

External assessment 2021

Multiple choice question book

Physics Alternative Sequence

Paper 1

General instruction

- Work in this book will not be marked.



Queensland
Government



Queensland Curriculum
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Section 1

QUESTION 1

Leptons do not experience the

- (A) weak force.
- (B) strong force.
- (C) gravitational force.
- (D) electromagnetic force.

QUESTION 2

Calculate the initial horizontal velocity of a projectile with an initial velocity of 38 m s^{-1} at an angle of 42° up from the horizontal.

- (A) 25 m s^{-1}
- (B) 28 m s^{-1}
- (C) 34 m s^{-1}
- (D) 40 m s^{-1}

QUESTION 3

Identify the correct formula for the mass–energy equivalence relationship.

- (A) $E = mc^2$
- (B) $E = mgh$
- (C) $E = \frac{1}{2}mc^2$
- (D) $E = \frac{1}{2}mv^2$

QUESTION 4

What is the final velocity of a 5 kg object dropped from a height of 16 m?

- (A) 9 m s^{-1}
- (B) 11 m s^{-1}
- (C) 13 m s^{-1}
- (D) 18 m s^{-1}

QUESTION 5

Mesons are

- (A) subatomic particles composed of one quark and one antiquark.
- (B) elementary particles that are classified as leptons.
- (C) elementary particles exchanged between quarks.
- (D) subatomic particles composed of three quarks.

QUESTION 6

The *mass defect* is the difference between the

- (A) mass of a proton and neutron in a stationary nucleus.
- (B) mass of a parent nucleus and daughter nucleus after radioactive decay.
- (C) mass of an intact nucleus and the sum of the masses of the individual nucleons of which it is made.
- (D) mass of a nucleus at rest and a nucleus observed in relative motion from the same frame of reference.

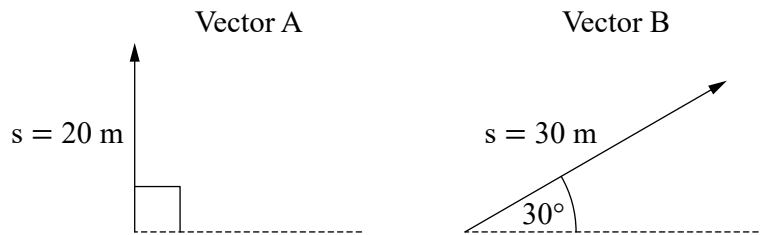
QUESTION 7

Normal force is the force acting along an imaginary line

- (A) parallel to the surface.
- (B) perpendicular to the surface.
- (C) opposite to the gravitational force.
- (D) in the same direction as the gravitational force.

QUESTION 8

The diagram shows two displacement vectors.



Calculate the resultant vector above the horizontal axis when Vector A is added to Vector B.

- (A) 43.6 m at 36.6°
- (B) 43.6 m at 53.4°
- (C) 48.4 m at 18.1°
- (D) 48.4 m at 71.9°

QUESTION 9

Alpha radiation is defined as

- (A) the release of electromagnetic energy from an unstable nucleus.
- (B) the radiation emitted by a black body from the conversion of thermal energy.
- (C) radiant energy consisting of synchronised oscillations of electric and magnetic fields.
- (D) the composite particle consisting of two protons and two neutrons tightly bounded together.

QUESTION 10

Proper length is the length measured in the frame of reference where the object is

- (A) at rest.
- (B) in motion.
- (C) accelerating.
- (D) in motion but not accelerating.

QUESTION 11

Uniform circular motion occurs when an object is travelling in a circle at a constant

- (A) speed, due to a force of constant magnitude acting in a parallel direction to its velocity.
- (B) velocity, due to a force of constant magnitude acting in a parallel direction to its speed.
- (C) speed, due to a force of constant magnitude acting in a perpendicular direction to its velocity.
- (D) velocity, due to a force of constant magnitude acting in a perpendicular direction to its speed.

QUESTION 12

Calculate the maximum height reached by a projectile with an initial velocity of 15 m s^{-1} at an angle of 30° up from the horizontal.

- (A) 2.87 m
- (B) 3.83 m
- (C) 8.61 m
- (D) 11.5 m

QUESTION 13

Calculate the orbital period of a satellite travelling around the Earth with a radius of $4.00 \times 10^8 \text{ m}$.

- (A) 3.49×10^{-2} hours
- (B) 3.94×10^2 hours
- (C) 6.99×10^2 hours
- (D) 1.76×10^9 hours

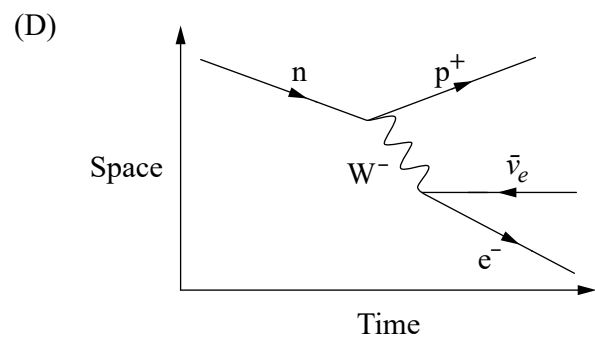
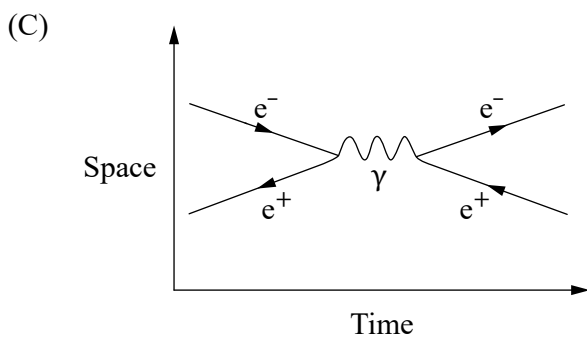
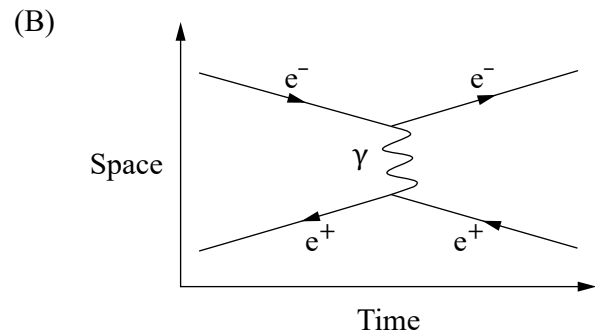
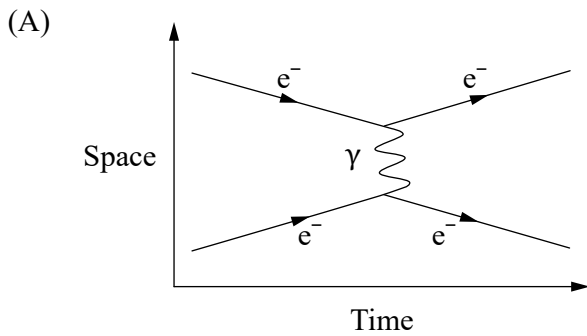
QUESTION 14

Which example describes one of Newton's laws of motion?

- (A) The acceleration of an object must always be uniform.
- (B) In the absence of a net force, an object maintains a constant velocity.
- (C) To an observer at rest, the length of a moving object appears shorter in the direction it is moving.
- (D) The force of attraction between each pair of point particles is inversely proportional to the square of the distance between them.

QUESTION 15

Which Feynman diagram shows an electron interacting with another electron?



QUESTION 16

The weight of a 5 kg object on Earth is

- (A) 0.49 N
- (B) 0.51 N
- (C) 49 N
- (D) 51 N

QUESTION 17

Which fundamental force is mediated by photons?

- (A) gravitational force
- (B) weak nuclear force
- (C) strong nuclear force
- (D) electromagnetic force

QUESTION 18

A gravitational field is the

- (A) net gravitational force per unit mass at a particular point in space.
- (B) energy stored in an object as a result of its position relative to another object.
- (C) region of space surrounding a body in which another body experiences a force of gravitational attraction.
- (D) position in space where objects experience a force or acquire potential energy as they are 'worked' into that position.

QUESTION 19

A spaceship with a velocity of $9.0 \times 10^7 \text{ m s}^{-1}$ is measured to be 125 m in length by an observer at rest.

Calculate the length of the spaceship as measured by somebody on board the spaceship.

- (A) 119 m
- (B) 131 m
- (C) 137 m
- (D) 178 m

QUESTION 20

To determine a value for acceleration due to gravity, a student dropped an object from a height equal to their eye-level and counted the time from release to impact. The student then conducted the experiment two more times.

To reduce the percentage error of the experimental value for acceleration due to gravity, the student should

- (A) use an object with a lower mass.
- (B) conduct more trials of the experiment.
- (C) increase the height from which the object is released.
- (D) use a stopwatch to measure the time from release to impact.



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