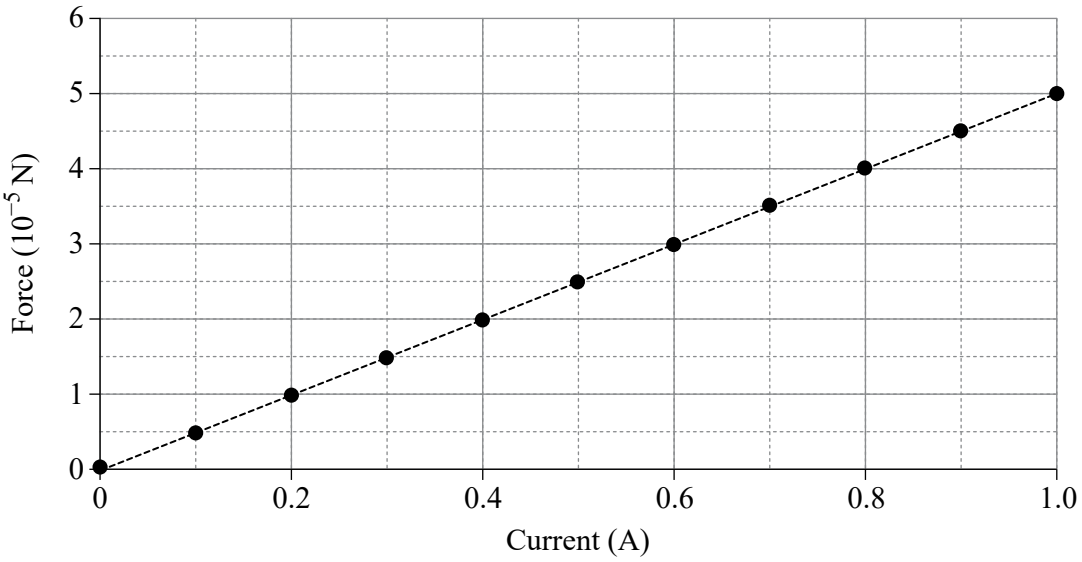
(B) current.

(C) voltage.

(D) resistance.

QUESTION 19

A current-carrying wire is placed perpendicular to two magnets. As the current in the wire is changed, the force acting on it is recorded.



The gradient of the line of best fit is proportional to the

(A) potential difference.

(B) electromotive force.

(C) resistance of the wire.

(D) magnetic field strength.

QUESTION 20

Which option lists the gauge bosons in ascending order of the strength of force they mediate?

(A) W boson < Z boson < Photon

(B) Gluon < Z boson < W boson

(C) Photon < W boson < Gluon

(D) Z boson < Photon < Gluon

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