Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/11**

Paper 1 Multiple Choice (Core) **May/June 2021**

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m / s^2).

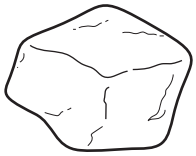
INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

This document has **16** pages.

[Turn over

1 The diagram shows a stone of irregular shape.



Which property of the stone can be found by lowering it into a measuring cylinder half-filled with water?

A length

B mass

C volume

D weight

The correct answer to this question is:

C - Volume

Explanation: When an irregularly shaped stone is lowered into a measuring cylinder containing water, it displaces a certain volume of water. The difference between the initial water level and the new water level after the stone is submerged gives the volume of the stone. This method is based on Archimedes' principle.

Other options are incorrect because:

Length (A) cannot be measured using a measuring cylinder.
Mass (B) requires a balance or scale.
Weight (D) requires a force-measuring device like a spring balance.
Thus, the property that can be determined using this method is volume.

2 Two stones of different weights fall at the same time from a table. Air resistance may be ignored.

What will happen and why?

	what will happen	why
A	Both stones hit the floor at the same time.	Acceleration of free fall is constant.
B	Both stones hit the floor at the same time.	They fall at constant speed.
C	The heavier stone hits the floor first.	Acceleration increases with weight.
D	The heavier stone hits the floor first.	Speed increases with weight.

Answer

To understand what happens when two stones of different weights fall from the same height, we need to consider the factors affecting their motion. In this scenario, air resistance is ignored, so the only force acting on the stones is gravity.

According to the principles of physics, specifically Galileo's law of falling bodies, all objects fall at the same rate in a vacuum, regardless of their mass. This is because the acceleration due to gravity is constant for all objects near the surface of the Earth, approximately 9.81 meters per second squared.

Let's evaluate each option:

A: Both stones hit the floor at the same time. Why: Acceleration of free fall is constant.

This is correct because the acceleration due to gravity is the same for both stones, regardless of their weight.
B: Both stones hit the floor at the same time. Why: They fall at constant speed.

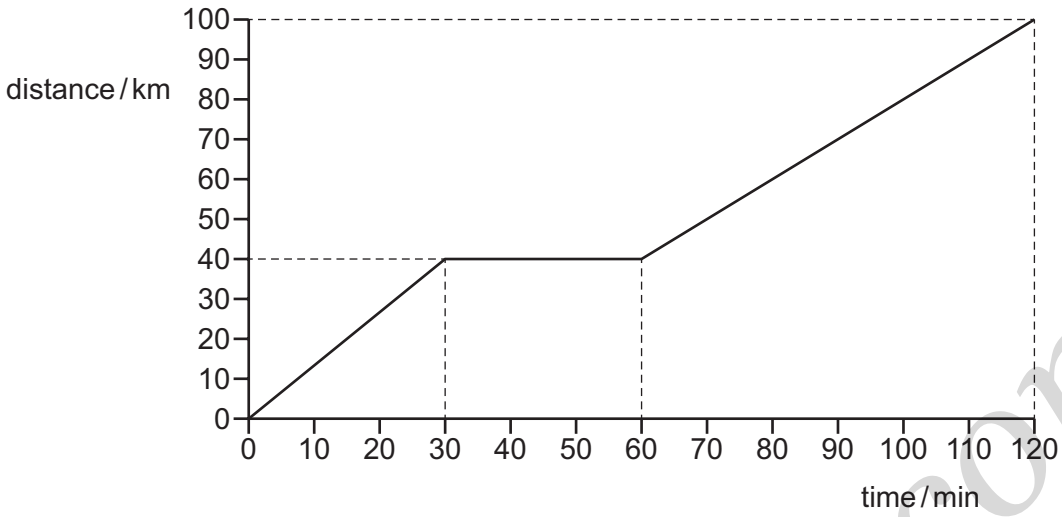
This is incorrect. While both stones hit the floor at the same time, they do not fall at constant speed; they accelerate due to gravity.
C: The heavier stone hits the floor first. Why: Acceleration increases with weight.

This is incorrect. Acceleration due to gravity is constant and does not depend on the object's weight.
D: The heavier stone hits the floor first. Why: Speed increases with weight.

This is incorrect. Speed does not increase with weight when air resistance is ignored; both stones accelerate at the same rate due to gravity.

Therefore, the correct answer is A: Both stones hit the floor at the same time because the acceleration of free fall is constant.

3 The distance–time graph for a motorway journey is shown.



What is the average speed for the journey?

A 50 km / h **B** 67 km / h **C** 70 km / h **D** 83 km / h

To calculate the average speed for the journey, we use the formula:

Average speed = Total distance / Total time

From the graph:

The total distance covered is 100 km (as shown on the vertical axis).
The total time taken is 120 minutes, which is equivalent to 2 hours (since 120 minutes / 60 minutes = 2 hours).
Now, apply the formula:

Average speed = 100 km / 2 hours = 50 km/h

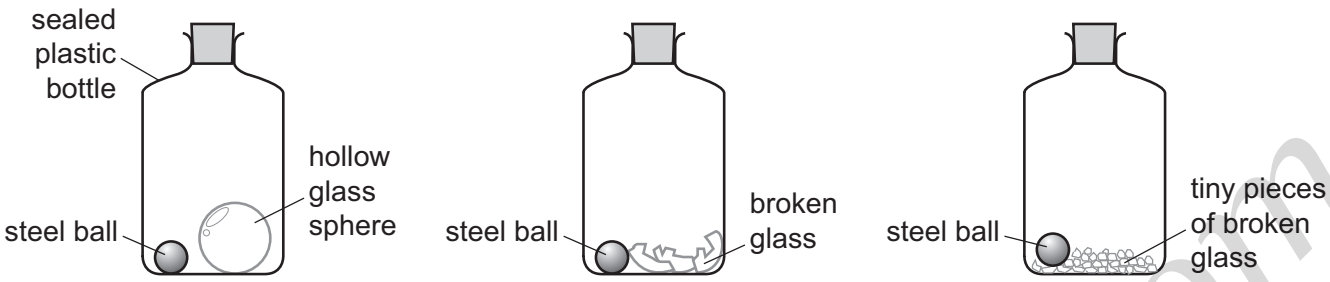
Thus, the average speed for the journey is 50 km/h.

Answer: A 50 km/h

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.

Let's analyze the situation step by step:

Diagram 1: The bottle contains a hollow glass sphere and a steel ball. The total mass of the bottle and contents is m1.
Diagram 2: After the bottle has been shaken, the hollow glass sphere is broken, and it now contains the pieces of broken glass. The total mass of the bottle and contents is m2.
Diagram 3: After further shaking, the broken glass is in tiny pieces. The total mass of the bottle and contents is m3.
Key Observations:
The mass of the bottle and contents in Diagram 1: Initially, the bottle contains a hollow glass sphere and a steel ball. The hollow glass sphere, though it is filled with air, still has mass. The steel ball contributes its mass as well, and the mass is m1.

The mass of the bottle and contents in Diagram 2: After the bottle is shaken, the glass sphere breaks into pieces, but no mass is lost during the breaking process. The total mass remains the same; therefore, m2 = m1.

The mass of the bottle and contents in Diagram 3: The broken pieces of glass are now smaller, but the total mass again does not change. This is because the total amount of glass and the steel ball's mass have not changed. m3 = m2.

Conclusion:
Since no mass is lost or added in the process of breaking the glass and shaking the bottle, the mass remains the same in all three diagrams.

Thus, the correct answer is:
A: m1 is equal to m2 and m2 is equal to m3.

5 On Mars, the acceleration of free fall g is $3.7\,m/s^2$.

What is the weight of a 2.0 kg mass on Mars?

A 0.54 N **B** 1.9 N **C** 7.4 N **D** 20 N

Answer

To find the weight of an object on Mars, we use the formula for weight:

Weight (W) = mass (m) * acceleration due to gravity (g).

Given:

Mass (m) = 2.0 kg
Acceleration due to gravity on Mars (g) = 3.7 m/s²
Using the formula:

Weight = 2.0 kg * 3.7 m/s² = 7.4 N

Therefore, the weight of a 2.0 kg mass on Mars is 7.4 N.

The correct answer is C: 7.4 N.

6 The mass of an empty flask is 34 g.

The volume of liquid added to the flask is 20 cm^3.

The total mass of the flask and the liquid is 50 g.

What is the density of the liquid?

A 0.80 g / cm^3 **B** 1.25 g / cm^3 **C** 2.50 g / cm^3 **D** 4.20 g / cm^3

Answer

To calculate the density of the liquid, we need to determine the mass of the liquid and then use the formula for density:

Density (ρ) = mass of the liquid (m) / volume of the liquid (V).

Given:

Mass of the empty flask = 34 g
Total mass of the flask and the liquid = 50 g
Volume of the liquid = 20 cm^3
First, calculate the mass of the liquid:

Mass of the liquid = Total mass - Mass of the empty flask = 50 g - 34 g = 16 g

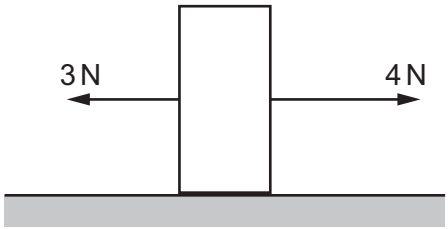
Now, use the formula for density:

Density = Mass of the liquid / Volume of the liquid = 16 g / 20 cm^3 = 0.80 g/cm^3

Therefore, the density of the liquid is 0.80 g/cm^3.

The correct answer is A: 0.80 g/cm^3.

7 The diagram shows a solid object on a flat surface, with two forces acting on the object.



What is the resultant force on the object?

A 1 N to the left

B 1 N to the right

C 7 N to the left

D 7 N to the right

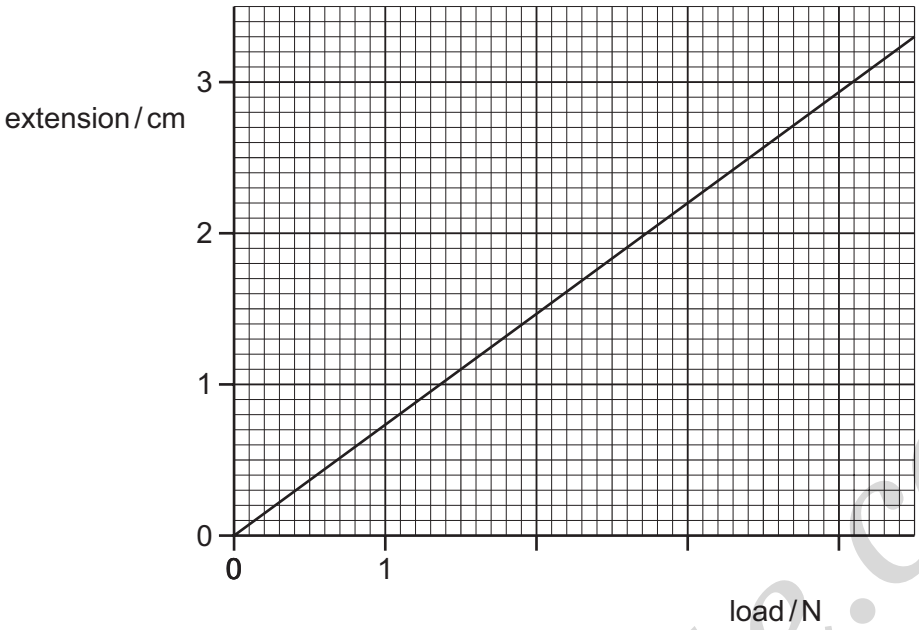
Let's analyze the forces on the object:

There is a force of 3 N acting to the left.
There is a force of 4 N acting to the right.
To find the resultant force, we subtract the smaller force (3 N to the left) from the larger force (4 N to the right).

Resultant force = 4 N (to the right) - 3 N (to the left) = 1 N to the right.

Correct answer: B 1 N to the right

8 The extension–load graph for a spring is shown. The unstretched length of the spring is 17.0 cm.



When an object is suspended from the spring, the length of the spring is 19.2 cm.

What is the weight of the object?

A 1.4 N **B** 1.6 N **C** 2.6 N **D** 3.0 N

Let's analyze the problem step by step:

Given:
Unstretched length of the spring: 17.0 cm
Stretched length when the object is hanging: 19.2 cm
To calculate the extension of the spring, subtract the unstretched length from the stretched length:

Extension = 19.2 cm - 17.0 cm = 2.2 cm
Now, we need to understand how the extension relates to the load (force applied to the spring). The extension-load graph shows how the spring stretches as different forces are applied.

From the graph:

We find that for 2.2 cm extension, the corresponding load is 6.0 N.
Conclusion:
The weight of the object is 6.0 N, so the correct answer is:

D. 6.0 N.

9 Which situation involves no work being done and no energy being transferred?

A a car skidding to a stop on a road

B a crane lifting a load

C a heavy load hanging from a strong bar

D a student dragging a big box over a rough floor

Answer

To determine which situation involves no work being done and no energy being transferred, we need to consider the definition of work and energy transfer. Work is done when a force causes displacement in the direction of the force. Energy transfer occurs when energy moves from one system to another.

Let's evaluate each option:

A: A car skidding to a stop on a road

Work is done against friction, and kinetic energy is transferred into thermal energy due to friction. So, work and energy transfer occur.
B: A crane lifting a load

Work is done by the crane in lifting the load against gravity, and energy is transferred from the crane to the load.
C: A heavy load hanging from a strong bar

No work is done because there is no displacement. The load is stationary, so no energy is transferred.
D: A student dragging a big box over a rough floor

Work is done against friction while dragging the box, and energy is transferred from the student to the box.

Therefore, the correct answer is C: A heavy load hanging from a strong bar, as it involves no work being done and no energy being transferred.

10 A student suggests that there are several ways of transferring energy to a small, stationary block of iron on a smooth table. He makes the following suggestions.

1 Heat it.

2 Shine light on it.

3 Pass a current through it.

Which suggestions are correct?

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

Answer

To determine which suggestions involve transferring energy to the block of iron, we need to consider how energy can be transferred:

Heating it: This transfers energy to the block by increasing its thermal energy. This is a correct method of energy transfer.

Shining light on it: Light carries energy in the form of electromagnetic radiation, which can be absorbed by the block, increasing its energy. This is also a correct method of energy transfer.

Passing a current through it: When an electric current flows through the block, electrical energy is transferred to the block, often increasing its thermal energy due to resistance. This is a correct method of energy transfer as well.

All three suggestions involve transferring energy to the block of iron. Therefore, the correct answer is D: 1, 2, and 3.