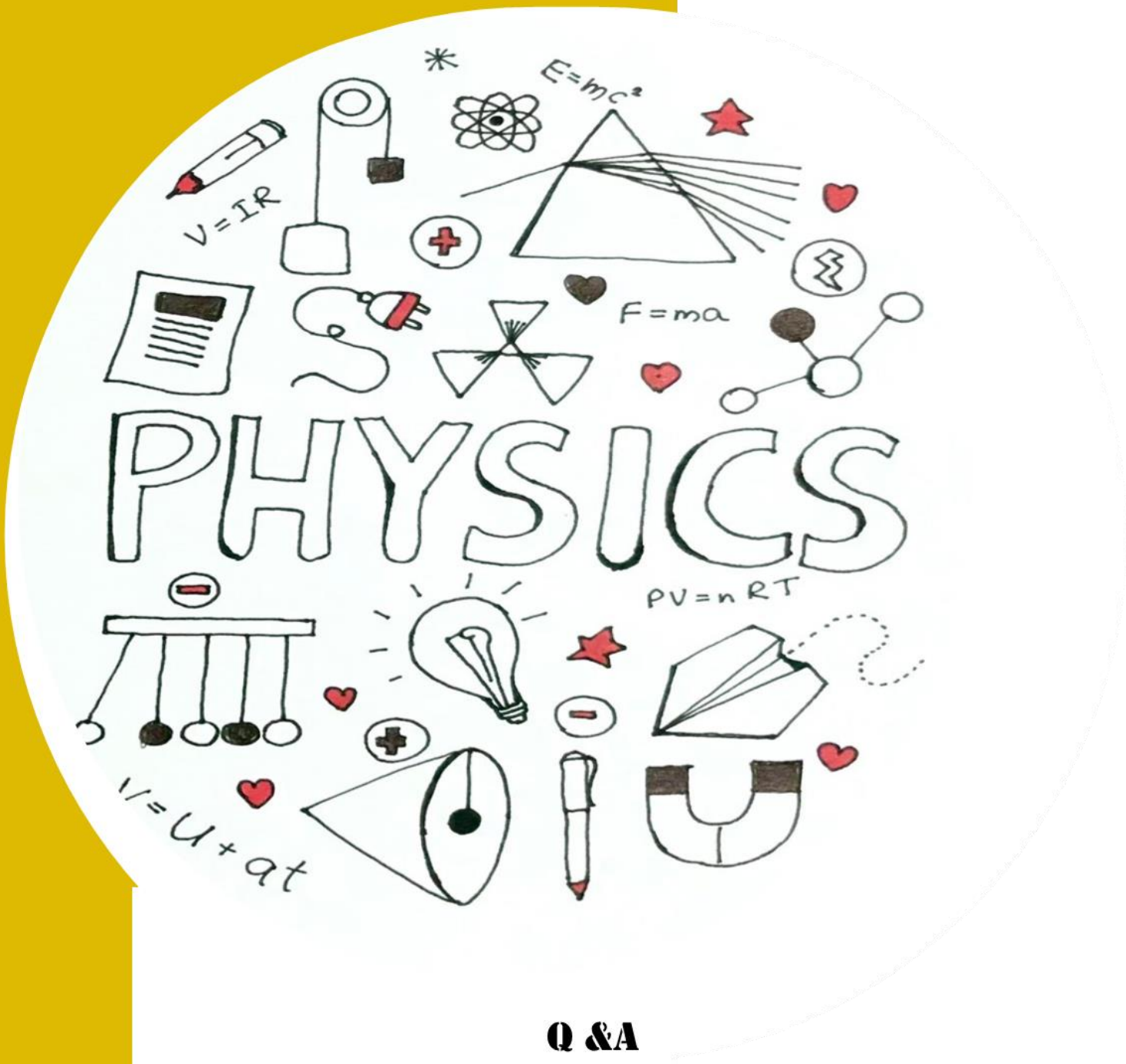


Q &A

REVISION GUIDE COMBINED SCIENCE 4003

TOPIC BY TOPIC

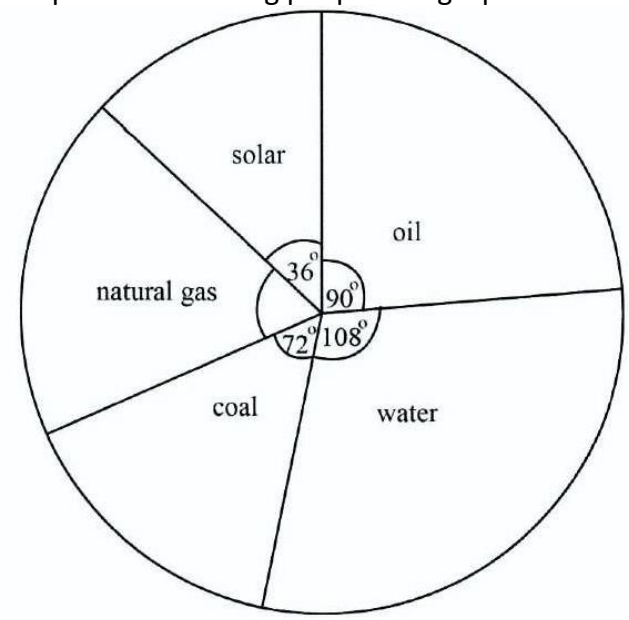
ZIMSEC NOV 2018 — JUN 2023

Compiled by Ndou.T, Masita S, Maphosa A

DATA PRESENTATION

N2018

Q6. Fig 6.2 is a pic chart showing people using a particular source of energy



(i) Identify the energy source which is mostly widely used [1]

Ans: Water

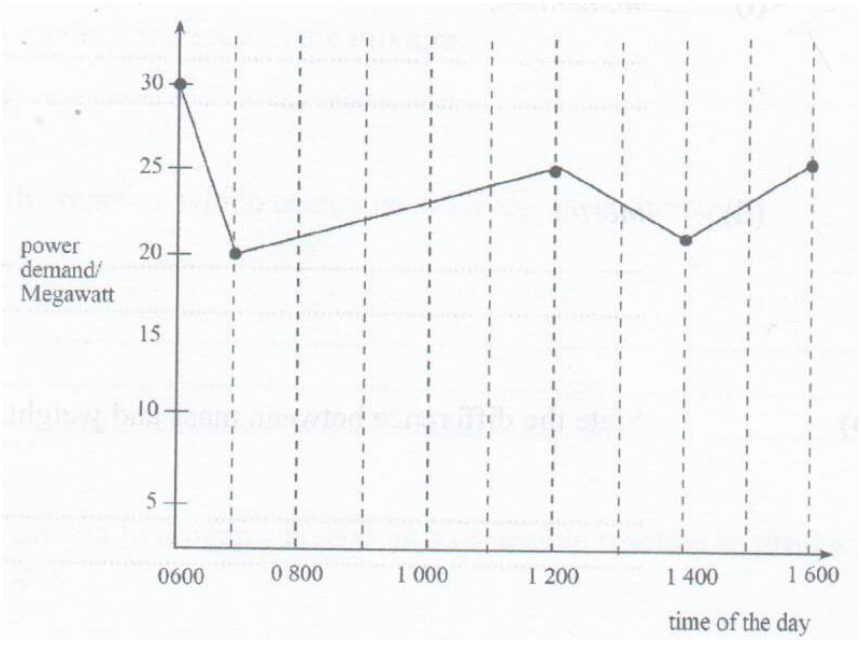
(ii) calculate the percentage of people using natural gas. [2]

Ans: Percentage of people using natural gas $= \frac{54\%}{360\%} \times 100\%$

$= 15\%$

J2020

Q6a. Fig 6,1 shows power demand between 6am and 4pm at a boarding school which uses only electricity as aits source of energy .



(i) Use fig 6.1 to identify the time of the day with the highest power demand. [1]

Ans: 06:00

(ii) The meal times for the boarding school are breakfast at 07:00

Supper at 17:00

Explain why there is a high power demand at 12:00 {2]

Ans: At 12:00 more power is needed to generate heat for preparation of meals

(iii) Describe how the school may reduce the amount of electricity they use per day? [1]

Ans: Use other sources of energy such as gas, solar, coal or firewood.

N2020

Q5(a) A box contains resistors of different sizes. Ten resistors are rated 5Ω, twelve are rated 8 Ω, eight are rated 10 Ω, and ten are rated 15 Ω,.

(i) State any one way of presenting the data apart from the description. [1]

Ans: - Table

- Bar chart

- Pie chart

(ii) Calculate the percentage of resistors rates 15 Ω [1]

Ans: $\frac{10}{40}$ *x 100%*

= 25%

MEASUREMENTS

J2023

Q 5(i) State the instrument used to measure

1 – Current *Ans: Ammeter* *[1]*

2 – Voltage *Ans: Voltmeter*

J2023

Q15(a)(i) Suggest an instrument that can be used to measure the external diameter of a very thin Objects [1]

Ans: - Tape measure

- meter ruler

(iii) Express the Newton (N) in base units

Ans: *→ mass x accelerator*

→ kg x mls^2

→kgm/s^2

N2020

Q 5(c) Give the most suitable instrument for measuring

(i) The internal diameter of a test tube [1]

Ans: *Vernier callipers*

(ii) The external diameter of a wire [1]

Ans; *micrometre screw gauge*

J2020

6(i) State the SI unit of mass and power

Ans: *Mass ⟶ kg/kilogram*

Power ⟶ W/watt

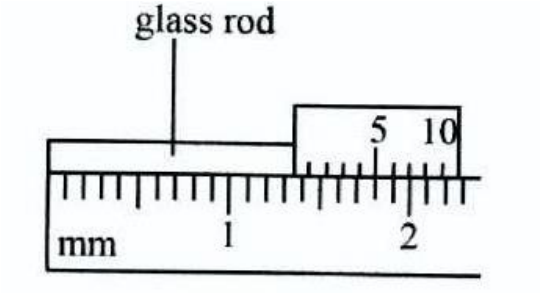
N2019

Q 15(e) Name the instrument (SI) unit of energy [1]

Ans: *manometer*

J2019

Q 14(a) Fig 14.1 shows how the length of a glass rod was measured



(i) Name the instrument used [1]

Ans: *Vernier callipers*

(ii) State the length of the glass rod [1]

Ans *1,35cm*

N2020

Q5 (b) One side of a cube measures 6.0cm

Calculate the volume of the cube

Ans: *Volume = LxWxH*

= 6x6x6

= 216 cm^3

FORCE

J2019

Q 13(c) Define the term

(i) Mass [1]

Ans: *Amount of matter in a body*

(ii) Weight

Ans: *Force of gravity on a body*

(ii) Momentum

Ans: *Product of mass and velocity*

J2019

Q14(a)(iii) State Newton's third law of motion [1]

Ans: *For every action there's an equal and opposite reaction*

(iv) Explain what happens when a person sits on a chair in terms of Newton's third law Of motion.

Ans: *The person exerts a force on the chair (action) and the chair exerts an equal and opposite force on the person (reaction) balancing his/her weight*

(b) A force of 300N pulls an object of mass 60kg along a horizontal surface.

(i) Calculate the acceleration of the object.

Ans: $= \frac{Force}{Mass}$

$= \frac{300}{60}$

$= 5m/5^2$

(ii) State whether the acceleration in **(b)(i)** is higher or lower than the practical value [1]

Ans: Higher

J2020

Q5 (a) Define the term

(i) Momentum [1]

Ans: Product of mass and velocity

(ii) Inertia [1]

Ans: reluctance of a body to change its state of motion

(b) State the difference between mass and weight [1]

Ans: - Mass is constant while weight varies with position

- Mass is a scalar while weight is a vector

(c) State Newton's first law of motion [1]

Ans: A body remains in its state of motion or rest unless a resultant force gets on it.

(d) A ball of mass 0,4kg accelerates uniformly at $2m/s^2$. Calculate the force of the ball

Ans: F = ma

= 0,4 x 2

= 0,8 N

N2021

Q 15(a) A boy pushes a wheel barrow with a force of 25N against a frictional force of 7N

(i) Define friction

Ans: a force that opposes motion.

(ii) Calculate the resultant force on the wheel barrow [2]

Ans: 25N – 7N

= 18N

(b) State any two applications of friction

Ans: - car brakes

- tyre threads

- shoe soles

N2022

Q6(a)(i) State one effect of a force [1]

Ans: *- Change of shape*

- change of position

- Change of speed

- change of direction

(ii) Name the instrument used for measuring force [1]

Ans: *- force meter*

- spring balance

(iii) State the standard international (SI) units of force [1]

Ans: *Newton (N)*

N 2023

Q13(a) A 400kg car is moving with a constant velocity of 100m/s.

(i) Define the term velocity [2]

Ans: *rate of change of displacement.*

(ii) Calculate the momentum of the car []3

Ans: *Momentum = Mass x Velocity*

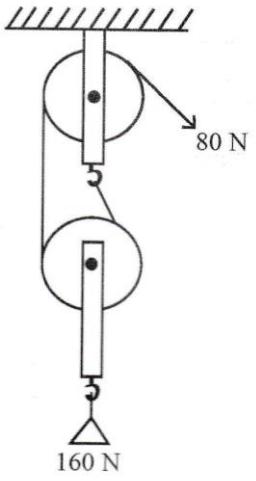
= 400kg x 100

= 40000kg/s

MECHANICAL SYSTEMS

J 2023

Q6(a) Fig 6.1 shows a pully system used to lift a load.



(i) State the velocity ration of the pulley system [1]

Ans: 2

(ii) Calculate the mechanical advantage of the pulley system [2]

Ans: $MA = \frac{load}{effort}$

$= \frac{160}{80}$

$= 2$

(iii) Calculate the efficiency of the pulley system [2]

Ans: $Efficiency = \frac{MA}{VR} \times 100\%$

$= \frac{2}{2} \times 100\%$

$= 100\%$

(iv) Give any one reason why efficiency of the pulley is not 100% [1]

Ans: = friction

= weight of moving parts.

(b) State any one other example of a machine [1]

Ans: - inclined plane

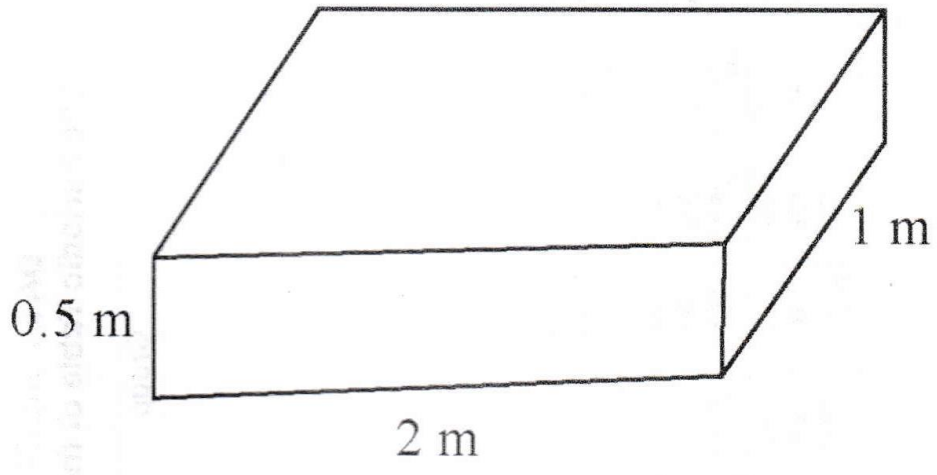
- lever

- gears

- wheel and axle

J2023

Q15(b) Fig 15.1 shows a concrete block of mass resting on its biggest face



(i) Calculate the pressure exerted by the block [4]

Ans: *Force* $= 2600 \times 10$

$= 26000\ N$

Area $= 2m \times 1m$

$= 2m^2$

Pressure $= \frac{Force}{Area}$

$= \frac{26000}{2}$

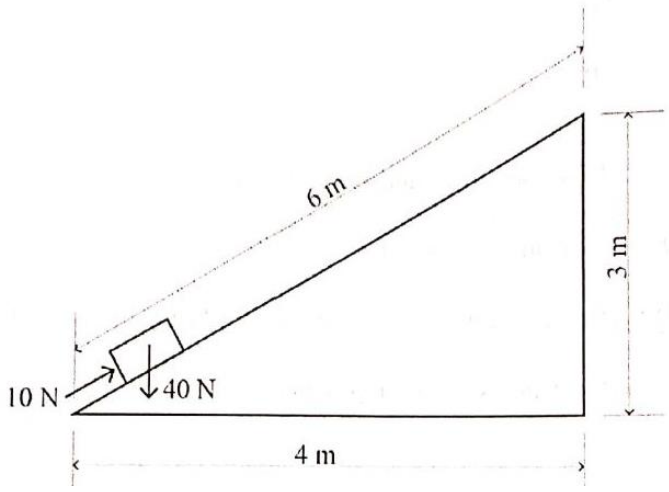
$13000Pa$

(ii) Explain how the pressure exerted by the block changes if it is rested on one of the smallest faces [4]

Ans: *pressure increases because pressure is inversely proportioned to area*.

N2023

Q 13(b) Fig 13.1 shows an inclined plane



(i) Calculate the mechanical advantage, MA of the inclined plane? [2]

Ans: *MA* $= \frac{Load}{effort}$

$= \frac{40}{10}$

$= 4$

(ii) Calculate the velocity ration, VR, of the inclined plane [2]

Ans: *VR* $= \frac{distance\ moved\ by\ effort}{distance\ moved\ by\ load}$

$= \frac{6}{3}$

$= 2$

(iii) State any one factor that results in more energy losses in machines [1]

Ans: - Friction/ mass of moving parts

N2021

Q6(a)(i) State the formula for calculating pressure in liquids [1]

Ans: Pressure – pgh

(ii) Calculate the pressure exerted by 1,5m column of water given that its density is 1200kgm^{-2}

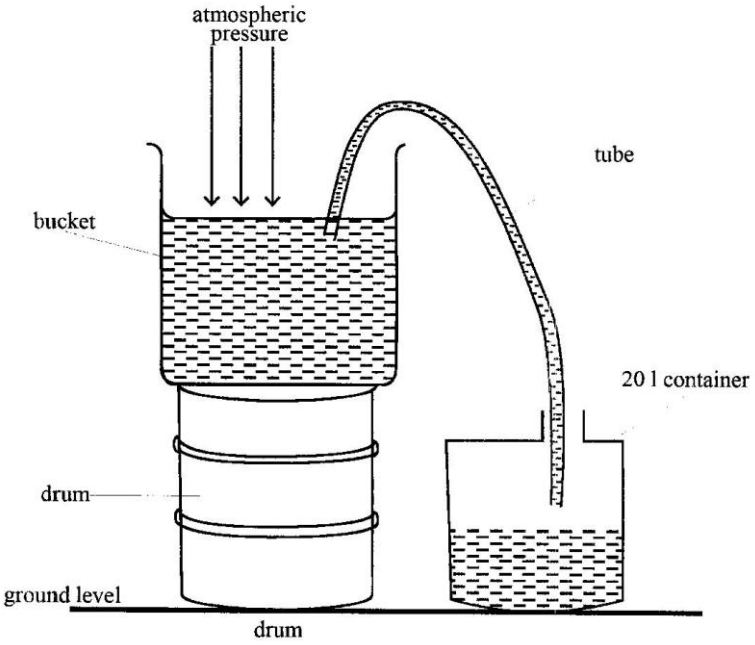
[accelerated due to gravity = 10ms^{-2}] [2]

Ans: Pressure = pgh

= 1200 x 10 x 1,5

= 18000 Pa

(b) Fig 6.1 shows a model of a siphon being used to drain a liquid



(i) Give two conditions that enable the Siphon to work [2]

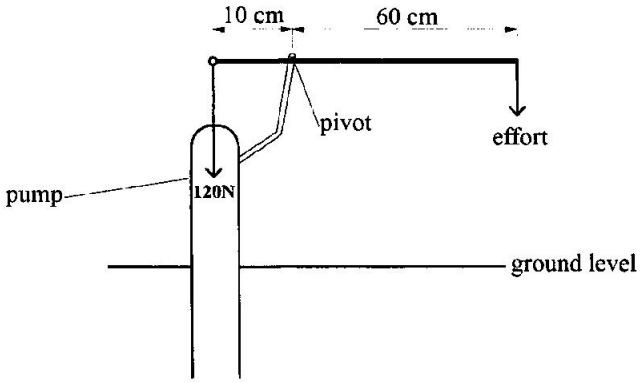
Ans - Siphoning tube is full of liquid.

- atmospheric pressure on the on the liquid on the bucket forces liquid into the tube.

- gravitational force makes liquid to flow continuously down the tube.

N2021

Q15(c) Fig 15.1 shows a borehole which is geared by a lever. The load is 120N



(i) State the principle of moments [1]

Ans: Clockwise moments equal anti-clockwise moments at equilibrium.

(ii) Calculate the minimum effort required to operate the pump [2]

Ans: Clockwise moments = anticlockwise moments

$F \times d = F \times d$

$120 \times 0,1 = F \times 0,6$

$F = \frac{120 \times 0,1}{0,6}$

$= 20N$

(iii) State the effort of reducing the length of the effort arm [1]

Ans: Effort increases

(iv) State how friction can be reduced in the effort arm. [1]

Ans: Lubrication

J2020

Q13(b) A man drags a 60kg bag up the inclined plane of length 4,5m and height of 1,5m to load it into the lorry

(i) Calculate the velocity ratio, VR, of the inclined plane. [2]

Ans: $VR = \frac{lenght\ of\ incline}{height\ of\ incline}$

$= \frac{4,5}{1,5}$

$= 3$

(ii) State the effect on the velocity ratio of the inclined plane of increasing the height [1]

Ans: Velocity ration decreases

N2019

Q14(a) A gear system has **ten** teeth in the driving gear and **thirty** teeth in the driven gear

(i) Calculate the velocity ratio, VR, of the gear system [2]

Ans: VR $= \frac{number\ of\ teeth\ in\ te\ driven\ gear}{numbe\ of\ teeth\ in\ he\ driving\ gear}$

$= \frac{30}{10}$

$= 3$

(ii) Determine the efficiency of the system if its mechanical advantage, MA, is 2

Ans: - Efficiency $= \frac{MA}{VR}$ *x 100%*

$= \frac{2}{3}$ *x 100%*

= 66,7%

(iii) Give any two reasons why the efficiency of a machine is always less than 100% [2]

Ans: - There is friction between moving parts

- Mass of moving parts need to be reduced.

(iv) State any two ways in which the efficiency of the machine can be improved

Ans: - lubrication

- use of ball bearing

- use light materials for the moving parts.

(b) State any two types of machines apart from gears

Ans: - levers

- pulleys

- inclined planes

- wheel and axle

J2019

Q6(a) A box measuring 0,3m wide, 0,5m long and 0,6m high has a weight of 20N. The box rests on a table.

(i) Define the terms weight and pressure [2]

Ans: Weight = force of gravity on a body

Pressure = force per unit area

(ii) Calculate the pressure exerted by the box when it rests on the 0,5m and 0,6m face [2]

Ans: *Pressure* $= \frac{Force}{Area}$

Area $= L \times W$

$= 0,5 \times 0,6$

$= 0,3m^2$

Pressure $= \frac{20N}{0,3m2}$

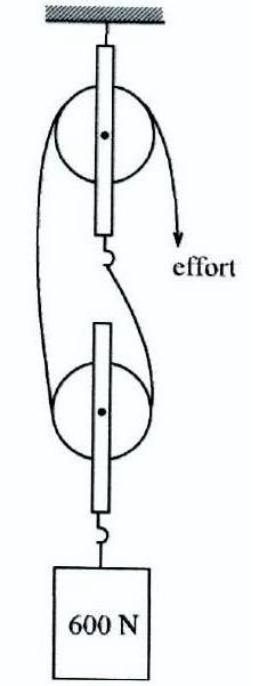
$= 66,7\ Pa$

(iii) Explain how the pressure calculated in (ii) Compare with the pressure exerted when the same box rest on the 0,3m by 0,5m face [2]

Ans: *pressure becomes greater due to decrease in the surface area*

J2019

Q13(a) Fig 13,1 shows a pulley system used to lift a load of 600N.The efficiency of the pulley system is 75%



(i) Define the term machine

Ans: *- a device which makes work easier*

(ii) Calculate the mechanical advantage ,MA, of the pulley system [3]

Ans: *VR* $= 2$

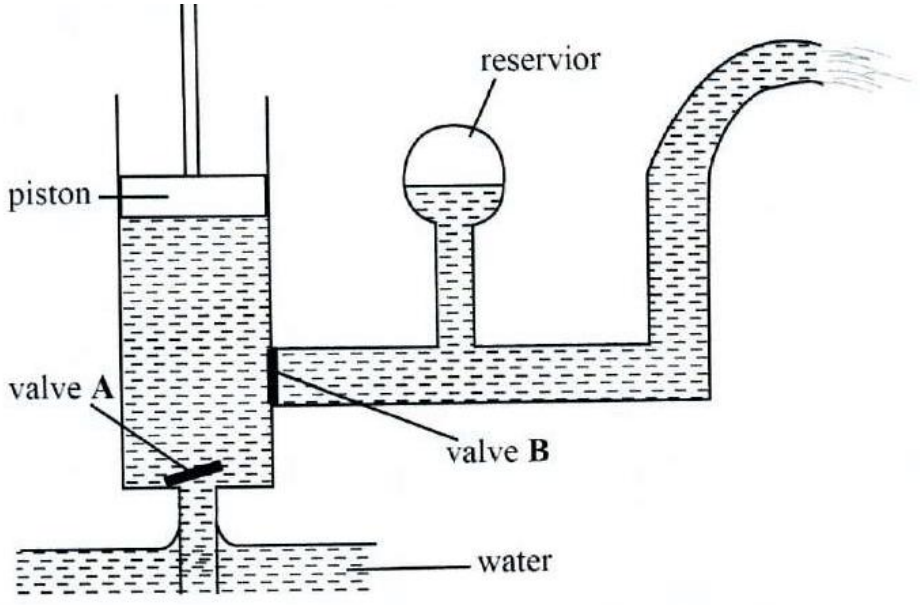
$\therefore$ *MA* $=$ *Efficiency x VR*

$= \frac{75}{100} \times 2$

$= 1,5$

N2018

Q6(a) Fig 6.1 shows a water pump



(i) Name the type of pump shown in fig 6.1 [1]

Ans: Force pump

(ii) Outline what happens during the upward stroke [3]

Ans: - Piston moves up
- pressure in the cylinder decreases
- valve A opens while valve B closes
- water moves into the cylinder

ENERGY

N2018

Q13(a) A diesel engine undergoes a four stroke cycle during its operation

(i) Describe what happens during the intake stroke of the diesel engine [3]

Ans: - Piston moves down

- pressure in the cylinder decreases

- inlet valve opens while exhaust valve is closed.

- air re-enters the cylinder

(ii) Explain why diesel engine does not have spark plugs [2]

Ans: - has a high compression ratio.

- high pressure ignites the fuel

(b) A hand feels hot when placed above an electric heater which is switched on.

Ans: *- heat travels by convection as air above the heater gains kinetic energy and expands*

- The air becomes less dense and rises as heat travels through radiation as heat wave moves Through space.

J2019

Q15(a)(i) Name any three types of media for signal transmission

Ans: *- 1. Optical fibre* *4. Sheathed pair cables*

- 2. Coaxial cables *5. Twisted wire cables*

- 3. WIFI

(ii) Describe how signals are transmitted in any one of the named in (i) [1]

Ans: *WIFI* *- original signal is converted to radio waves*

- radio waves are transmitted into space

- radio waves are charged in original signal

(b) State the function of a decoder

Ans: *separates carrier signal from actual signal*

(c) Describe three advantages of email over ordinary mail. [3]

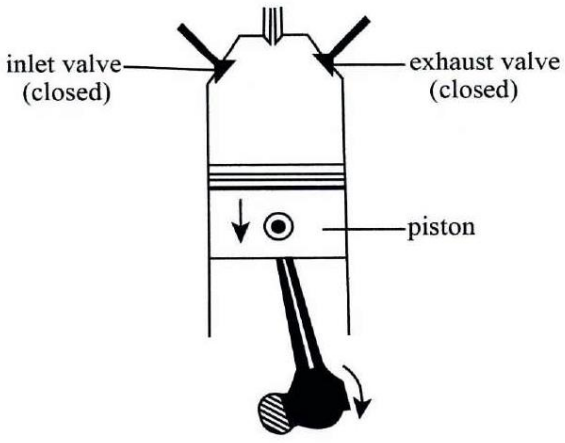
Ans: *1. Email reaches destination faster*

2. Email is cheaper, the cost is the same through all distances

3. Email is accessible whenever there is network

N2019

Q5(a) Fig 5.1 shows a stroke in the operation of an engine



Identify giving two reasons, the stroke shown [3]

Ans; Stroke ⟶ Power

Reason 1 ⟶ both valves are closed

Reason 2 ⟶ piston is moving down

(b)(i) State the role of a fuel injector in a petrol engine [1]

Ans: Injects petrol into the combustion chamber.

(ii) State the role of carburettor [1]

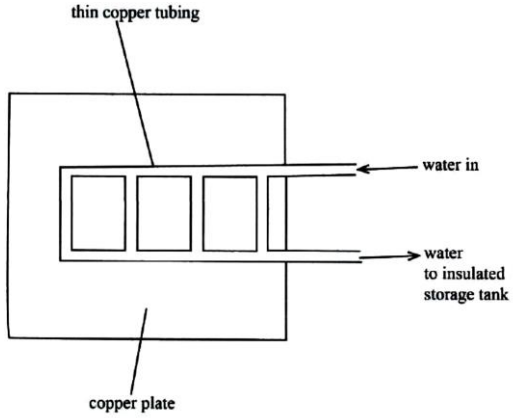
Ans: mixes air with fuel

(iii) Explain the advantages of fuel injectors over a carburettor [2]

Ans: provides same amount of petrol to all cylinders leading to powerful engine

N2019

Q6 Fig 6.1 shows part of the design of a solar water heater



(a) State with reason the most suitable for placing the solar water heater for best results [2]

Ans: Place - roof top

Reason - captures maximum heat

(b) State with reason the paint on the copper plate [2]

Ans: Colour black

Reason good absorber of heat

(c) Explain why

(i) A thin copper tubing is used [1]

Ans: easily pass heat to the water

(ii) The storage tank is insulated [1]

Ans: reduce heat loss from the water

J2020

Q15(a) Telecommunications messages can be transmitted in a variety of ways by wide range of devices

(i) Name any other device that can be used to send messages apart from a cell phone [1]

Ans: *- Computer/laptop*

- radio

- telephone/fax

(ii) State the energy conversion that occurs in devices named in (i) [2]

Ans: *computer/laptop*

Electrical energy ⟶ *light energy*

Or

Telephone

Sound energy ⟶ *electrical energy*

(iii) State any two types of information that can be transmitted by a cell phone [2]

Ans: *1. Sound*

2. Video

3. Text

4. Image/picture

(b)(i) Coaxial cables are one type of media for signal transmission. State any other types of media for signal transmission.

Ans: *1. Optic fibre*

2. sheathed pair cable

3 WiFi

(ii) Describe how signals are transmitted by coaxial cables [3]

Ans: *- transmits electrical impulses*

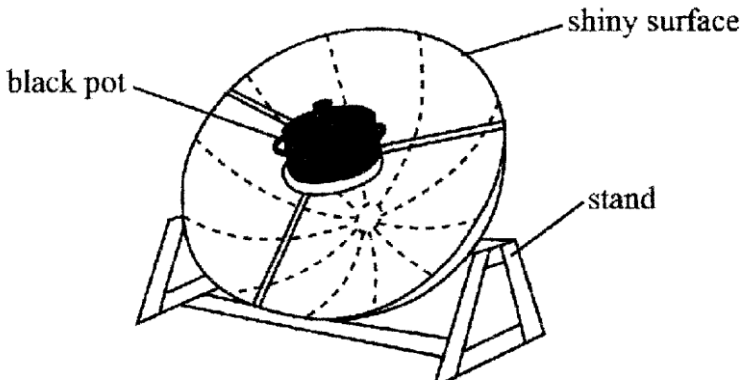
- signal is transmitted down the inner conductor

- outer conductor acts as return wire

- outer conductor shields inner conductor from external interference.

N2020

Q6. Fig 6.1 shows a simple solar cooker



(a)(i) Explain the function of the shiny curved surface

Ans: Reflects heat to a point.

(ii) Explain why the pot is painted black

Ans: black is a good absorber of heat

(b)i) Give a reason why solar energy is called renewable source energy [1]

Ans: cannot be exhausted.

(ii) Explain how solar energy is indirectly used to produce electricity

Ans: Solar furnaces produce steam, which turn turbines.

N2020

Q15(a) A pot with water is placed on an electric stove and the water heated until it boils.

(i) State the modes heat transfer involved [2]

Ans: - conduction

- convection

(ii) Describe the modes heat transfer stated in (a)(i) [3]

Ans: - conduction = heat transferred between solids

- convection = water at the base of the pot is heated and becomes less dense and rises to the top setting in convection currents.

N2020

Q14(b) State any two uses of solar systems [2]

Ans: - heating

- lighting

- powering of appliances

N2021

Q5(a)(i) State the law of conservation of energy

Ans: Energy is never created or destroyed but can be changed from one form to another

(ii) Write down the energy conversion in a stretched catapult

Ans: elastic potential energy *kinetic energy + sound energy*

J2022

Q5 (a) State one difference between a petrol engine and a diesel engine [1]

Ans: - Petrol engine has a carburettor while a diesel engine has no carburettor.

- Petrol engine has a spark plug while a diesel engine has no spark plug

(b) Describe what happens during the power stroke of a petrol engine [3]

Ans: - both valves are closed

- the spark plug ignites the petrol/air mixture

- piston moves downwards

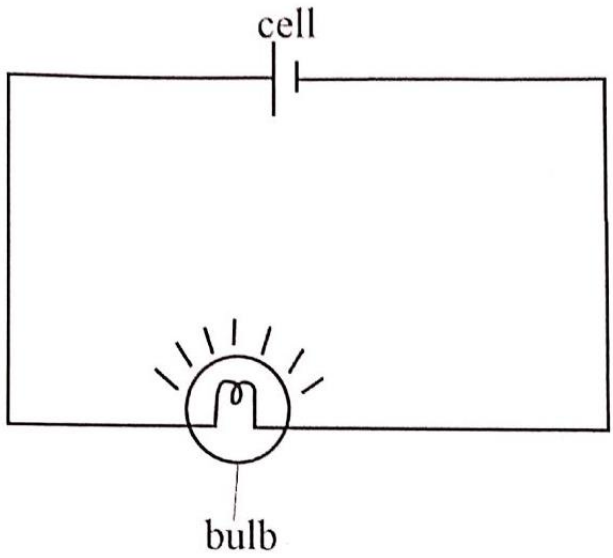
(c) Name any two gases which are released in car exhaust fumes [2]

Ans: - carbon dioxide

- carbon monoxide

N2022

Q6(b) Fig 6.1 shows electric circuit in which a cell is used to light a bulb.



Construct an energy chain for Fig 6.1

Ans: Chemical energy ⟶ electric energy ⟶ light energy + heat energy

(c)(i) State any one effect of energy [1]

Ans: *- Seeing (by light)*

- Hearing (by sound)

- Makes things hot

- makes things move

(ii) Suggest one advantage of solar energy [1]

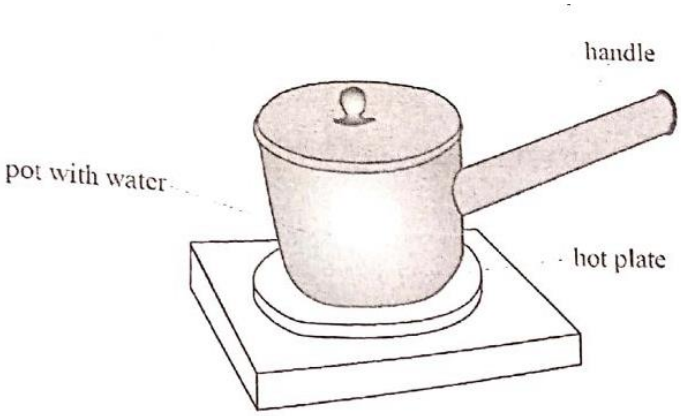
Ans: *- No pollution*

- renewable

- readily available

N2022

Q14(a) Fig 14.1 shows water in a pot being heated on a hot plate.



(i) State the method of heat transfer from hot plate to the pot [1]

Ans: *Conduction*

(ii) State, giving a reason a suitable material for making the handle of the pot [2]

Ans: *- plastic/wood*

Reason- it is a bad conductor of heat.

(iii) Explain the process of convection in terms of the kinetic theory of matter [3]

Ans: *- heated water becomes less dense*

- particles gain kinetic energy

- hot water rises

- cold water sink

J2023

Q13(a)(i) Name the source of energy used by solar cooker [1]

Ans: - sun

(ii) State two methods through which heat is transferred from surface of the cooker to the water in the pot [2]

Ans: - radiation

- conduction

(iii) Describe the appearance of the surface of the solar cooker [3]

Ans; - it is shiny/slivery

- it is smooth

- it is curved

(iv) Explain how the solar cooker works [3]

Ans: - heat from the sun gets to the curved surface

- the shiny surface reflects heat to a focal point.

(b) State the name given to a material that is a poor conductor of heat. [1]

Ans: Insulator

J2023

Q14(a) Fig 14.1 shows one of the four strokes of an engine

(i) Identify, giving two reasons, the stroke shown

Ans: - Intake stroke

Reason - piston is moving down

- inlet valve is open

(ii) Name the type of engine that consists of the stroke shown in fig 14.1 [1]

Ans: diesel engine

(iii) Give a reason for the answer in (ii) [1]

Ans: has no spark plug

(iv) State one advantage and one disadvantage of the engine stated in (ii)

Ans: *Advantages*

- more fuel efficient

- less polluting

- more powerful

Disadvantages

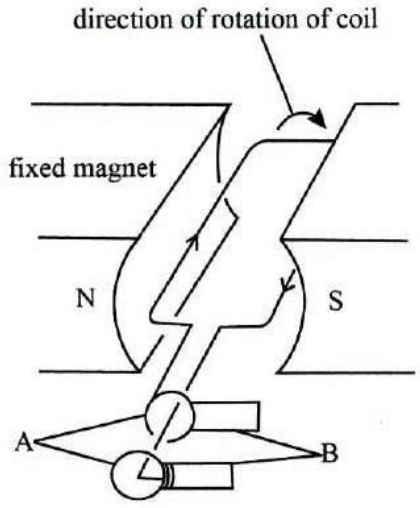
- Expensive to maintain

- Difficult to start in cold conditions

MAGNETISM

N 2019

Q13(a) Fig 13.1 shows an alternating current (a.c) generator.



(i) Name the parts labelled **A** and **B.** [2]

Ans : A – slip rings

B – carbon brushes

(ii) Describe how the (a.c) generator produces electricity [4]

Ans: - Coil rotates in magnetic field due to magnets and cuts magnetic field lines

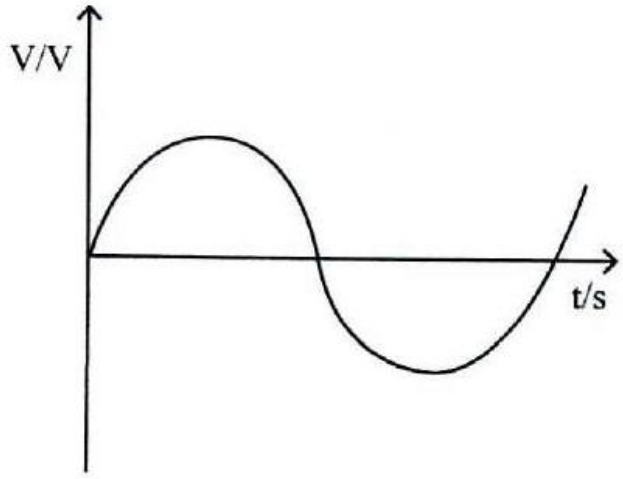
- current is induced in the ciol.

- kinetic energy is converted to electrical energy.

- the induced current changes direction after every half rotation.

(iii) Sketch a graph of output voltage of the generator against time. [2]

Ans:



(b) Explain the effect of using stronger magnets on the magnitude of the output voltage. [2]

Ans: voltage increases as more lines will be cut

N 2019

Q15(a) Describe how electricity is generated at a thermal power station. [4]

Ans: - boilers are heated to produce steam under high pressure

- *The steam turns turbines connected to a coil which is in a magnetic field.*
- *Current is induced as magnetic cuts across the turns of the coil.*

(b) State any two disadvantages of using coal as a source of fuel for a thermal power station. [2]

Ans: - non renewable

- *Causes air pollution*
- *Use of cooling towers is expensive*
- *Leads to global warming*

(c) Give the main difference between a thermal power station and a hydroelectric power station. [2]

Ans: turbines at a hydroelectric power station are turned by the force of water while turbines at a thermal power station are turned from steam

(d) State the type of energy possessed by water which is in a dam. [1]

Ans: gravitational potential energy

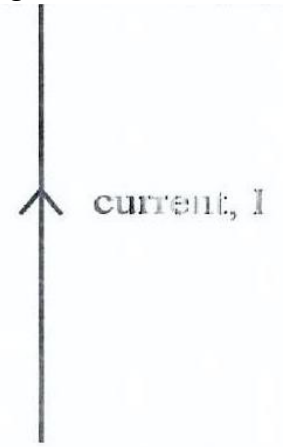
(e) State the Standard International (S.I) unit of energy. [1]

Ans: joule

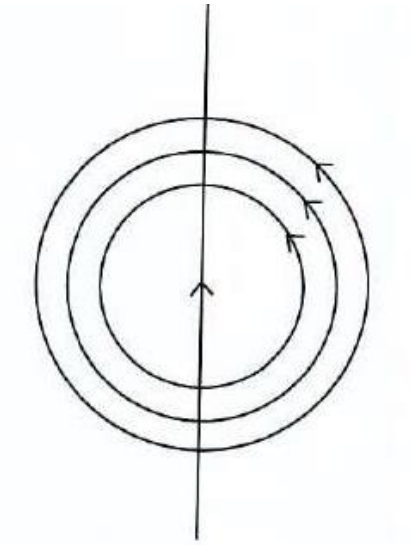
J 2019

Q 5(a) Fig5.1 shows a current carrying conductor

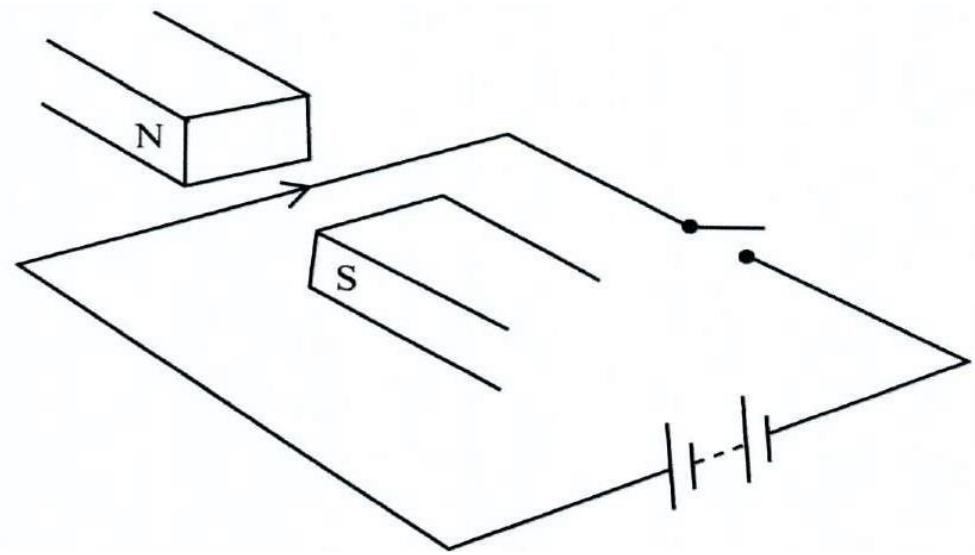
Draw on fig 5.1 the magnetic field lines around the conductor [2]



Ans:



(b). The current carrying conductor is then placed between two magnets and connected to a circuit as shown in fig 5.2



(i) State with a reason what happens when the

1. Switch is closed [2]

Ans: conductor moves downwards

Reason – current carrying conductor has a magnetic field around it. The magnetic field interacts with the magnetic field due to magnets.

2. Battery terminals are reversed and switch closed [2]

Ans : conductor moves upwards

Reason – the direction of the magnetic field of the conductor changed due to current reversed

(ii) Give one application of the principle illustrated

Ans: electric motor

N 2018

Q 14(a) A direct current (d.c) motor is a device which converts electrical energy to kinetic energy. [3]

(i) Describe how motion is produced in a d.c motor.

Ans: - wire carrying current has a magnetic field around it

- magnets of the motor have a magnetic field .

- the two magnetic field interact causing the coil to rotate

(ii) State any two factors that would affect the motion of the motor [2]

Ans: - strength of magnets

- number of turns in the coil

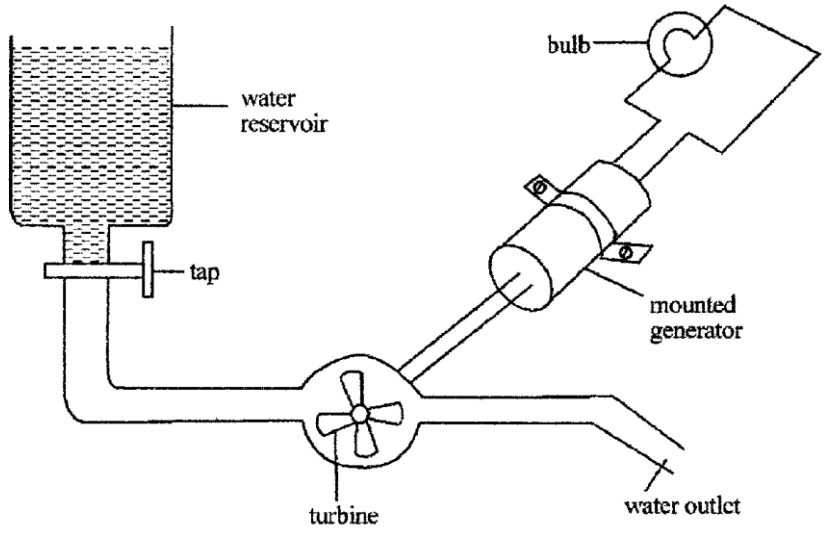
- amount of current

(iii) State what would happen if the d.c power supply is replaced by alternating current (a.c) [1]

Ans: the coil will not rotate

N 2020

Q 14(a) fig 14.1 shows a model of a hydroelectric power station designed by a student.



(i) Describe using energy changes how the bulb in the model lights [3]

Ans: - gravitational potential energy of water in the reservoir is changed to kinetic energy as the turbine turns.
- Kinetic energy of the turning generator is changed to electrical energy.
- the bulb changes electrical energy to heat and light.

(ii) Explain why using a hydroelectric power station is better than using a thermal power station.[2]

Ans: - no pollution to the environment
- it is renewable

ELECTRICITY

N 2020

Q13(a) Explain how a positively charged gold leaf electroscope can be used to test the charge of a charged rod [4]

Ans: - bring the unknown charged rod close to the cap of positively charged gold leaf electroscope
- an increase in the divergence of the leaf indicates that the charge on the rod is positive since like charges repel.
- a decrease in the divergence of the leaf indicates that the charge on the rod is negative since unlike charges attract.

(b)(i) Describe how a house is protected by a lightning conductor. [3]

Ans: -the conductor is a wire /metal with spikes
- it is taller than the building
- it provides a path for the flow of charge from the top of the building to the earth.

(ii) State any two dangers of lightning. [2]

Ans: - high voltage
- electrocution
- heating effect

(iii) State any one safety precaution that should be taken against lightning [1]

Ans: - Keep away from metallic objects
- Disconnect roof top aerials
- Do not shelter near or under isolated trees
- Disconnect electrical appliances
- Avoid being in contact with water during a lightning storm

N 2020

Q15(b) A pot with water is placed on an electric stove and the water is heated until it boils. The electric stove is marked 2000 W.

(i) Define the terms *electrical power* and *electric energy* [2]

Ans : electrical power is the rate of electrical power conversion
: electrical energy is the work done by an electrical appliance

(ii) The water in the pot boils after 8 minutes
Calculate the energy supplied by the electric stove [3]

Ans: $E = P \text{ x } t$ t = 8min x 60 sec
$= 2000W \text{ x } 480s$
$= 960000\text{J}$

N 2021

Q13(a)(i) A 2A electric heater was connected to a 110 V supply for 1hour.
Calculate the cost of running the electric heater [4]

Ans: $P = V \text{ x } I$
$= 110 \text{ x } 2$
$= 220\ W$
Units used $= \frac{220\ W}{1000} \times 1hour$
$= 0{,}22kWh$
Cost $= 0{,}22kWh \times 50cents$
$= 11cents$

(ii) State one limitation of Ohm's law [1]
Ans: Temperature

(iii) Name the two cables on a two pin plug. [2]
Ans: - Live wire
- Neutral wire

(b) (i) Outline how a lightning conductor should be installed for it to protect a building [2]

Ans: - height of the conductor must be above the building
- the conductor should extend into the earth.

(ii) State any one myth on lightning [1]

Ans: - wearing red clothes during a thunderstorm attracts lightning
- lightning is a result of witchcraft

N2022

Q14(b)(i) Define the term lightning. [1]

Ans: Movement of charges from the cloud to the ground

(ii) State any three precautions to be taken against lightning [3]

Ans: -Do not shelter under trees
- Install a lightning conductor
- Avoid contact with metallic objects
- Avoid contact with water

J2023

Q5(b) Two balloons were rubbed with a woollen material

(i) State the charge formed on the balloons. [1]

Ans: negative

(iii) Explain how each material got charged during the rubbing process [2]

Ans: - wool lost electrons
- balloon gained electrons

J2020

Q14(a) Table 14.1 shows Tobias' record of electricity use for two appliances used in one month.

Appliance	**Casing material**	**Power rating/ W**	**Total time switched On/ hour**
Radio	Plastic	500	60
Hot plate	metal	2000	30

(i) State giving a reason, which one of the two appliances has a two pin plug. [2]

Ans: Radio

Reason: - has aplastic casing
- double insulation
- draws small current

(ii) Electricity costs 10c per unit
Calculate the cost of using the hot plate for the month.

Ans: $units\ used = P \text{ x } t$

$$= \frac{2000}{1000} \times 30$$
$$= 60\ units$$
$$cost = units\ used\ \text{ x }\ cost\ per\ unit$$
$$= 60 \text{ x } 10 cents$$
$$= \$6.00$$

(b) State any three precautions which should be observed when using electricity [3]

Ans: - avoid overloading circuits
- earthing
- use insulated cables
- do not handle appliances with wet hands

(c) Give any two ways of saving electricity [2]

Ans: - use energy saving bulb
- Switch off appliances not in use
- use alternative sources

J 2020

Q13(a) A polythene rod can be charged negatively by rubbing it with a woollen cloth.
Describe how the rod becomes negatively charged through the rubbing done [3]

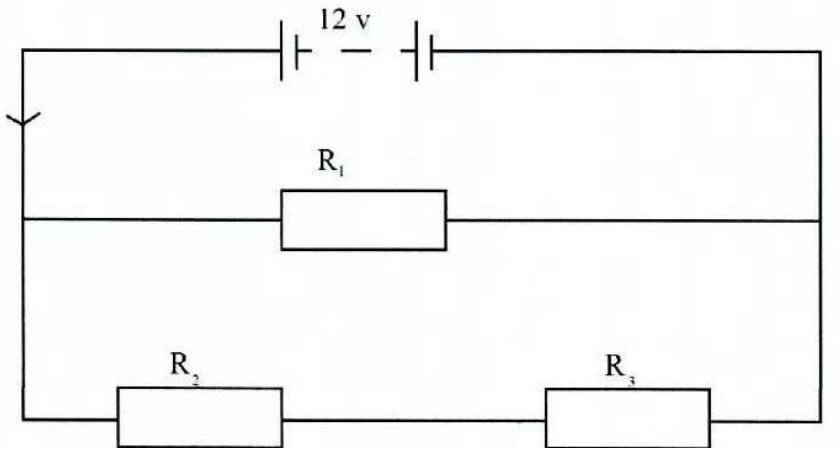
Ans: - woollen cloth loose electrons/negative charges
- the rod gains electrons/ negative charges
- the rod has excess electrons

N2018

Q5(a) State Ohm's law and give any one limitation to the law [2]

Ans: Ohm's law – the voltage across a conductor is directly proportional to the current flowing through it.
Limitation - it is only applicable to metallic conductors
- temperature is not constant

(b) Fig 5.1 shows an electric circuit with three resistors $\mathbf{R}_1$ which is 2Ω, $\mathbf{R}_2$ which is 2Ω and $\mathbf{R}_3$ which is 6Ω



(i) State the in which $\mathbf{R}_1$ is connected with in relation with $\mathbf{R}_2$ and $\mathbf{R}_3$

Ans: - parallel

(ii) Calculate the total current, I, in the circuit [3]

Ans:

total resistance in series $= R_2 + R_3$

$= 2\Omega + 6\Omega$

$= 8\Omega$

total resistance in circuit $= \frac{Product}{sum}$

$= \frac{8\Omega \times 2\Omega}{8\Omega + 2\Omega}$

$= \frac{16}{10}$

$= \underline{1.6\ \Omega}$

$I = \frac{V}{R} = \frac{12\ V}{1.6\ \Omega} = \underline{7.5\ A}$

N2018

Q14(b) State any three precautions taken against lightning

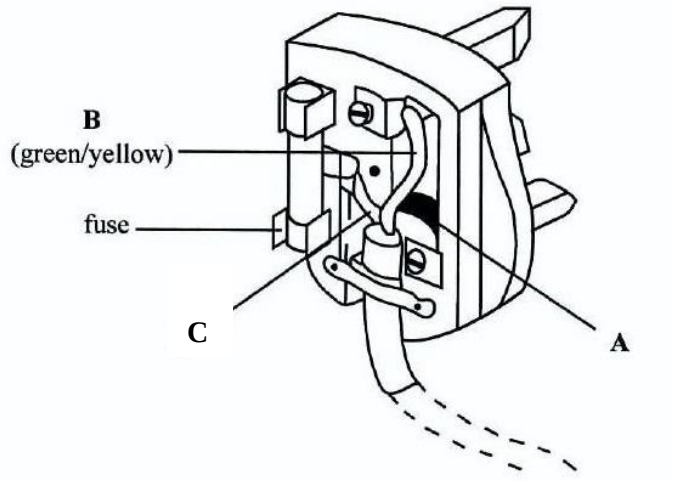
Ans: - Do not shelter under trees
- Install a lightning conductor
- Avoid contact with metallic objects
- Avoid contact with water
-

(c) Name a device which can be used to determine whether or not a glass rod is charged.

Ans: - gold leaf electroscope

N2018

Q15(a) Fig 15.1 shows a 3 pin plug



(i) State which of the labelled wires is the live wire [1]

Ans: C

(ii) State the colours of wires **A** and **C** **[2]**

Ans: **A** – blue
C- brown

(iii) State any **one** advantage and any **one** disadvantage of using photo voltaic Cells as a source of electricity [2]

Ans: **advantage** - no pollution
- renewable
disadvantage – only work during the day when there is enough light intensity
- many cells needed to be connected together to produce enough power.

(iv) Explain how photo voltaic cells are used as a source of electrical power for appliances which use both alternating current and direct current.

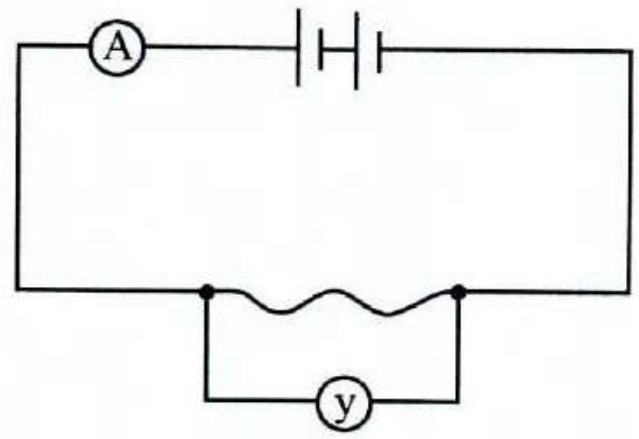
Ans: - they convert solar energy to electrical energy.
- the electrical energy is stored in a battery
- the energy in the battery is used to power d.c appliances
- an invertor is used to convert d.c to a.c so that a.c appliances can be used

(b) State any one use of Electricity in the home

Ans: - lighting
- heating
- powering electrical appliances

J2019

Q14(c) Fig 14.2 shows a circuit used to determine the resistance of a wire.



(i) Name the instrument **Y** **[1]**

Ans: voltmeter

(ii) State the effect of using a longer wire of the same material and thickness

Ans: resistance increases