This is a Class 1 exam

Lebanon Evangelical School for Boys and Girls

Lighting the fires that burn for eternity

Louéizeh - Baabda

Lebanon Evangelical School

for Boys and Girls — Loueizeh - Baabda

SE01 Exam

10NOV2025

Do NOT write in this box. Your MARK will be placed here.

Subject :	Physics
Class :	10A
Teacher :	Dr Ruth Brett
Duration :	1 hour

You should find any formulae you need and the value of g on the last page. You may remove the formula sheet and NOT re-attach it.

You are to answer the questions to this exam on : This exam paper

Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

Q1.

(a) Diagram 1 shows a metal ball held at rest above the floor.

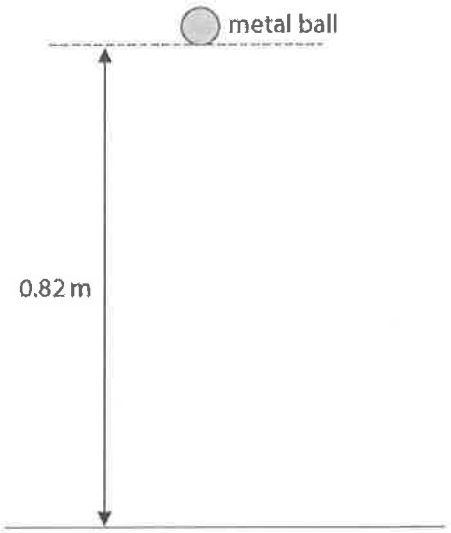


Diagram 1

The metal ball has a mass of 0.52 kg and is held at a height of 0.82 m above the floor.

(i) Calculate the decrease in the metal ball's GPE store when the ball falls to the floor from this height.

(2)

decrease in GPE store = ... J

(ii) State the amount of energy in the metal ball's kinetic store just before it hits the floor. Ignore the effects of air resistance.

(1)

energy in kinetic store = ... J

(iII) Calculate the speed of the metal ball just before it hits the floor.

(4)

speed = ... m/s

(Total for question = 7 marks)

Q2. A technician uses a water bath to heat some water.

(a) The water bath is filled with water at an initial temperature of 15 °C.

Calculate the initial temperature of the water in kelvin.

(1)

initial temperature = ... K

(b) The technician heats the water to a final temperature of 60 °C.

The energy transferred in the heating process is 932 kJ.
Calculate the mass of water being heated.
Assume that all the energy is transferred to the thermal store of the water.
[for water, specific heat capacity = 4200 J / kg °C]

(3)

mass of water = ... kg

(c) Some water evaporates as a gas from the water bath.

(i) Describe the arrangement of particles in a gas.

(2)

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(ii) Describe **two** differences between evaporation and boiling.

(2)

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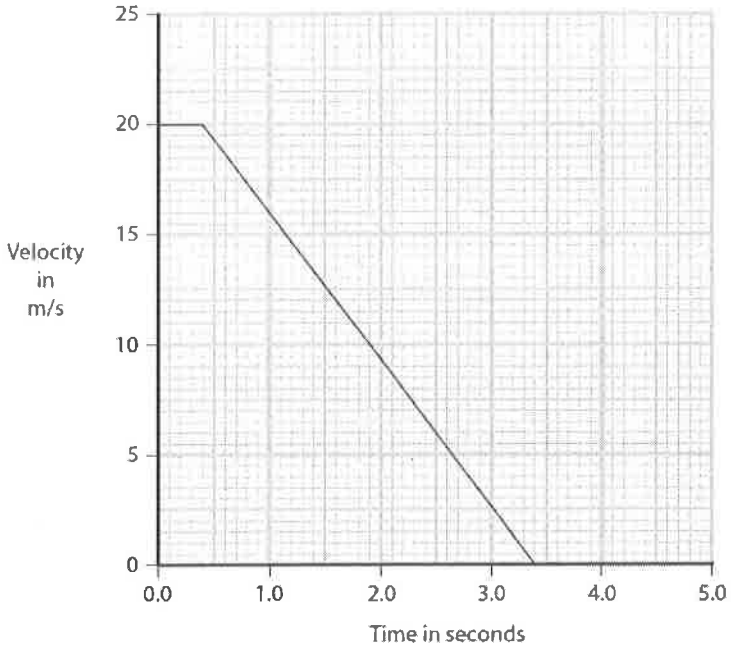
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(Total for question = 8 marks)

Q3. A person is driving a car along a dry road. They see an obstruction and apply the brakes. This is the velocity-time graph for the car.



(a) Which feature of the graph gives the acceleration of the car while the car is braking?

(1)

- ☐ **A** area under the line from 0.0 to 0.4 seconds
- ☐ **B** area under the line from 0.4 to 3.4 seconds
- ☐ **C** gradient of the line from 0.0 to 0.4 seconds
- ☐ **D** gradient of the line from 0.4 to 3.4 seconds

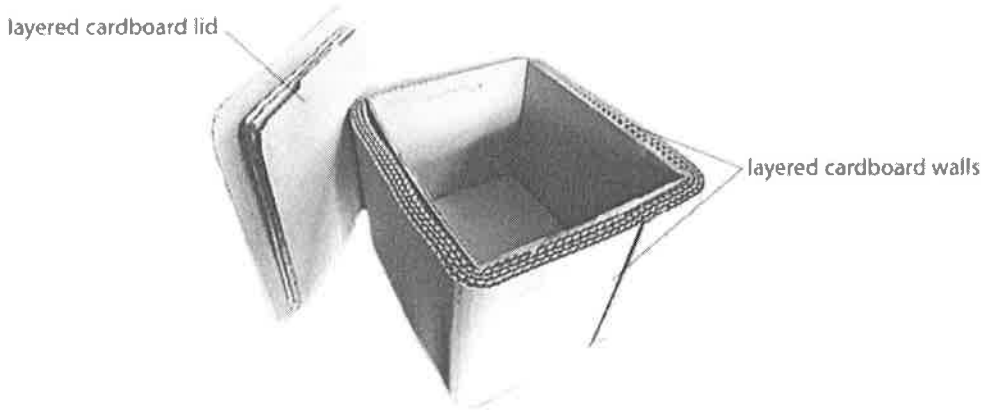
(b) Use the graph to determine the braking distance of the car.

(3)

braking distance =.....m

(Total for question = 4 marks)

Q4. The photograph shows a recyclable box designed for transporting cold food.



The box has these design features

- thick walls made from several layers of cardboard with air trapped between the layers
- a thick lid made from layers of cardboard

Cold food and ice packs are placed in the box.

(a) Give a reason why there is a net transfer of energy from the outside of the box to the inside of the box during transportation in a hot country.

(1)

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(b) Explain how the box is designed to reduce energy transfer by **conduction**.

(2)

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(c) Explain how the box is designed to reduce energy transfer by **convection**.

(2)

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(d) A student suggests that painting the inner surfaces of the box a different colour would help to reduce the rate of energy transfer to the cold food.

Explain which colour the inner surfaces of the box should be painted.

(2)

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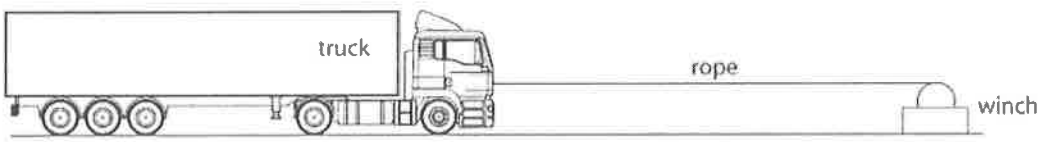
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(Total for question = 7 marks)

Q5. A winch is used to pull a truck along a horizontal road.

The winch is connected to the truck by a thick rope.



(Source: © A. Bizgaimer/Shutterstock)

(a) The winch does 41 kJ of useful work on the truck when the truck is pulled a horizontal distance of 15 m.

Calculate the force that the rope exerts on the truck.

(3)

force = ... N

(b) The winch includes a small engine. The engine burns petrol to power the motor in the winch.

The winch transfers energy mechanically to the truck.

(i) The winch has an efficiency of 25% when pulling the truck.
Draw and label a Sankey diagram for this energy transfer.

(3)

(ii) The winch can also be used to pull the truck uphill at a constant speed.
The table gives some energy stores.
Add one tick (✓) to each row to show what happens to the energy in each store as the truck is pulled uphill.

(4)

Energy store	Decreases	Increases	Stays the same
chemical store of petrol in winch			
gravitational store of truck			
kinetic store of truck			
thermal store of surroundings			

(Total for question = 10 marks)

Q6. A student needs to determine the density of some small rocks that appear to all be made of the same material.



(Source: © Chake / Shutterstock)

(a) The student uses an electronic balance to measure the mass of each rock.

Describe a method the student could use to **accurately** determine the volume of each rock. You may draw a diagram to help your answer.

(3)

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(b) The table shows the student's results for three of the rocks.

Rock	Mass in g	Volume in cm^3
A	15	6.3
B	13	6.1
C	16	7.5

After looking at the data, the student concludes that one of the rocks may be made of a different material from the others.

Using the data from the table, justify the student's conclusion.

(4)

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(Total for question = 7 marks)

Q7.

A camel has a mass of 660 kg.
The total area of contact of the camel's feet with the ground is 1300 cm^2.

Calculate the pressure this camel exerts on the ground.

(3)

pressure = ... N / cm^2

(Total for question = 3 marks)

Q8.

(a) Diagram 1 shows a plastic bottle containing water.



Diagram 1

The pressure difference between the surface of the water and the water at the bottom of the bottle is 2300 Pa.

Calculate the depth of water in the bottle.

Give your answer in cm.

[density of water = 1000 kg / m^3]

(3)

depth = ... cm

(b) Three holes are made in the bottle at positions A, B and C.

Diagram 2 shows the path of the water leaving the bottle from hole B.

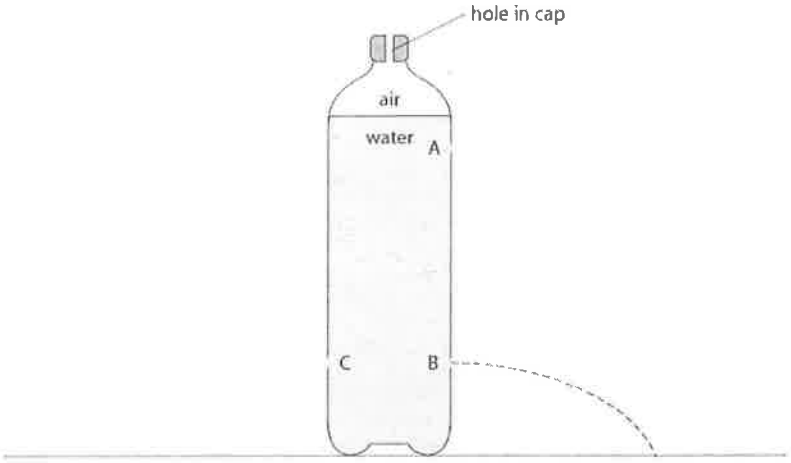


Diagram 2

(i) Draw a line on diagram 2 to show the path of the water leaving the bottle from hole A.

(1)

(ii) Explain the path of the water leaving the bottle from hole A.

(2)

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(iii) Hole C is at the same depth in the bottle as hole B but on the opposite side of the bottle. Explain the shape of the path of the water leaving the bottle from hole C.

(3)

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(Total for question = 9 marks)

EQUATIONS : REMOVE THIS PAGE AND DO **NOT** RETURN IT WITH YOUR PAPER

If necessary, take the acceleration of free fall, $g = 10\text{m/s}^2$

1. Forces and Motion	
average speed = $\frac{\text{distance moved}}{\text{time taken}}$	
acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$	$a = \frac{(v-u)}{t}$
(final speed)^2 = (initial speed)^2 + (2 × acceleration × distance moved)	$v^2 = u^2 + (2 \times a \times s)$
force = mass × acceleration	$F = m \times a$
weight = mass × gravitational field strength	$W = m \times g$

4. Energy resources and energy transfers	
efficiency = $\frac{\text{useful energy output}}{\text{total energy output}} \times 100\%$	
work done = force × distance moved	$W = F \times d$
gravitational potential energy = mass × gravitational field strength × height	$GPE = m \times g \times h$
kinetic energy = $\frac{1}{2}$ × mass × speed^2	$KE = \frac{1}{2} \times m \times v^2$
power = $\frac{\text{work done}}{\text{time taken}}$	$P = \frac{W}{t}$

5. Solids, liquids and gases	
density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$
pressure = $\frac{\text{force}}{\text{area}}$	$p = \frac{F}{A}$
pressure difference = height × density × gravitational field strength	$p = h \times \rho \times g$
$\frac{\text{pressure}}{\text{temperature}}$ = constant	$\frac{p_1}{T_1} = \frac{p_2}{T_2}$
pressure × volume = constant	$p_1 \times V_1 = p_2 \times V_2$

change in thermal energy = mass × specific heat capacity × change in temperature
$\Delta Q = m \times c \times \Delta T$

Q1.

(a) Diagram 1 shows a metal ball held at rest above the floor.

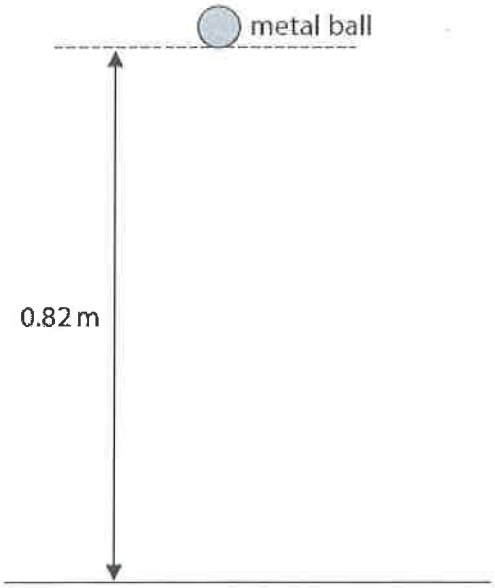


Diagram 1

The metal ball has a mass of 0.52 kg and is held at a height of 0.82 m above the floor.

(i) Calculate the decrease in the metal ball's GPE store when the ball falls to the floor from this height.

(2)

$GPE = m \times g \times h = 0.52 \times 10 \times 0.82 = 4.264$ (1)

decrease in GPE store = 4.26 (1) J

(ii) State the amount of energy in the metal ball's kinetic store just before it hits the floor. Ignore the effects of air resistance.

(1)

(1)

energy in kinetic store = 4.26 J

(iII) Calculate the speed of the metal ball just before it hits the floor.

(4)

$KE = \frac{1}{2} \times m \times v^2$ $\quad 4.26 = \frac{1}{2} \times 0.52 \times v^2$ (1)

$v^2 = \frac{4.26}{0.26} = 16.384$ (1) $\quad v = \sqrt{16.384} = 4.048$ (1)

(1)

speed = 4.05 m/s

(Total for question = 7 marks)

Q2. A technician uses a water bath to heat some water.

(a) The water bath is filled with water at an initial temperature of 15 °C.

Calculate the initial temperature of the water in kelvin.

(1)

$T\,(K) = 15 + 273 = 288\ K$

initial temperature = 288 (1) K

(b) The technician heats the water to a final temperature of 60 °C.

The energy transferred in the heating process is 932 kJ. $\Delta Q = 932\,000$
Calculate the mass of water being heated.
Assume that all the energy is transferred to the thermal store of the water.
[for water, specific heat capacity = 4200 J / kg °C]

(3)

$\Delta Q = m \times c \times \Delta T$

$\Delta T = 60 - 15 = 45$ could be here

$932\,000 = m \times 4200 \times 45$ (1)

$m = \frac{932\,000}{189\,000} = 4.93\ kg$

(1)

(1)

mass of water = 4.93 kg

(c) Some water evaporates as a gas from the water bath.

(i) Describe the arrangement of particles in a gas.

(2)

The particles in a gas are arranged randomly (1) and far apart. (1)

(ii) Describe **two** differences between evaporation and boiling.

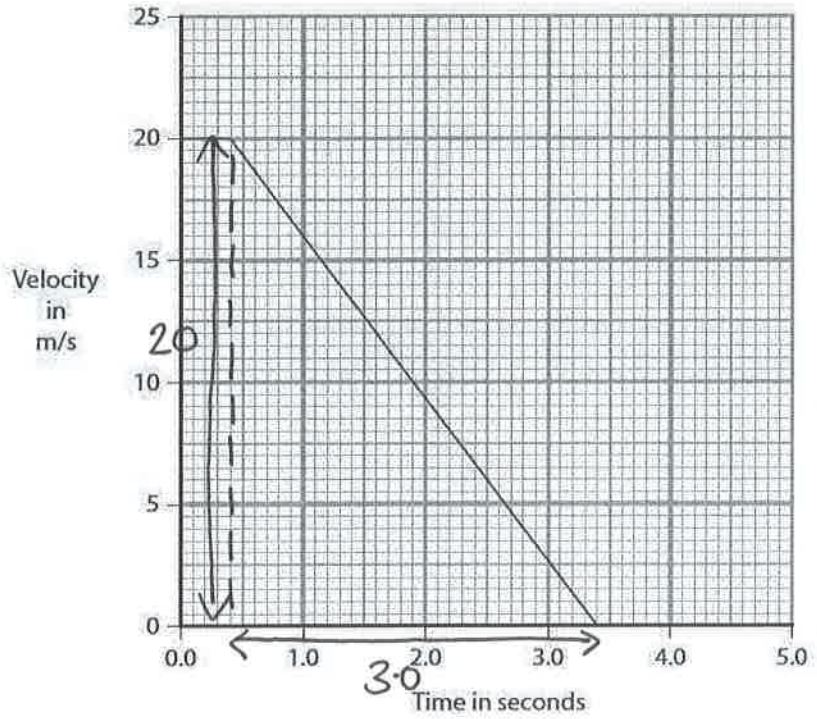
(2)

Boiling happens at a specific temperature, the boiling point, but evaporation can happen at any temperature. (1)

Evaporation only happens at the surface, but boiling happens throughout a liquid. (1)

(Total for question = 8 marks)

Q3. A person is driving a car along a dry road. They see an obstruction and apply the brakes. This is the velocity-time graph for the car.



(a) Which feature of the graph gives the acceleration of the car while the car is braking?

(1)

- ☐ **A** area under the line from 0.0 to 0.4 seconds
- ☐ **B** area under the line from 0.4 to 3.4 seconds
- ☐ **C** gradient of the line from 0.0 to 0.4 seconds
- (1) ☒ **D** gradient of the line from 0.4 to 3.4 seconds

(b) Use the graph to determine the braking distance of the car.

(3)

Braking distance = area while speed is decreasing (1) or any attempt to find the area

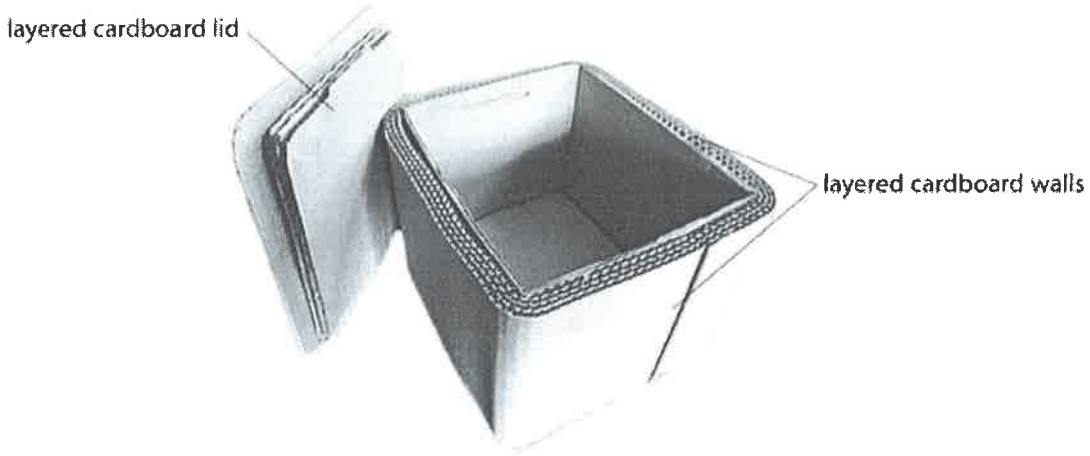
Distance = $\frac{1}{2} \times 30 \times 20 = 30$ (1)

(1)

braking distance = ... 30 ..... m

(Total for question = 4 marks)

Q4. The photograph shows a recyclable box designed for transporting cold food.



The box has these design features

- thick walls made from several layers of cardboard with air trapped between the layers
- a thick lid made from layers of cardboard

Cold food and ice packs are placed in the box.

(a) Give a reason why there is a net transfer of energy from the outside of the box to the inside of the box during transportation in a hot country.

(1)

The temperature is hotter outside the box than inside the box and heat flows from hot to cold. (1)

(b) Explain how the box is designed to reduce energy transfer by **conduction**.

(2)

Cardboard is a poor conductor (1) and the walls are thick so they will conduct more slowly. (1)

or air is a poor conductor (1) because the particles are far apart so they don't collide often (1)

(c) Explain how the box is designed to reduce energy transfer by **convection**.

(2)

Air is trapped (1) in the layers and under the lid, which reduces convection currents. (1)

(d) A student suggests that painting the inner surfaces of the box a different colour would help to reduce the rate of energy transfer to the cold food.

Explain which colour the inner surfaces of the box should be painted.

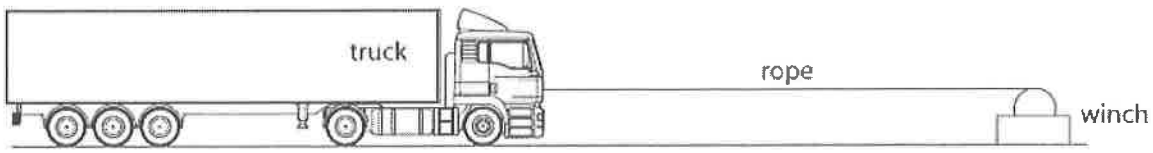
(2)

They should be painted white or silver because (1)
these colours are poor emitters of radiation. (1)

(Total for question = 7 marks)

Q5. A winch is used to pull a truck along a horizontal road.

The winch is connected to the truck by a thick rope.



(Source: © A. Bizgaimer/Shutterstock)

(a) The winch does 41 kJ of useful work on the truck when the truck is pulled a horizontal distance of 15 m.

Calculate the force that the rope exerts on the truck.

(3)

$W = F \times d$

$41000 = F \times 15$ (1)

$F = \frac{41000}{15} = 2733.\overline{3}$

(1)

(1)

force = 2730 N

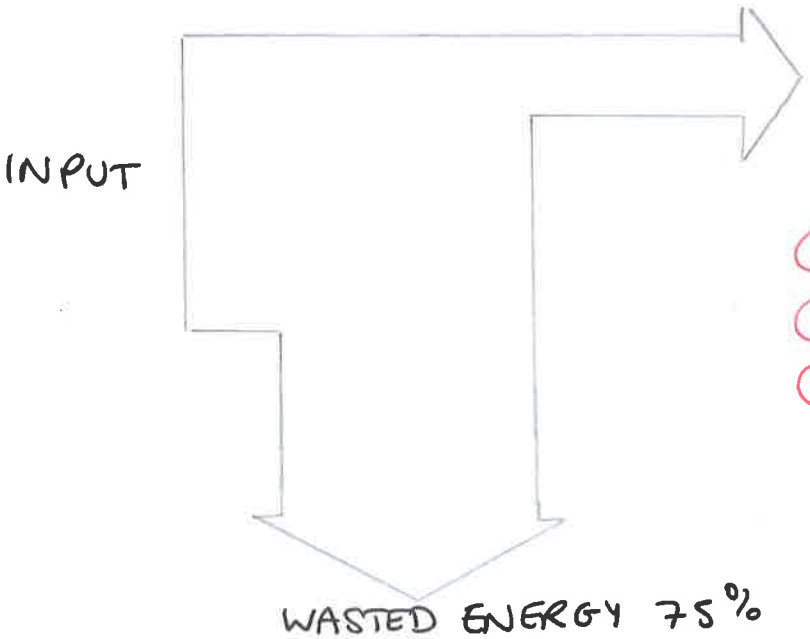
(b) The winch includes a small engine. The engine burns petrol to power the motor in the winch.

The winch transfers energy mechanically to the truck.

(i) The winch has an efficiency of 25% when pulling the truck.

Draw and label a Sankey diagram for this energy transfer.

(3)



(1) 1 input + 2 outputs
(1) correct labels
(1) correct scale
(wasted energy = 3x useful energy)

(ii) The winch can also be used to pull the truck uphill at a constant speed.

The table gives some energy stores. GPE KE

Add one tick (✓) to each row to show what happens to the energy in each store as the truck is pulled uphill.

(4)

Energy store	Decreases	Increases	Stays the same
chemical store of petrol in winch	✓ (1)		
gravitational store of truck		✓ (1)	
kinetic store of truck			✓ (1)
thermal store of surroundings		✓ (1)	

(Total for question = 10 marks)

Q6. A student needs to determine the density of some small rocks that appear to all be made of the same material.



(Source: © Chake / Shutterstock)

(a) The student uses an electronic balance to measure the mass of each rock.

Describe a method the student could use to **accurately** determine the volume of each rock. You may draw a diagram to help your answer.

(3)

(1)

Use a measuring cylinder to measure the volume of water at the beginning. Carefully add a rock (1) without losing any water. Measure the new volume of water. The volume of the rock will be the difference (1) in the two volumes of water recorded.

(b) The table shows the student's results for three of the rocks.

Rock	Mass in g	Volume in cm^3
A	15	6.3
B	13	6.1
C	16	7.5

After looking at the data, the student concludes that one of the rocks may be made of a different material from the others.

Using the data from the table, justify the student's conclusion.

(4)

$\rho = \frac{m}{V}$

A: $\rho = \frac{15}{6.3} = 2.38\ g/cm^3$ (1)

B: $\rho = \frac{13}{6.1} = 2.13\ g/cm^3$ (1)

C: $\rho = \frac{16}{7.5} = 2.13\ g/cm^3$ (1)

The density of rock B is the same as rock C. But the density of rock A is different, so it is made from a different material (1), so the student is correct.

(Total for question = 7 marks)

Q7.

A camel has a mass of 660 kg.
The total area of contact of the camel's feet with the ground is 1300 cm^2.

Calculate the pressure this camel exerts on the ground.

(3)

$p = \frac{F}{A}$ $\quad F = W = m \times g = 660 \times 10 = 6600N$ (1)

$p = \frac{6600}{1300} = 5.0769 N/cm^2$ (1)

(1)

pressure = 5.08 N / cm^2

(Total for question = 3 marks)

Q8.

(a) Diagram 1 shows a plastic bottle containing water.



Diagram 1

The pressure difference between the surface of the water and the water at the bottom of the bottle is 2300 Pa.

Calculate the depth of water in the bottle.

Give your answer in cm.

[density of water = 1000 kg / m^3]

(3)

pressure difference = $h \times \rho \times g$

$2300 = h \times 1000 \times 10$ (1)

$h = \frac{2300}{10000} = 0.23m$ (1)

$m \rightarrow c$ ×100

(1)

depth = 23 cm

(b) Three holes are made in the bottle at positions A, B and C.

Diagram 2 shows the path of the water leaving the bottle from hole B.

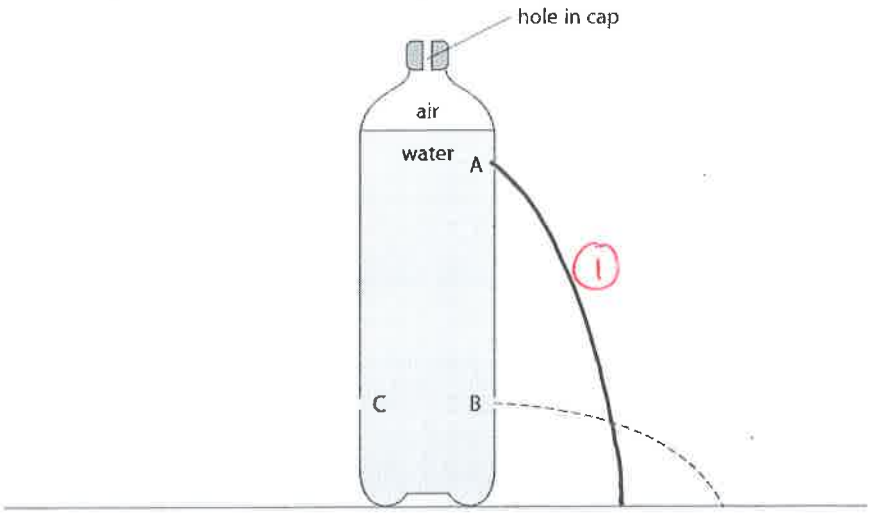


Diagram 2

(i) Draw a line on diagram 2 to show the path of the water leaving the bottle from hole A.

(1)

(ii) Explain the path of the water leaving the bottle from hole A.

(2)

The pressure from the water is less at A, so the force exerted on the water leaving the bottle at A is less so it leaves the bottle at a lower speed than at B.

(1) (1) (1)

Alternative mark

(iii) Hole C is at the same depth in the bottle as hole B but on the opposite side of the bottle. Explain the shape of the path of the water leaving the bottle from hole C.

(3)

The path will be identical to the path from B, but on the other side. (1) Pressure acts equally in all directions at the same depth, (1) so the pressure at C is the same as the pressure at B, (1) so the water leaves at the same speed. (1)

MAX 3 OUT OF 4 OPTIONS

(Total for question = 9 marks)

EQUATIONS : REMOVE THIS PAGE AND DO **NOT** RETURN IT WITH YOUR PAPER

If necessary, take the acceleration of free fall, $g = 10\text{m/s}^2$

1. Forces and Motion	
average speed = $\frac{\text{distance moved}}{\text{time taken}}$	
acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$	$a = \frac{(v-u)}{t}$
(final speed)^2 = (initial speed)^2 + (2 × acceleration × distance moved)	$v^2 = u^2 + (2 \times a \times s)$
force = mass × acceleration	$F = m \times a$
weight = mass × gravitational field strength	$W = m \times g$

4. Energy resources and energy transfers	
efficiency = $\frac{\text{useful energy output}}{\text{total energy output}} \times 100\%$	
work done = force × distance moved	$W = F \times d$
gravitational potential energy = mass × gravitational field strength × height	$GPE = m \times g \times h$
kinetic energy = $\frac{1}{2}$ × mass × speed^2	$KE = \frac{1}{2} \times m \times v^2$
power = $\frac{\text{work done}}{\text{time taken}}$	$P = \frac{W}{t}$
5. Solids, liquids and gases	
density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$
pressure = $\frac{\text{force}}{\text{area}}$	$p = \frac{F}{A}$
pressure difference = height × density × gravitational field strength	$p = h \times \rho \times g$
$\frac{\text{pressure}}{\text{temperature}}$ = constant	$\frac{p_1}{T_1} = \frac{p_2}{T_2}$
pressure × volume = constant	$p_1 \times V_1 = p_2 \times V_2$
change in thermal energy = mass × specific heat capacity × change in temperature	$\Delta Q = m \times c \times \Delta T$