Sea Breeze

3 Hot air rises up

4 Cold air blows from sea to land

SEA

LAND

1 Lower specific heat capacity

2 Higher in increase in temperature (hotter)

Diagram 3 show a pile driver used to drive a steel pile to the ground. The force involved in driving the steel pile is impulsive force.

Diagram 3

Explain how the steel pile is driven to the ground.

ANSWER:

- Both pile driver and steel pile are material with hard surface
- Place the pile driver at a certain height
- Release the pile driver onto the steel pile
- Short time of impact between the pile driver and the steel pile
- Produces high impulsive force to drive the pile into the ground

While driving a car on a hot day, you may see a mirage on the road as show in the Diagram 9.

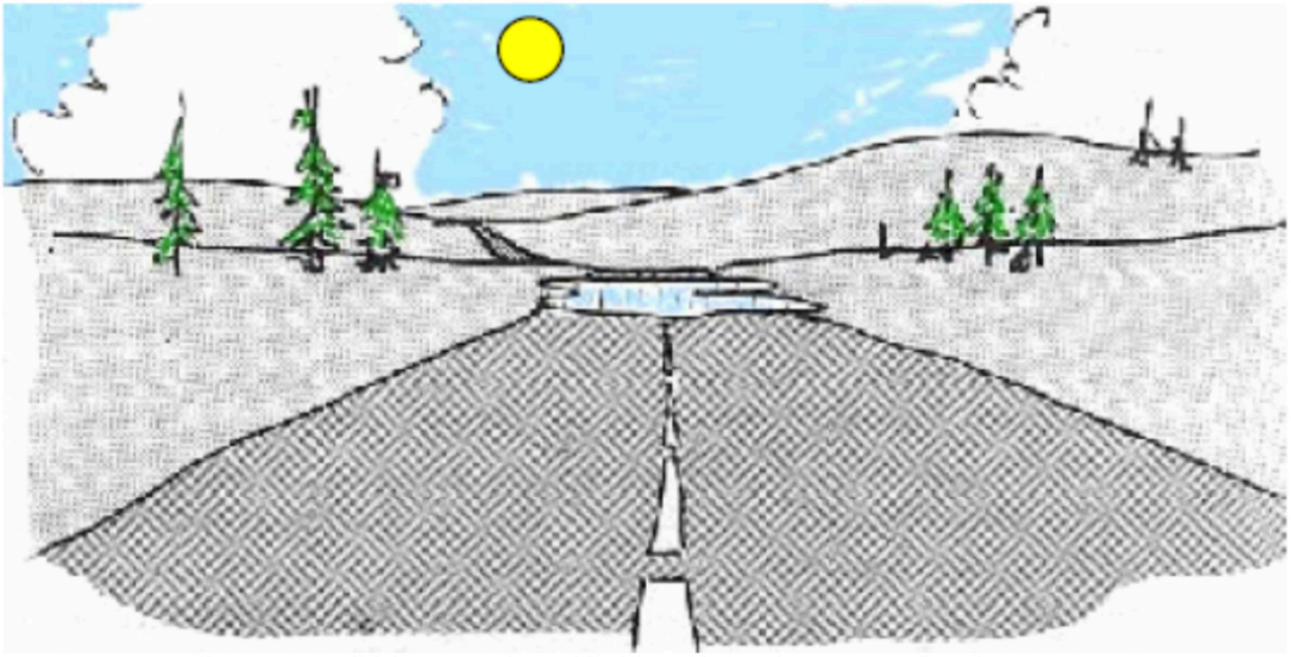


Diagram 9

Explain how mirage occurred.

ANSWER:

- The layers of air nearer the road warmer.
- The density of air decrease nearer to the road surface.
- The light travel from denser to less dense area.
- The light refract away from the normal
- When the angle of incidence exceed the critical angle, total internal reflection occurs

Diagram 13 shows a filament lamp.

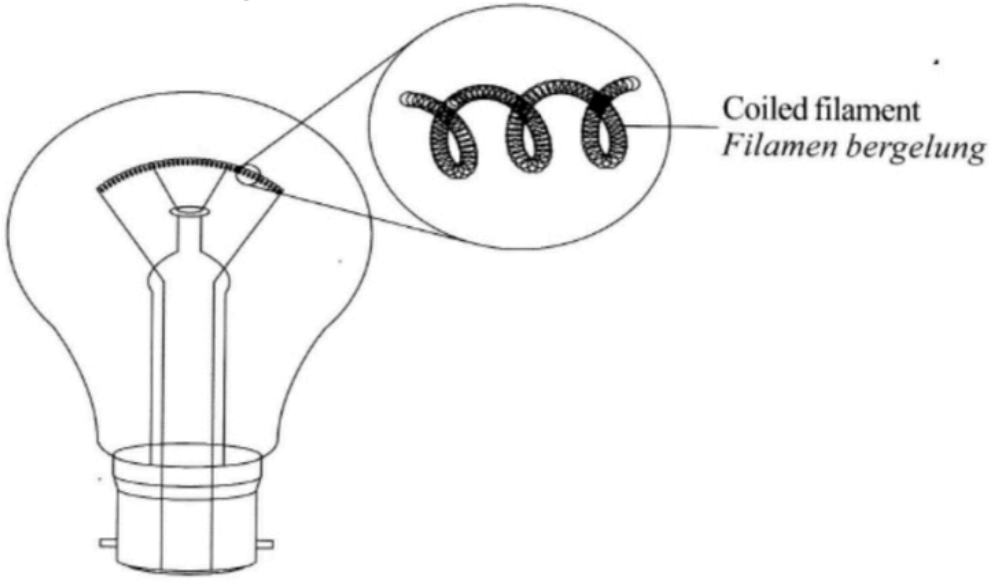


Diagram 13

Explain why the filament in coiled shape produces more light.

ANSWER:

- coil shape, length increases
- resistance increases
- heat produced increases
- heat energy convert to light energy

Diagram 9 shows a bicycle dynamo.

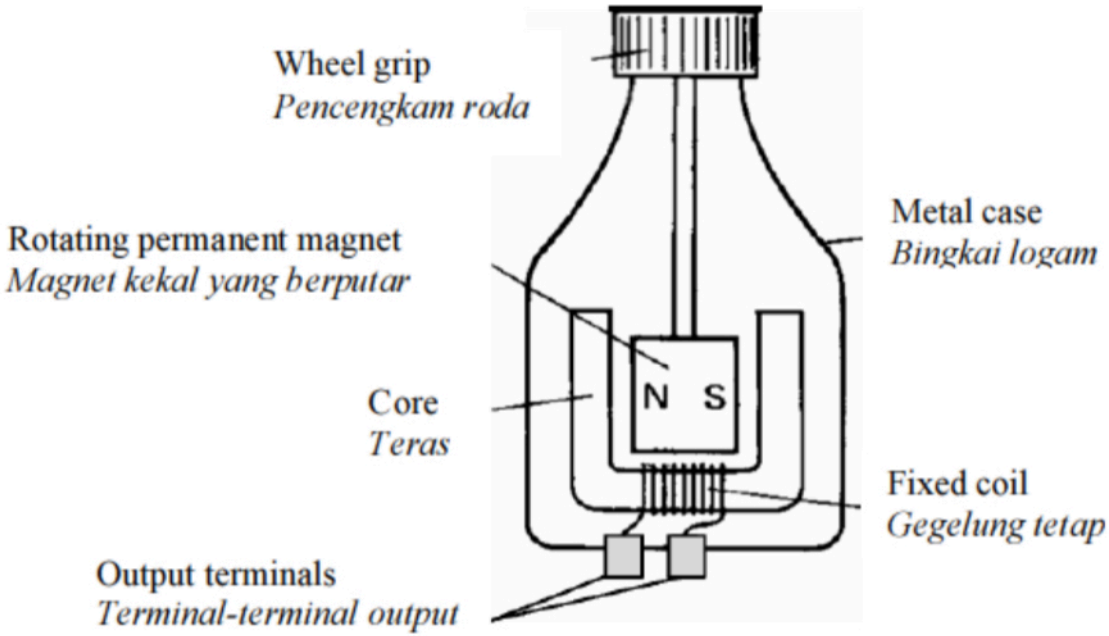


Diagram 9

When the wheel grip is rotated, an e.m.f. is induced in the coil. An induced current flows out from the output terminals.

What is the meaning of induced current?
Explain why carbon brushes are not required in this type of dynamo.
Name the type of current produced.
Explain your answer.

ANSWER:

- The producing of induced current when there is a change of magnetic field
- The direction of the magnetic flux that cuts the coil changes constantly
- Alternating current
- The current produced constantly changes in direction

Diagram 11.1(a) and Diagram 11.1(b) show two cups of coffee with same mass and same initial temperature. A metal spoon and a plastic spoon of same mass are placed in the cups of coffee respectively. The temperature of coffee decreases after several minutes.

Diagram 11.1 (a)

Diagram 11.1 (b)

After an hour, the temperature of the coffee in Diagram 11.1 is equal to the temperature of the surrounding. Explain this situation.

ANSWER:

- the temperature of coffee is higher than surrounding
- heat from coffee transfers to surrounding
- heat transfers until achieve thermal equilibrium
- rate of heat transfer is equal / /temperature re equal/net rate of heat transfer is zero

Diagram 2 shows a train in a tunnel. The sound waves from the train can be heard loudly and clearly at night.

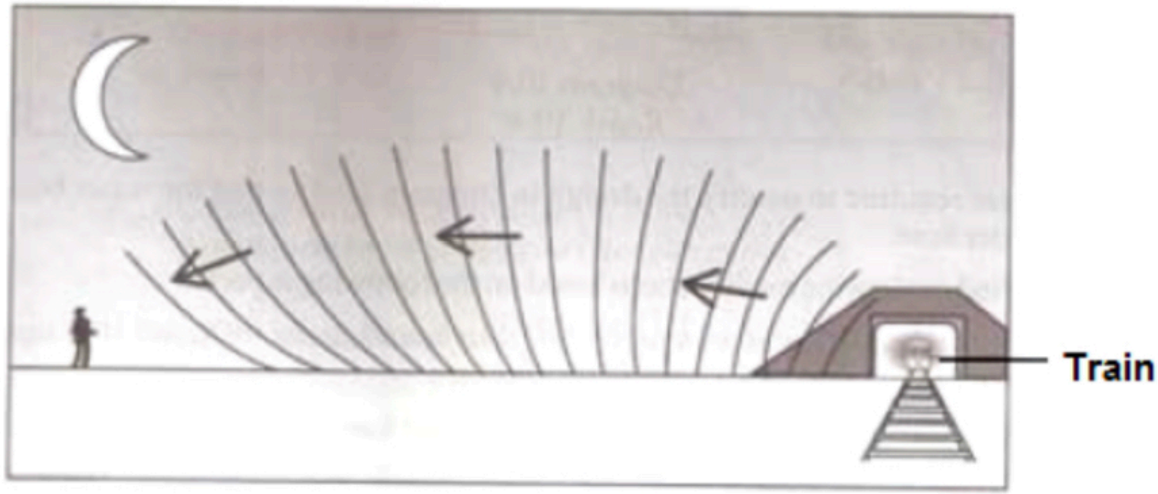


Diagram 2

The distance of the sound waves are further apart at the top than at the ground level.
Explain why this situation occurs, and state how this leads to the sound being loud and clear.

ANSWER:

- At night ground cools quickly // Ground has low specific heat capacity /air layer near the ground colder // low temperature.
- Cold air denser than warm air // Diagram labelled.
- Sound faster in warm air // sound slower in cold air
- Sound bends towards observer // ground // Refraction occurs.

Diagram 4 shows a vacuum cleaner.

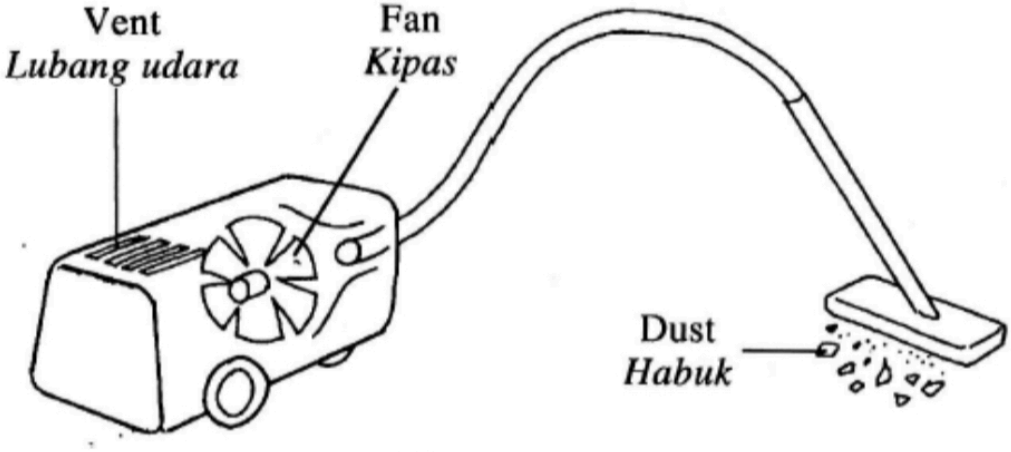


Diagram 4

Explain how the vacuum cleaner is able to remove dust from the floor.

ANSWER:

- Fan blows air out from vent
- Low pressure inside vacuum cleaner
- High pressure outside vacuum cleaner
- Different in pressure result sucking force

Diagram 5 shows a simple hydraulic system.

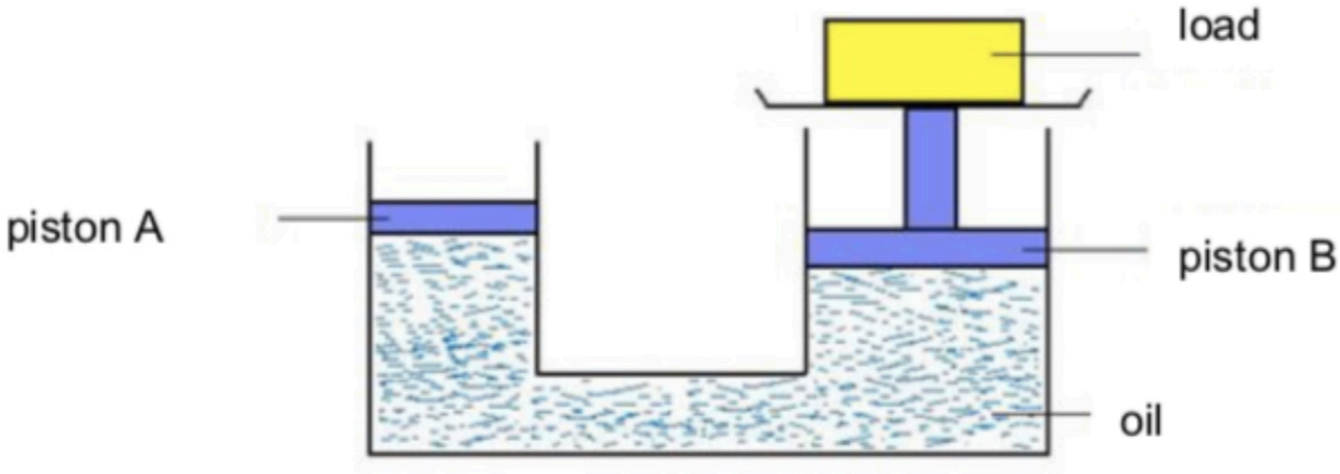


Diagram 5

Explain how the load can be lifted to the certain height.

ANSWER:

- Small force exerted on piston A produce pressure.
- The pressure is transmitted equally throughout the system.
- The pressure exerted on piston B produce output force.
- Since the surface area piston B > piston A, therefore output force produced for piston B is greater.

SKILL 1 - UNDERSTANDING

With the aid of suitable diagram, describe the working principle of a Bunsen burner.

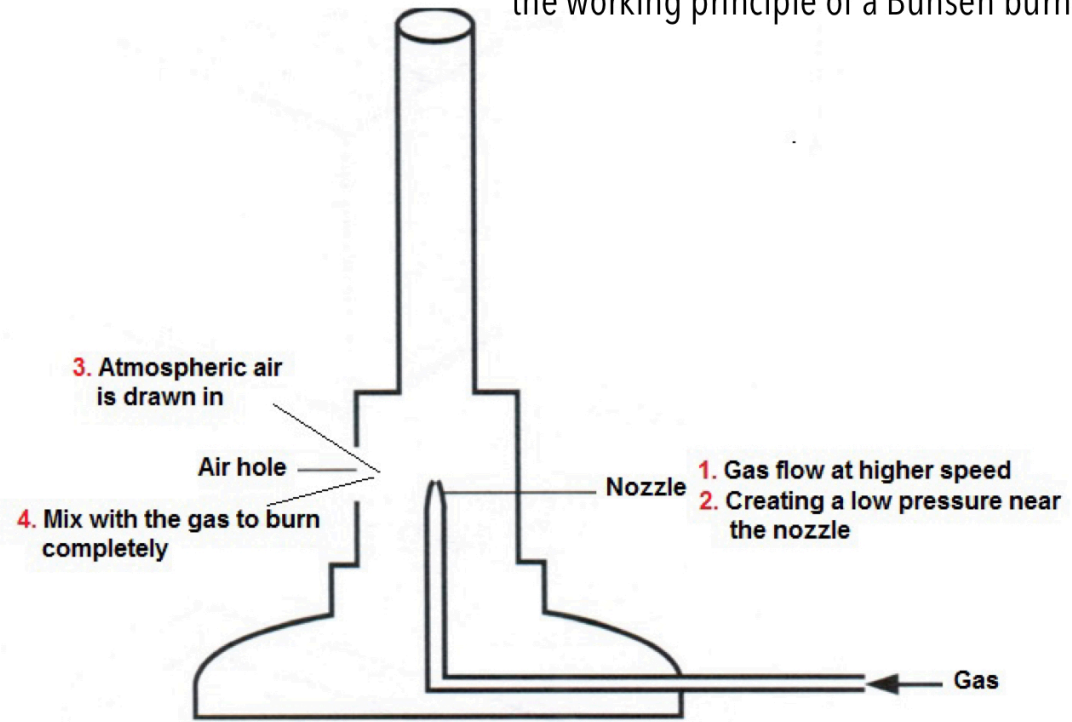


Diagram 8 shows an ideal transformer.

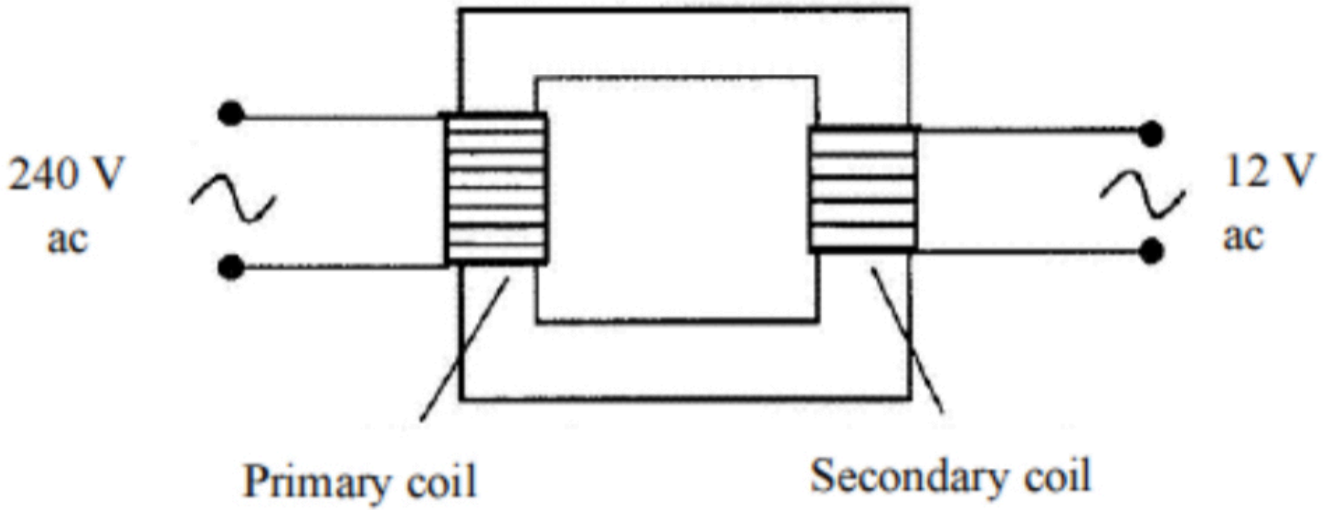


Diagram 8

Name the type of transformer.
Explain how current is induced in the secondary coil?

ANSWER:

- Step down transformer
- When an alternating current flows through the primary coil
- a changing magnetic field will be produced.
- The soft iron core will link the change of the magnetic flux to the secondary coil
- Induced current produced in secondary coil

Diagram 10 shows the structure of a generator.

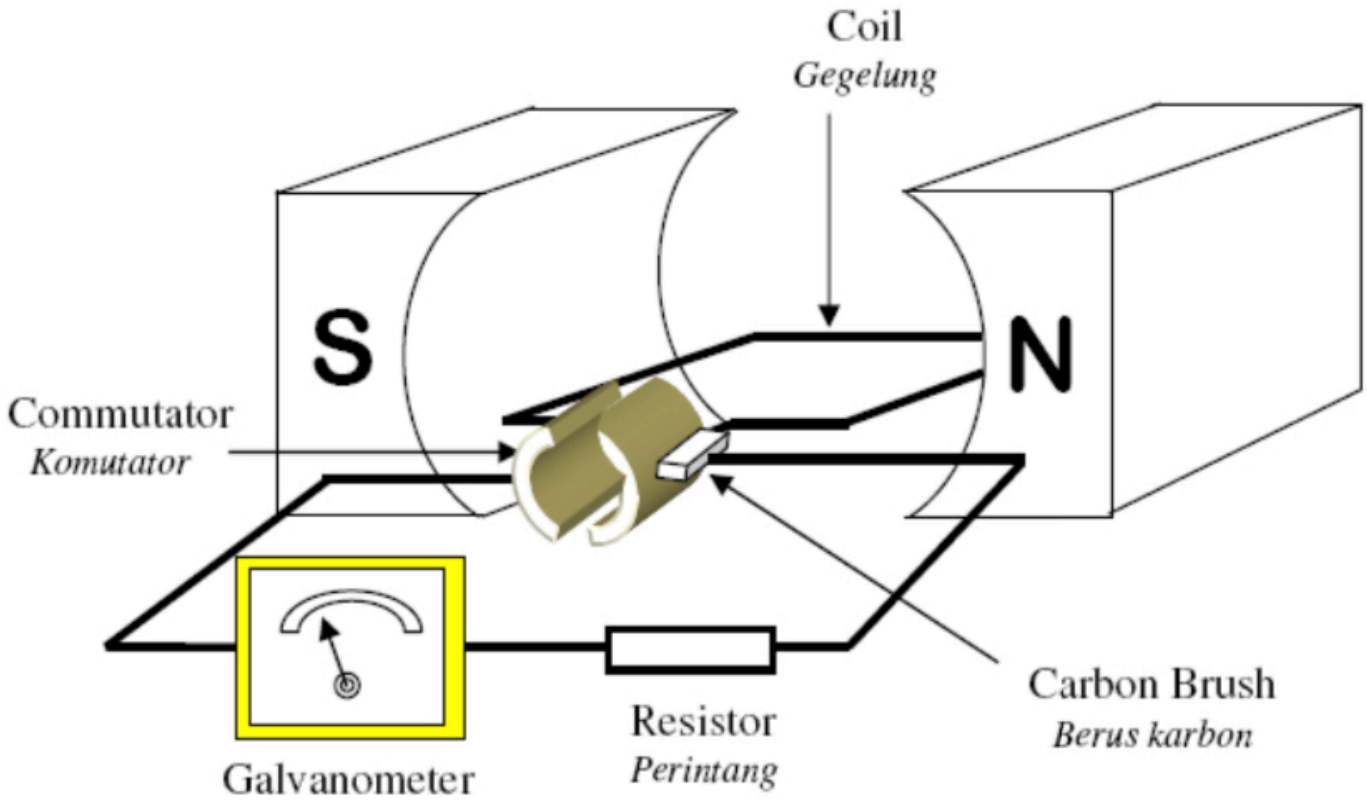


Diagram 10

Explain how the generator can be used to produce electricity.

ANSWER:

- When the coil is rotated by external force apply on it
- Both side of coil cutting magnetic field, produce change of magnetic field flux
- The change of magnetic field flux produces an induced current
- The direction of the induced current is reverse every half turn by commutator

1. BOT LAJU (SPEED BOAT)

ASPEK	JAWAPAN	SEBAB
Bentuk bot (*Shape of the boat*)	Aerodinamik (*Aerodynamic*)	Kurangkan rintangan air (*Reduce water resistance*)
Jisim Bot (*Mass of boat*)	Rendah (*low mass*)	Ringan/ pecutan bertambah (*Lighter/increase acceleration*)
Kuasa enjin (*Engine power*)	Tinggi (*High*)	Pecutan bertambah (*Increase acceleration*)
Saiz kipas (*Size of propeller*)	Besar (*Big*)	Tambah daya (*Increase force*)
Bahan badan bot (*Material used for the body of the boat*)	Komposit carbon (*Carbon composite*)	Kukuh/ ringan/tidak berkarat (*Strong/ lighter/ does not rust*)

2. PAKAIAN MENYELAM (DIVERS SUIT)

ASPEK	JAWAPAN	SEBAB
Ketebalan pakaian (*Thickness of suit*)	Tebal (*Thick*)	Tidak mudah koyak/ kuat/ halang dari kesejukan (*Strong/ not easy tear/ prevent from cold*)
Ketumpatan pakaian (*Density of suit*)	Rendah (*Low*)	Ringan (*Lighter*)
Keupayaan pakaian untuk meregang (*Ability of the suit to strectch*)	Tinggi (*High*)	Tidak mudah koyak (*Not easy to tear*)
Saiz pakaian	Ketat/ sendat (*tight/ fit*)	Kurangkan rintangan air (*Reduce water resistance*)

8. DART SEBAGAI PELURU PISTOL MAINAN

ASPEK	JAWAPAN	SEBAB
Bentuk dart (*Shape of dart*)	Aerodinamik (*Aerodynamic*)	Kurangkan rintangan udara (Reduce air resistance)
Jisim dart (*Mass of dart*)	Rendah (*Low*)	Kelajuan bertambah (*Increase speed*)
Ketebalan dawai spring (*Thickness of spring wire*)	Tebal (*Thicker*)	Lebih Tegar / k tinggi/ Tenaga keupayaan elastik tinggi (*Stiffer/ high k / high elastic potential energy)*
Diameter gegelung spring (*Diameter of spring coil*)	Kecil (*Small*)	Lebih Tegar / k tinggi/ Tenaga keupayaan elastik tinggi (*Stiffer/ high k / high elastic potential energy)*
Teknik menembak (*Shooting technique*)	Halakan keatas sedikit dari garisan ufuk (*Aim upward from horizontal line*)	Mengatasi daya graviti. (*Overcome gravitational force*)

9. SPOILER KERETA LUMBA

ASPEK	JAWAPAN	SEBAB
Bahan yang digunakan (*Material used*)	Komposit karbon (*Carbon composite*)	Ringan / kuat (*Lighter/ strong*)
Bentuk (*Shape*)	Aerofil (*Aerofoil*)	Hasilkan daya kebawah (*Produce downward force*)
Jisim (*Mass*)	Rendah (*Low*)	Tambah halaju (*Increase speed*)
Permukaan spoiler (*Surface area of spoiler*)	Besar (*Bigger*)	Hasilkan lebih tinggi daya kebawah (*Produce higher downward force*)

2. Diagram 1 shows a car. Using appropriate physics concept, explain the modifications needed to be done to the car so that it can be used as a safe racing car.

Diagram 1

Modification	Explanation
Aerodynamic shape	To reduce air friction
Light materials	Can move in high speed // accelerate easily
Strong material	Not easily to break
Tyre with more thread	More grip // to increase the friction between the tyre & the road
Spoiler	To stabilize the car
Increase the power of the engine	accelerate easily

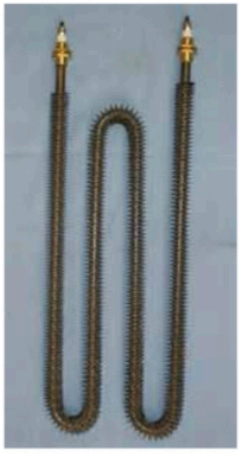
2. BILIK KULIAH

ASPEK	JAWAPAN	SEBAB
Bahan untuk dinding (*Material for the wall*)	Papan lembut (*Softboard*)	Menyerap gelombang bunyi/ elak gema (*Absorb sound waves/ avoid echo*)
Kedudukan mikrofon (*Position of microphone*)	Belakang pembesar suara (*Back of speakers*)	Elakkan 'bising' (*Avoid Noise*)
Jenis mikrofon (*Type of microphone*)	Mikrofon tanpa wayar (*Wirelessmicrophone*)	Bebas bergerak (*free to move*)
Kedudukan pembesar suara (*Position of speakers*)	Tinggi (*High*)	Elakkan halangan (*Avoid obstacle*)
Jarak antara dua pembesar suara (*Distance between two speakers*)	Jauh (*Far*)	Jarak antara dua bunyi kuat berturutan, x adalah dekat. (*Distance between two consecutive loud sounds short*)

3. GELOMBANG ELEKTROMAGNET UNTUK SISTEM PENYIARAN SATELIT

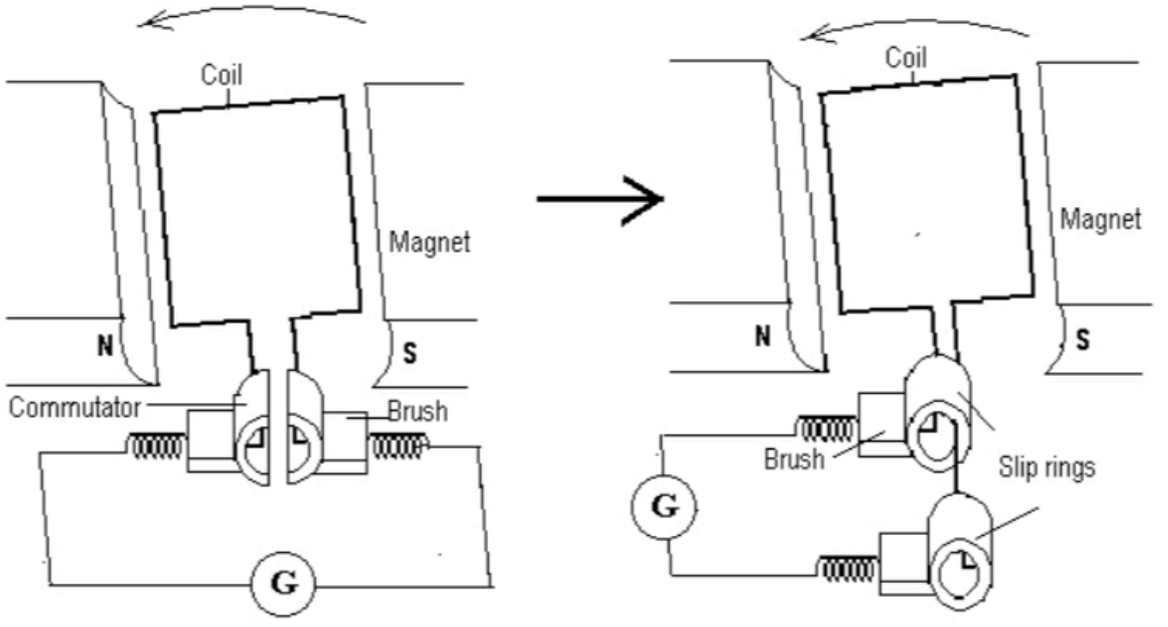
ASPEK	JAWAPAN	SEBAB
Nama gelombang	Gelombang elektromagnet/ mikro	Tidak perlu medium/frekuensi tinggi/ Tenaga tinggi
Frekuensi gelombang	Tinggi	Tenaga tinggi/ boleh bergerak jauh
Panjang gelombang	Rendah	Mudah di pantulkan
Halaju gelombang	Tinggi	Dapat bergerak jauh
Pelembapan	Rendah	Kurang tenaga terbebas semasa penyiaran

5. ELEMEN PEMANAS DALAM CEREK ELEKTRIK (HEATING ELEMENT IN ELECTRIC HEATER)



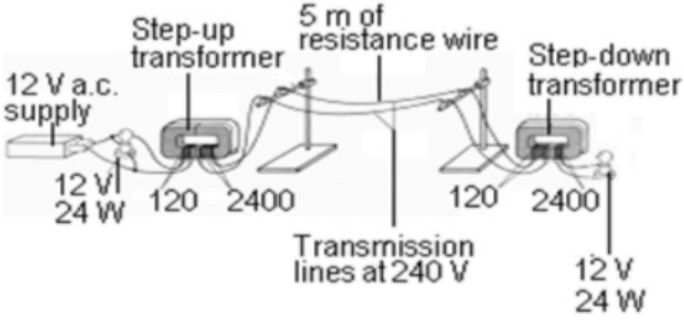
ASPEK	JAWAPAN	SEBAB
Bahan gegelung pemanas (*material of the coil*)	Nikrom (*Nichrome*)	Rintangan tinggi (*High resistance*)
Bilangan lilitan gegelung (*Number of turns of the coil*)	Banyak (*Many*)	Rintangan tinggi / banyak haba (*High resistance/ more heat*)
Takat lebur (*Melting point*)	Tinggi (*High*)	Tidak mudah melebur (*Not easy to melt*)
Kadar pengoksidaan (*Oxidation rate*)	Rendah (*Low*)	Tidak mudah berkarat (*not easy to rust*)

6. UBAHSUAI PENJANA A.T KE PENJANA A.U

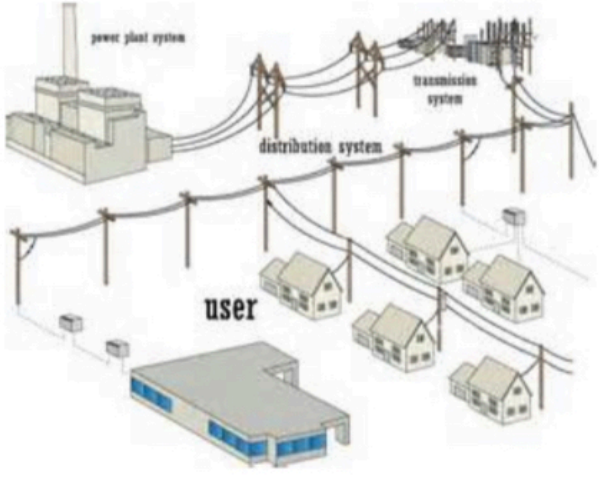


ASPEK	JAWAPAN	SEBAB
Bentuk Magnet (*Shape of magnet used*)	Melenkung (Curve)	Menghasilkan medanmagnet jejarian/ Garis medan magnet tertumpu pada armatur (*Produce radial magnetic field/ magnetic field lines is concentrated at the armature*)
Kekuatan magnet (*Strength of magnet*)	Kuat (*Strong*)	Hasilkan lebih banyak pemotongan fluks/ arus bertambah (Produce more cutting of flux) / increase current)
Bilangan lilitan gelung (*Number of turns of the coil*)	Banyak (*More/ higher*)	Hasilkan lebih banyak pemotongan fluks/ arus bertambah (*Produce more cutting of flux) / increase current*)
Sentuhan berus dan komutator (*Contact of brush and commutator*)	Spring	Pastikan sentuhan ketat (*Ensure the contact is tight*)
Cincin yang digunakan (*Ring used*)	Slip Ring	Mengubah arah arus selepas separuh putaran untuk memastikan daya kupel memutarkan gelung dalam arah yang sama. (*Reverse the current each half revolution to keep the couple force turning the coil in the same direction*)

7. PENGHANTARAN TENAGA ELEKTRIK

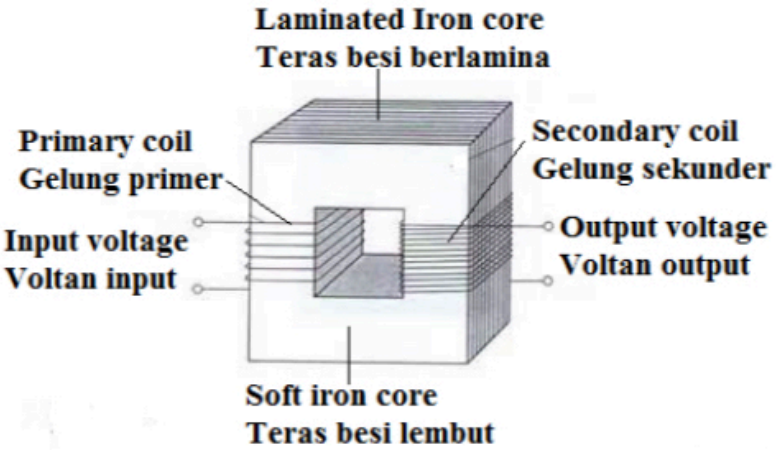


MODEL



ASPEK	JAWAPAN	SEBAB
Jenis dawai kabel (*Type of cable wire*)	Kuprum (*Copper*)	Rintangan rendah (*Low resistance*)
Ketebalan dawai kabel (*Thickness of cable wire*)	Tebal (Thicker)	Rintangan rendah (*Low resistance*)
Jenis transformer (*Type of transformer*)	Injak Turun (*Step down*)	Turunkan voltan (*Lower the voltage*)
Susunan litar (*Arrangement of circuit*)	Selari (*Parallel*)	Satu mentol terbakar, lain masih menyala. (*One bulb blow, other still function*)
Ketumpatan kabel (*Density of cable wire*)	Rendah (*Low*)	Ringan (*lighter*)
Jenis arus yang digunakan	Ulang alik	Mudah dinaikkan dan diturunkan voltaan dengan menggunakan transformer.
Magnitud Voltan	Tinggi	Mengecilkan arus / kehilangan tenaga dikurangkan.

8. TRANSFORMER

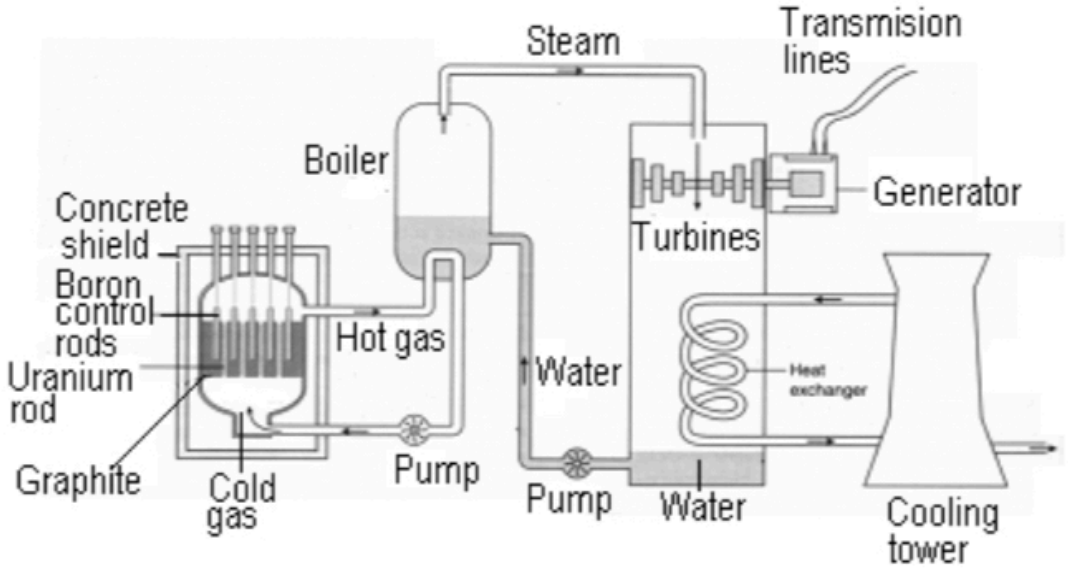


ASPEK	JAWAPAN	SEBAB
Jenis teras besi (*Type of iron core*)	Teras besi lembut (*Soft Iron Core*)	Mudah dimagn etkan dan mudah dinyahmagnetkan (*Easy to magnetized and demagnetized*)
Sifat teras besi (*Characteristic of iron core*)	Berlapis/berlamina (*Laminated*)	Kurangkan arus pusar (*Reduce Eddy Current*)
Bahan dawai (*Material of wire*)	Kuprum (*Copper*)	Rintangan rendah (*Reduce resistance*)
Ketebalan dawai (*Thickness of wire*)	Tebal (Thick)	Rintangan rendah (*Reduce resistance*)
Jarak antara gelung primer dan gelung sekunder (*Distance between primary coil and secondary coil*)	Rapat/dekat (*close*)	Elak kebocoran fluks (*Avoid flux leakage*)

Prinsip Kerja Sebuah Transformer:

1. Arus ulangalik yang berubah arah dan magnitud mengalir dalam gelung primer
2. Menghasilkan medan magnet yang juga berubah arah dan magnitud
3. Dengan bantuan teras besi lembut medan magnet mengalir ke gelung sekunder
4. Pemotongan fluks berlaku dalam gelung sekunder menghasilkan d.g.e aruhan dan arus aruhan.

12. REAKTOR NUKLEAR (NUCLEAR REACTOR)



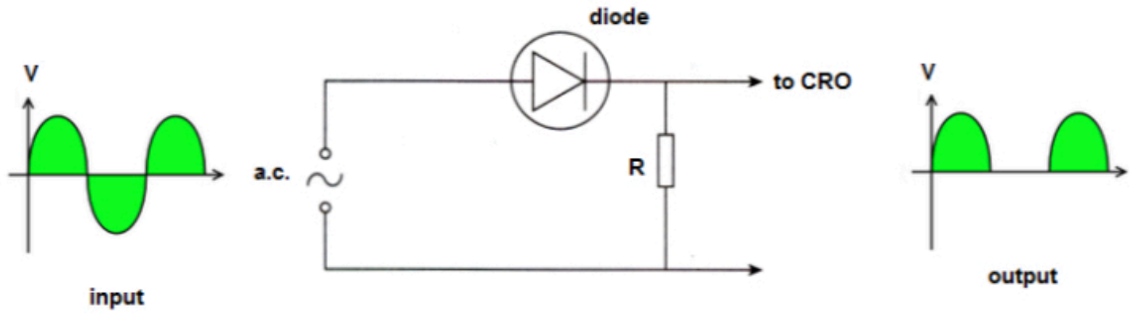
ASPEK	JAWAPAN	SEBAB
Bahan api yang digunakan (*Fuel used*)	Uranium	Menghasikkan tindakbalas pembelahan lebih mudah (*Produce fision reaction easily*)
Separuh hayat bahan (*Half life of the source*)	Lama (*Long*)	Tahan lama (*Lasting*)
Keadaan Jirim (*State of matter*)	Pepejal (*Solid*)	Mudah diuruskan (*Easy to handle*)
Moderator	Grafit (*Graphite*)	Memperlahankan gerakan neutron (*Slow down the motion of neutrons*)
Rod pengawal (Control Rod)	Boron / Cadmium	Serap neutron (*Absorb the neutron*)

PASCAL'S PRINCIPLE

The characteristic of a hydraulic brake system in a car.

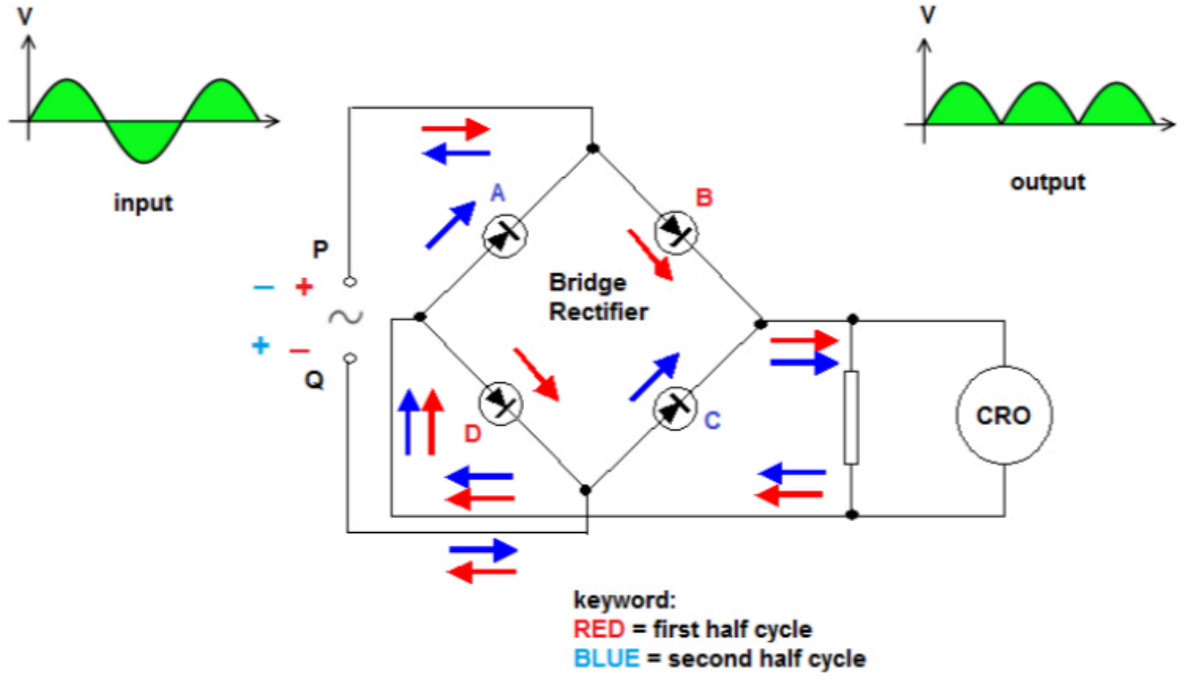
BRAKE FLUID	OIL, INCOMPRESSIBLE PRESSURE CAN BE TRANSMITTED EQUALLY
MATERIAL FOR TRANSMISSION PIPE	NON CORROSIVE - LONG LASTING // NOT EASILY RUST STEEL - STRONG MATERIAL
SPRING CONSTANT OF THE SPRING	HIGHER - EASY TO RETURN TO ORIGINAL SHAPE // CAN WITHSTAND HIGH FORCE
RATIO OF CROSS-SECTIONAL AREA OF PISTON IN THE MASTER CYLINDER TO BRAKE DRUM CYLINDER	BIG RATIO TO PRODUCED BIGGER OUTPUT FORCE // EASY TO SLOW DOWN OR STOP
BOILING POINT	HIGHER - DOES NOT VAPORISE EASILY - CAN WITHSTAND HIGHER TEMPERATURE

➢ HALF-WAVE RECTIFICATION



- The current will only flow in the first half-cycle when the diode in forward bias.
- The current is blocked in the second half-cycle when the diode is in reverse bias.

➢ FULL-WAVE RECTIFICATION



- In the first half, the current flows from P → B → D → Q.
- In the second half, the current flows from Q → C → A → P.

➢ THE USES OF CAPASITOR

1. When the current pass through the resistor and capacitor, the capacitor is charged and stores energy.
2. When there is no current pass through the resistor and capacitor, the capacitor discharge and the energy from it is used to produce voltage across the resistor.
3. As a result it produces a smooth dc output.