

Student Name :

Physics Assignment (Electricity, Energy, solid liquid gas)

Q1- 5 marks

The photograph shows a halogen lamp.



(a) The halogen lamp has a power of 50 W when operating at its normal voltage.

Calculate the amount of electrical energy transferred to the halogen lamp in 40 hours.

(3)

electrical energy transferred = ..... J

(b) A student notices that in addition to producing light, the lamp also gets hot.

She concludes that the lamp cannot be 100% efficient.

Explain whether the student's conclusion is correct.

(2)

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Q2-4 marks

This question is about electric charge.

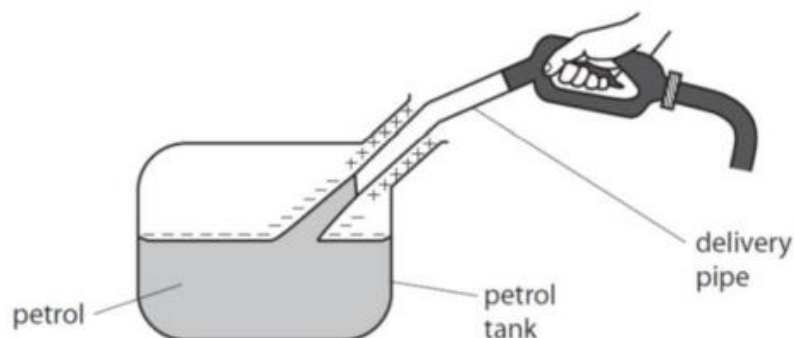
(a) When a balloon is rubbed with a cloth, the balloon becomes negatively charged.

Tick (✓) the two correct statements in the table.

(2)

Statement	Tick
negatively charged particles move from the cloth onto the balloon	
positively charged particles are rubbed off the balloon	
negatively charged particles on the balloon are protons	
the cloth becomes positively charged	

(b) When petrol passes through a delivery pipe, electrostatic charge can build up as shown in the diagram.



(i) Give a reason why a build-up of charge can be dangerous.

(1)

(ii) State how the build-up of electrostatic charge can be prevented.

(1)

Q3-5 marks

(b) As the girl slides down, she becomes charged and her hair stands on end.



© Chris Darling (Wikipedia)

(i) The passage explains how the girl becomes charged.

Use words from the box to complete the passage.

Each word may be used once, more than once, or not at all.

(3)

conduction

electrons

friction

negative

positive

protons

The girl becomes charged because of \_\_\_\_\_ between the slide and her clothes.

As the girl travels down the slide, the slide loses \_\_\_\_\_.

When the girl reaches point B, the slide has a \_\_\_\_\_ charge.

(ii) Explain why the girl's hair stands on end.

(2)

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Q4- 4 marks

(a) (i) State the relationship between power, current and voltage.

(1)

(ii) A lamp with a power of 6.5 W is connected to a 230 V supply.

Calculate the current in the lamp.

(3)

current = ..... A



Q5- 14 marks

The table gives some measurements about a raindrop.

mass of raindrop	0.000 035 kg
distance raindrop falls	1200 m
speed of raindrop as it hits the ground	8.8 m/s

(a) (i) State the relationship between momentum, mass and velocity.

(1)

(ii) Calculate the momentum of the raindrop as it hits the ground.

Give the unit.

(3)

momentum = \_\_\_\_\_ unit \_\_\_\_\_

(b) (i) State the equation linking gravitational potential energy, mass,  $g$  and height.

(1)

(ii) Calculate the change in gravitational potential energy (GPE), when the raindrop falls 1200 m above the ground.

(2)

GPE = \_\_\_\_\_ J

(iii) State the kinetic energy (KE) of the raindrop as it hits the ground.  
[assume no energy losses]

(1)



(c) (i) State the equation linking kinetic energy, mass and speed.

(1)

(ii) Show that the speed of the raindrop as it hits the ground would be about 150 m/s.  
[assume no energy losses]

(3)

(iii) Explain why the actual speed of the raindrop as it hits the ground is much less than 150 m/s.

(2)

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Q6- 10 marks

A man uses a wheelbarrow to carry some logs along a flat path, as shown.



©[http://commons.wikimedia.org/wiki/file:wheelbarrow\\_%28PSF%29.png](http://commons.wikimedia.org/wiki/file:wheelbarrow_%28PSF%29.png)

(a) He pushes with a horizontal force of 140 N and the wheelbarrow moves 39 m.

(i) State the relationship between work done, force and distance moved.

(1)

(ii) Calculate the work done moving the wheelbarrow.

(2)

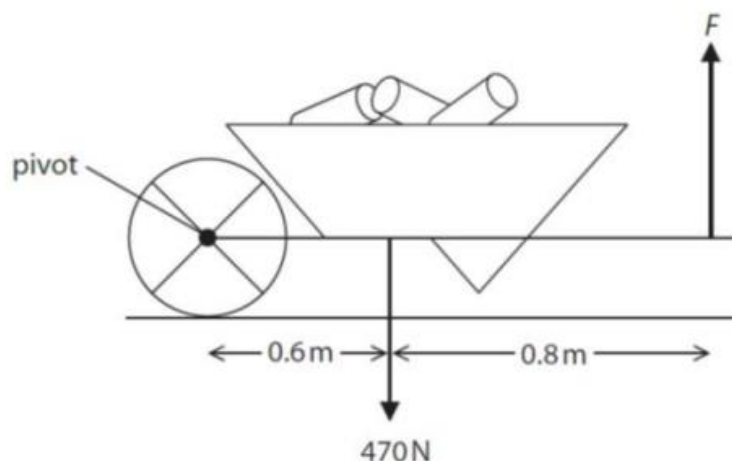
work done = ..... J

(iii) State how much energy is transferred to the wheelbarrow.

(1)



(b) The man stops and holds the wheelbarrow horizontally, as shown.



The man exerts a total upward force of  $F$  N.

The weight of the loaded wheelbarrow is 470 N.

(i) Mark X on the diagram to indicate the centre of gravity of the loaded wheelbarrow.

(1)

(ii) State the equation linking moment, force and perpendicular distance from the pivot.

(1)

(iii) Calculate the force  $F$ .

(4)



Q7- 9 marks

The photograph shows some large concrete cubes.



The mass of one of the concrete cubes is 1000 kg.

(a) State the weight of this concrete cube.

Give the unit.

(2)

weight of concrete cube = ..... unit .....

(b) The density of this concrete cube is  $2300 \text{ kg/m}^3$ .

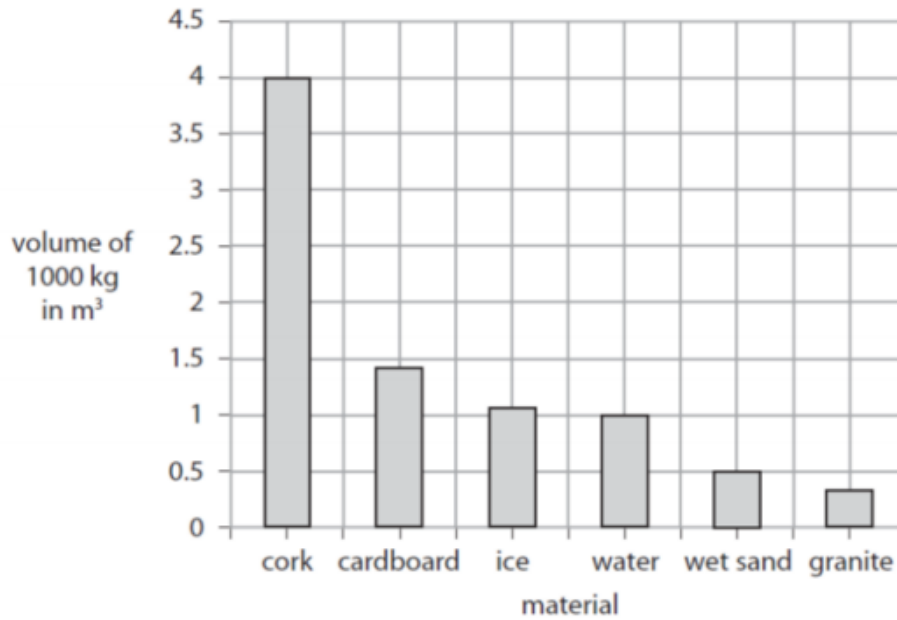
(i) State the equation linking density, mass and volume.

(1)

(ii) Calculate the volume of this concrete cube.

(2)

(c) The graph shows the volumes of 1000 kg of some other materials.



(i) State the type of graph shown.

(1)

(ii) Give a reason why a line graph is not an appropriate way to display this data.

(1)

(iii) Use information from the graph to compare the densities of cork and water.

(2)

Q8- 6 marks

The particles in the different states of matter behave differently.

(a) Draw a straight line linking each state of matter with the description of its particles.

(2)

state of matter

solid

liquid

gas

description of particles

close together, moving about and can slide past one another

far apart, moving quickly and at random

close together, vibrating about fixed positions

(b) Ethyne is a substance that is a gas at room temperature.

At a temperature of  $-81^{\circ}\text{C}$ , ethyne can exist as a solid, a liquid or a gas.

This temperature is called the triple point of ethyne.

(i) Complete the table by giving the missing temperatures.

(2)

	Temperature in $^{\circ}\text{C}$	Temperature in kelvin
room temperature		291
triple point of ethyne	$-81$	

(ii) State what happens to the average kinetic energy of the gas molecules as the temperature is lowered from room temperature to the triple point of ethyne.

(1)

(iii) State what happens to the volume of an ethyne molecule when the gas changes to a solid at the triple point.

(1)

Q9- 7 marks

This question is about temperature and pressure in gases.

(a) A gas is heated in a container which has a constant volume.

The particles in the gas

(1)

- ☐ A expand
- ☐ B hit the walls of the container harder
- ☐ C move closer together
- ☐ D have a lower average speed

(b) Describe what happens to the average kinetic energy of particles as the temperature decreases from 10K towards 0K.

(2)

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(c) (i) Convert a temperature of 27 °C into kelvin (K).

(1)

temperature = \_\_\_\_\_ K

(ii) The gas in a cylinder has a pressure of 210 kPa at a temperature of 27 °C.

Calculate the new pressure when the temperature of the gas rises to 81 °C.

(3)

pressure = \_\_\_\_\_ kPa

Q10- 6 marks

The photograph shows a kettle on a camping stove.

The cylinder contains some gas.



(a) Water in the kettle boils at a temperature of  $100^{\circ}\text{C}$  and steam is produced.

(i) Convert this to a temperature on the Kelvin scale.

(1)

$100^{\circ}\text{C} = \dots\dots\dots \text{K}$



(iii) Explain how the molecules of steam exert a pressure on the inside of the kettle.

(3)

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(b) The wind blows the flame out and  $820 \text{ cm}^3$  of gas, at a pressure of 130 kPa, escapes from the cylinder.

As the gas escapes, its pressure decreases to 101 kPa.

Calculate the volume of the escaped gas at a pressure of 101 kPa.

(2)

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