Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

PHYSICS **0625/11**

Paper 1 Multiple Choice (Core) **May/June 2017**

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB recommended)

MODIFIED LANGUAGE

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
Electronic calculators may be used.
Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m/s^2).

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **19** printed pages and **1** blank page.

1 A stopwatch is used to time a runner in a race. The diagrams show the stopwatch at the start and at the end of the race.

start

end

How long did the runner take to run the race?

A 70.00 seconds

B 110.00 seconds

C 115.20 seconds

D 155.20 seconds

Answer

The correct answer is A: 70.00 seconds.

Step-by-Step Explanation:
Identify the Start and End Times:

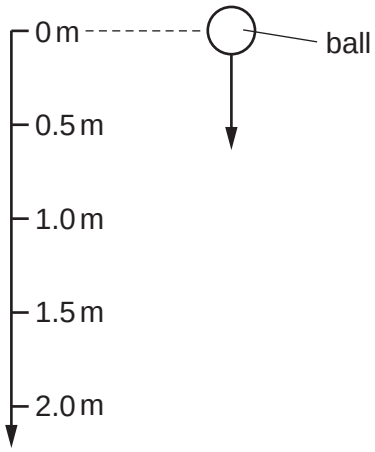
The start time on the stopwatch is 0 minutes 45.20 seconds (45.20 seconds).
The end time on the stopwatch is 1 minute 55.20 seconds.
Convert the End Time to Seconds:

1 minute = 60 seconds, so 1 minute 55.20 seconds = 60 + 55.20 = 115.20 seconds.
Calculate the Time Taken:

Time taken = End time - Start time
Time taken = 115.20 seconds - 45.20 seconds
Time taken = 70.00 seconds
Final Answer:
A: 70.00 seconds.

2 On Earth, a ball is dropped and falls 2.0 m in a vacuum.

The acceleration of the ball at 1.0 m is 10 m / s^2.



What is the acceleration of the ball at 0.5 m?

A 5.0 m / s^2 **B** 10 m / s^2 **C** 15 m / s^2 **D** 20 m / s^2

Answer

The correct answer is B: 10 m/s².

Step-by-Step Explanation:
Understanding Acceleration Due to Gravity

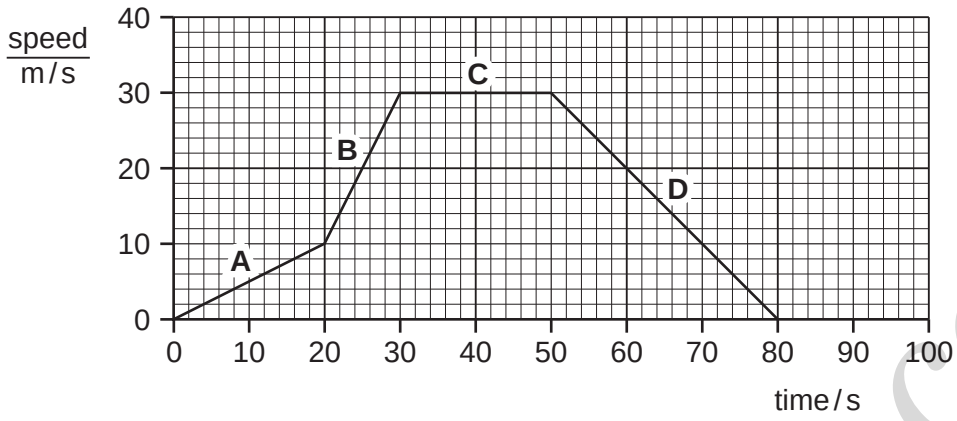
The ball is falling in a vacuum, meaning there is no air resistance.
On Earth, the acceleration due to gravity (g) is always 10 m/s², regardless of height.
Checking Given Information

The problem states that the acceleration at 1.0 m is 10 m/s².
Since acceleration due to gravity is constant, it remains 10 m/s² at all heights, including at 0.5 m.
Why Not Other Options?

A (5.0 m/s²) → Incorrect, because acceleration due to gravity does not decrease at lower heights.
C (15 m/s²) → Incorrect, because gravity remains constant.
D (20 m/s²) → Incorrect, because Earth's gravity is 10 m/s², not 20 m/s².
Final Answer:
B: 10 m/s²

3 The speed-time graph represents a motorcycle journey.

In which part of the graph is the acceleration equal to zero?



Answer

The correct answer is C.

Step-by-Step Explanation:
Understanding Acceleration in a Speed-Time Graph

Acceleration is the rate of change of speed.
In a speed-time graph, acceleration is represented by the slope (gradient) of the graph.
If the graph has a positive slope, the motorcycle is accelerating.
If the graph has a negative slope, the motorcycle is decelerating.
If the graph is horizontal (flat line), the speed is constant, meaning acceleration is zero.
Identifying the Section Where Acceleration is Zero

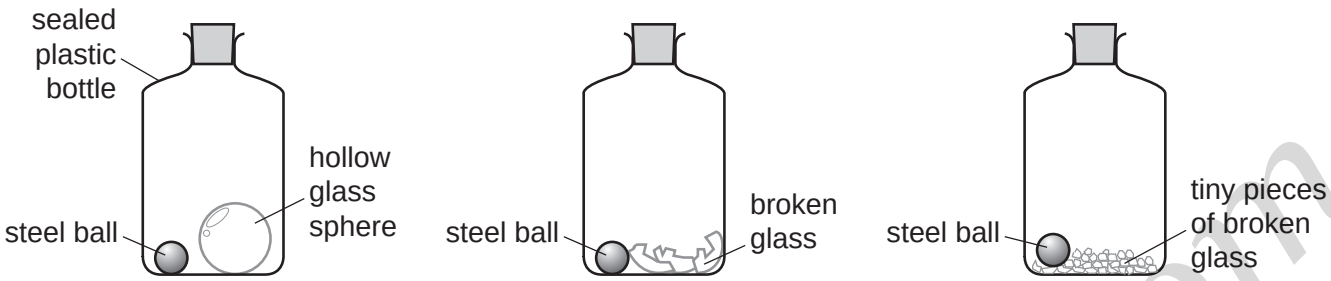
A and B: The graph is sloping upward, meaning the motorcycle is accelerating.
D: The graph is sloping downward, meaning the motorcycle is decelerating.
C: The graph is a horizontal straight line, meaning the speed is constant and acceleration is zero.

Final Answer:
C: The acceleration is zero where the graph is horizontal, indicating constant speed.

4 Diagram 1 shows a sealed plastic bottle containing a hollow glass sphere and a steel ball.

Diagram 2 shows the same bottle after it has been shaken.

Diagram 3 shows the same bottle after it has been shaken again until the broken glass is in tiny pieces.



The mass of the bottle and contents in diagram 1 is m_1.

The mass of the bottle and contents in diagram 2 is m_2.

The mass of the bottle and contents in diagram 3 is m_3.

Which statement gives the correct relation between m_1, m_2 and m_3?

A m_1 is equal to m_2 and m_2 is equal to m_3.

B m_1 is greater than m_2 and m_2 is greater than m_3.

C m_1 is less than m_2 and m_2 is greater than m_3.

D m_1 is less than m_2 and m_2 is less than m_3.

Answer

The correct answer is A: m_1 is equal to m_2 and m_2 is equal to m_3.

Step-by-Step Explanation:
Understanding the Changes in the Bottle

In diagram 1, the bottle contains a hollow glass sphere and a steel ball.
In diagram 2, the glass sphere has broken into large pieces.
In diagram 3, the broken glass has been shaken further into tiny pieces.
Does Mass Change?

Mass is a conserved quantity, meaning it does not change unless some material is added or removed.
In all three diagrams, nothing has been removed from or added to the bottle.
The only change is the physical state of the glass sphere, but its mass remains the same.
Analyzing the Mass Relationships

Since no material is lost, the total mass remains the same in all cases.
Therefore, $m_1 = m_2 = m_3$.
Why Not Other Options?
B ($m_1 > m_2 > m_3$) → Incorrect, because no mass is lost during the process.
C ($m_1 < m_2 > m_3$) → Incorrect, because the mass does not increase.
D ($m_1 < m_2 < m_3$) → Incorrect, as the mass remains constant.
Final Answer:
A: m_1 is equal to m_2 and m_2 is equal to m_3.

5 A student is weighed on laboratory scales.

Which row about weight and mass is correct?

	unit of weight	unit of mass
A	kg	kg
B	kg	N
C	N	kg
D	N	N

Answer
Let's clarify the difference between weight and mass:

Mass
Mass is the amount of matter in an object
Mass is measured in kilograms (kg)
Mass does not change with location
Mass is a scalar quantity

Weight
Weight is the gravitational force acting on a mass
Weight is measured in newtons (N)
Weight changes with location (different on Earth vs Moon)
Weight is a force, so it's measured in newtons

Looking at the options:

Option A: Weight in kg, Mass in kg
Incorrect: Weight cannot be measured in kg

Option B: Weight in kg, Mass in N
Incorrect: Both units are wrong

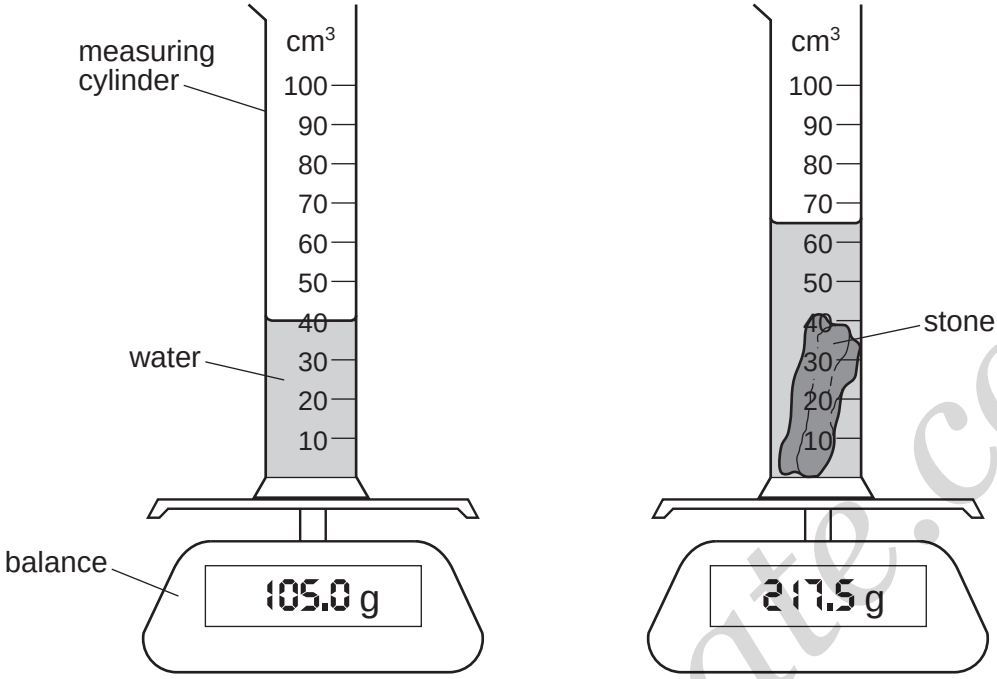
Option C: Weight in N, Mass in kg
Correct! Weight is in newtons and mass is in kilograms

Option D: Weight in N, Mass in N
Incorrect: Mass cannot be measured in N

Therefore, the correct answer is C: Weight is measured in newtons (N) and mass is measured in kilograms (kg).

6 A measuring cylinder containing only water is placed on an electronic balance. A small, irregularly shaped stone is now completely immersed in the water.

The diagrams show the equipment before and after the stone is immersed.



What is the density of the material of the stone?

A $1.7\,g/cm^3$ **B** $3.3\,g/cm^3$ **C** $4.5\,g/cm^3$ **D** $8.7\,g/cm^3$

Answer

The correct answer is C: 4.5 g/cm³.

Step-by-Step Explanation
1. Find the Mass of the Stone
Mass before immersion (water + measuring cylinder) = 105.0 g
Mass after immersion (water + measuring cylinder + stone) = 217.5 g
Mass of the stone = 217.5 g - 105.0 g = 112.5 g
2. Find the Volume of the Stone
Initial water level = 30 cm³
Final water level = 55 cm³
Volume displaced by the stone (which is equal to the volume of the stone) = 55 cm³ - 30 cm³ = 25 cm³
3. Calculate the Density of the Stone
Density formula: Density = Mass / Volume
Density of the stone = 112.5 g / 25 cm³
Density = 4.5 g/cm³

Final Answer:
C: 4.5 g/cm³

7 A boat is travelling at a steady speed in a straight line across the surface of a lake.

Which statement about the boat is correct?

A The resultant force on the boat is in the direction of motion.

B The resultant force on the boat is in the opposite direction to its motion.

C The resultant force on the boat is vertically downwards.

D The resultant force on the boat is zero.

Answer
Let's analyze this using Newton's Laws of Motion:

Newton's First Law states that an object will remain in uniform motion (constant velocity) unless acted upon by a net force.

In this case, we know:

The boat is moving at a "steady speed" (constant velocity)
It's moving in a "straight line" (no change in direction)
This means there is no acceleration

Let's examine each option:

Option A: Resultant force in direction of motion
Incorrect: This would cause acceleration forward
The boat would speed up, not maintain steady speed

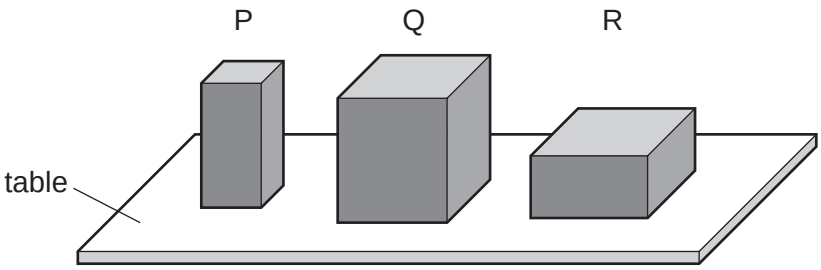
Option B: Resultant force opposite to motion
Incorrect: This would cause deceleration
The boat would slow down

Option C: Resultant force vertically downwards
Incorrect: This would cause the boat to sink
The boat is floating, so upward buoyancy balances downward weight

Option D: Resultant force is zero
Correct!
For constant velocity motion, all forces must balance
Forward thrust balances water resistance
Upward buoyancy balances downward weight
Net force = 0 allows steady speed in straight line

Therefore, the correct answer is D: The resultant force on the boat is zero.
This follows directly from Newton's First Law - an object moving at constant velocity must have zero net force acting on it.

8 The diagram shows three uniform, solid wooden blocks with a square cross-sectional area resting on a horizontal table.



Which list puts the blocks in order from the **least** stable to the **most** stable?

A P → Q → R

B P → R → Q

C R → P → Q

D R → Q → P

Answer

The correct answer is A: P → Q → R (from least stable to most stable).

Step-by-Step Explanation
1. Understanding Stability of Objects
The stability of an object depends on two main factors:

Height of the center of mass – A higher center of mass makes an object less stable.
Base area – A wider base provides more stability.
Objects with a higher center of mass are more likely to topple over when tilted.

Objects with a lower center of mass are more stable because they require a greater tilt before their center of mass moves outside the base.

2. Analyzing the Stability of Blocks P, Q, and R
P (Tall and narrow)
Has the highest center of mass, making it least stable.
Q (Medium height, medium width)
Has a lower center of mass than P but is still relatively tall.
R (Short and wide)
Has the lowest center of mass, making it the most stable.
3. Ordering from Least Stable to Most Stable
P is the least stable (tallest).
Q is more stable than P but less stable than R.
R is the most stable (widest and lowest center of mass).
Thus, the correct order is:
P → Q → R

Final Answer:
A: P → Q → R (from least stable to most stable).

9 Energy resources are used to generate electricity.

Which resource is renewable and does **not** release carbon dioxide when being used to produce electricity?

A biomass

B nuclear

C oil

D wind

Answer

Let's analyze each energy resource based on two criteria:

Is it renewable?
Does it release CO_2 during electricity generation?
Option A: Biomass

Renewable? YES (plants can be regrown)
Releases CO_2? YES (burning biomass releases CO_2)
Not the answer because it releases CO_2
Option B: Nuclear

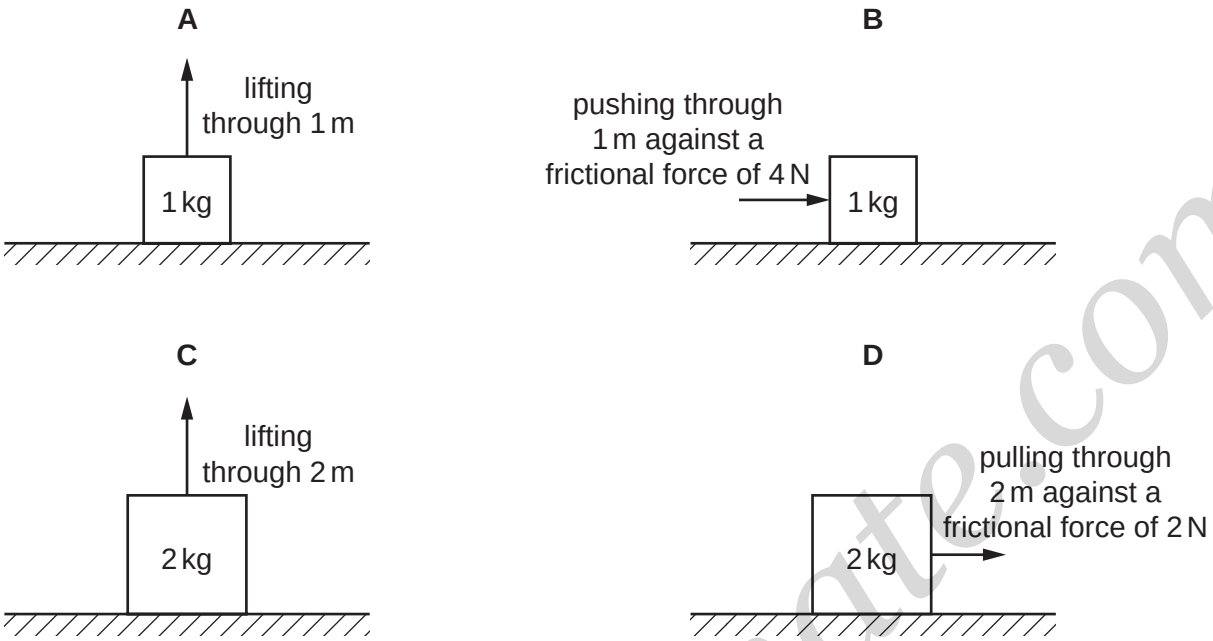
Renewable? NO (uranium is a finite resource)
Releases CO_2? NO (fission doesn't produce CO_2)
Not the answer because it's not renewable
Option C: Oil

Renewable? NO (fossil fuels are finite)
Releases CO_2? YES (burning oil releases CO_2)
Not the answer - fails both criteria
Option D: Wind

Renewable? YES (wind is continuous and naturally replenished)
Releases CO_2? NO (no combustion involved)
This is the correct answer - meets both criteria
Therefore, the correct answer is D: Wind energy is both renewable and does not release CO_2 during electricity generation.

10 A student does some simple exercises.

In which exercise is the most work done?



Answer

The correct answer is C: Lifting 2 kg through 2 m.

Step-by-Step Explanation
1. Understanding Work Done
Work done (W) = Force (F) × Distance (d) in the direction of the force.
When lifting an object, the force applied is equal to its weight, which is calculated using:
Weight (F) = mass × gravitational acceleration (g)
(where g = 10 m/s² on Earth).
When pushing or pulling an object against friction, the force is equal to the frictional force.
2. Calculate Work Done for Each Exercise
A (Lifting 1 kg through 1 m)

Weight = 1 kg × 10 = 10 N
Work done = 10 N × 1 m = 10 J
B (Pushing 1 kg through 1 m against a frictional force of 4 N)

Work done = 4 N × 1 m = 4 J
C (Lifting 2 kg through 2 m)

Weight = 2 kg × 10 = 20 N
Work done = 20 N × 2 m = 40 J
D (Pulling 2 kg through 2 m against a frictional force of 2 N)

Work done = 2 N × 2 m = 4 J
3. Identifying the Maximum Work Done
Work done in C (40 J) is the highest compared to A (10 J), B (4 J), and D (4 J).
Therefore, the most work is done in exercise C.

Final Answer:
C: Lifting 2 kg through 2 m (40 J of work).