

**CHARACTERISTIC/PROPERTIES  
FOR QUESTION ON MODIFICATION AND MAKING DECISION**

**Chapter 1/2/3 (FORCES AND MOTION/PRESSURE)**

BIL	ASPECT/CHARACTERISTIC/ MODIFICATION	REASON/EXPLANATION
1	The small reading of scale 0.01 cm	More sensitif/more accurate/suitable to measure a small length
2	Front and rear crumple zones	to increase time of impact //to reduce impulsive force.
3	Air bags	will inflate during collision/to prevent driver and passenger colliding with steering wheel and dashboard.
4	Dashboard - made of soft material	to lengthen the time of impact so as to reduce impulsive force.
5	Seat belt	to prevent passengers thrown forward due to it inertia
6	Headrest	to prevent head thrown back due to it inertia
7	Thicker wall at the base	To withstand greater pressure at the bottom as the pressure increases with depth
8	The wall is constructed using stronger materials / Using reinforce concrete	To avoid the wall from breaking / To increase the strength of the wall / To avoid leaking
9	Equipped with the water overflow system	To avoid flooding / To channel away the overflow water
10	The mass must be high	so that the vehicles becomes more stable
11	the types of engine is diesel	so the cost is low
12	the diameter of the tyre must be bigger	so the pressure is low // more stable
13	Streamline / larus	reduce the resistance of water/ kurangkan rintangan air
14	Low Density / <i>ketumpatan rendah</i>	higher buoyant force/ daya apungan tinggi
15	Specific heat capacity high / <i>muatan haba tentu tinggi</i>	absorbs heat slowly/serap haba dengan perlahan
16	High strength / <i>Kekuatan tinggi</i>	Difficult to damage / sukar rosak
17	Material made from glass	Glass does not corrode with acid
18	Small diameter of capillary tube	To increase the sensitivity of the hydrometer
19	High density of shots/added more	Makes the hydrometer stays upright/lower center of gravity
20	Big diameter of bottom bulb	To obtaine a bigger upthrust/stability
21	Aerodynamics / cone shape at top	Reducing of air friction
22	Small mass	Higher rate of acceleration/easy to carry
23	Less than half of the bottle filled with water(water roket)	Enough space for increasing air pressure/ Big buoyant force
24	3 or 4 wings	The stability of the rocket
25	Angle of projection = 45 degree	Increase the flight distance
26	Low density of an object	So that it is lighter/accelerate faster
27	Higher density	Bigger inertia/stability
28	High engine power	To produce high acceleration// high resultant force

29	High spring constant // stiffer spring	So that the spring is stiffer // motorcycle bounce less // less vibration
30	Wide tyre // smooth tyre	To increase stability // to reduce friction
31	use a spring with a bigger diameter	so that k is bigger
32	the spring is made from steel a larger k(spring constant)	the type of material influences k produces a bigger elastic PE. elastic P E changes to K E
33	spring is greatly compressed	so that elastic Potential Energy is bigger
34	slope of inclined plane is 45 degrees	so that distance is maximum
35	The melting point should be high	To be able to withstand high
36	The material must be very strong	To be able to withstand very strong force
37	Shaped with a curved surface at the top and a flat surface at the bottom(aerodynamic)	To achieve an upward lifting force when moving at high speed
38	Run with higher speed	To increase kinetic energy
39	Bend pole greater // jump when the pole is maximum bend	Increase elastic potential energy
40	Elastic pole // strong material // low density	So that the pole can return to it original shape // So that it will not break // light
41	Wear fit attire	Reduce air resistance
42	Use mattress/soft material	increase time of collision // reduce impulsive force//increase landing time
43	Made of concrete	Stronger / Not easy to break // metal can rust easily
44	thicker wall at the bottom	able to withstand the higher pressure at the bottom
45	height from ground is high(dam)	to produce a greater difference in pressure
46	Wide base cross section area	So that ship can float//prevent from overturn // ship more stable // ship not sink deeper
47	High volume of air space in the ship	Produce air buoyant force// ship can float
48	Spring arrange in parallel	The spring sistem is stiffer/less extension/less elastic
49	Spring with thicker wire	The spring is stiffer/wire not easily break
50	Spring with smaller diameter of coil	Increase the stiffness of the spring//can with stand higher force
51	Rope with small diameter(parachute)	Accupy less space/less mass
52	Long stem(for hydrometer)	Cover a wider range of densities
53	Stem with smaller diameter	Sink more and increase the sensitivity
54	Low rate of rusting	To ensure tha material last longer
55	Semicircular curve shaped(for slope)	Exchange between KE and GPE easily
56	Smooth surface	Easily to move/reduce frictional force
57	Synthetic material	Light weight/air-proof material

**Chapter 4 (HEAT)**

BIL	ASPECT/CHARACTERISTIC/ MODIFICATION	REASON/EXPLANATION
1	the lid of the pan designed to lower the air pressure inside the pan	the boiling point of water decreased
2	the lid of the pan made of substance which has weak conductivity of heat	heat will not absorbed by the the lid,so heat will not lost to surrounding
3	Made from material with low specific heat capacity	Temperature in the pot can be increased quickly when heated. This saves fuel / cooking gas.
4	Made from a low density material	Pot is light and more portable
5	Made from material that is not easily corroded or oxidized	Pot is more durable and will not contaminate the food with dangerous material
6	The handle of the pot is made from material with high specific heat capacity	The handle becomes hot slower and can be held without scorching the hand
7	The pot is designed to have vertical compartments which can be added or removed	This makes the pot versatile because different food can be cooked at the same time
8	High melting point	Does not melt easily if there is an increase in temperature.
9	Liquid that difficult to compress.	Pressure will be transmited uniformly in all directions/ flows easily
10	High degree of hardness	Can withstand great force / does not break easily
11	Large numbers of fin blade -	Increase surface area // release heat quickly // engine cools quickly
12	Big size of fan	Can suck more air // more air can be blow to the engine /Can cool down a larger area
13	High boiling point	Not easily to vaporize // the volume of liquid reduce slowly // takes a longer time to boil
14	High specific heat capacity	Takes a longer time to become hot // the rise in temperature is slow
15	Increase the length/area of cooling coil	increase the resistance/Can transfer the heat faster to the surrounding
16	A storage tank must be place at a higher level	To give higher pressure
17	Pipe embedded in plate must be long	will enlarge surface area will absorbs heat faster
18	The pipe inside the plate must be made of metal	Metal is a good heat conductor,so it will transmit heat to water easily/resistance hih
19	thermometer is made from strong transparent glass	so that it is not easily broken
20	the thermometric liquid chosen is mercury	because it easily expands uniformly
21	the capillary tube is made narrow and thin	so that it is more sensitive
22	the shape of the thermometer is round	so that it has a magnifying effect
23	the thermometer is placed in melting ice	to obtain the lower point
	the thermometer is placed in steam	to obtain the upper point
24	Low specific heat capacity of ice cream box	Easy get cold // becomes cool quickly
25	Smaller size of ice cream box	Easier to carry // easy too become cool
26	Plastic PVC	Poor conductor of heat

27	Bright colour of outer box	Does not absorb heat from surrounding quickly
28	Use insulator behind the absorber panel	To prevent the loss of heat energy
29	Use an absorber panel which is painted black.	A black surface is a good absorber of radiation so it will absorb heat faster

### Chapter 5 (LIGHT)

BIL	ASPECT/CHARACTERISTIC/MODIFICATION	REASON/EXPLANATION
1	Small critical angle.	Allow more light to involve in total internal reflection
2	strong material	not easily broken.
3	flexible material.	Can easily change the shape.
4	fine diameter	can enter small holes.
5	High refractive index	Total internal reflection can occur easily
6	Optical fibre in a bundle	Large number of signal/higher intensity of light can propagate
7	Material with weak rigidity	The optical fibre can be bent easily
8	Material with great strength	The optical fibre can last longer/not easily spoil
9	A plane mirror mounted on an adjustable arm	Reflects light to the vertical screen, corrects lateral and vertical inversion
10	Use a converging mirror instead of plane mirror	Focus the light directly to the lens // increase the intensity of light.
11	Place the filament at the centre of curvature of the converging mirror // use high powered lens	Light goes directly from the lamp and reflect back on the same path // increase the intensity of light towards the transparency // to get brighter image
12	Use heat filter	To absorb excess heat to the transparency
13	Electric fan operates during and after the lamp is switched on	Cooling system to stabilize the temperature (heat energy produced by filament bulb)
14	Shorter // smaller size of binocular	easy to carry
15	Use prism to make the total internal reflection occur	Produce upright image
16	Higher density	Higher refractive indeks
17	Objective lens with larger diameter	More light passes through the lens
18	Eyepiece with higher power	Shorter focal length
19	Shorter focal length	Higher power/increase the magnification
20	Convex lense	Can produce real image
21	u a bit bigger than f	Produce maximum magnification
22	periscope	Cheaper than cctv
23	2 plane mirror/prism	Can reflect light from object
24	Casing to hold the mirror	Easier to handle periscope
25	Convex mirror	Wider field view
26	Optical fibre with higher densities/ refractive index inner compare than outer	To ensure total internal reflection occur

**Chapter 6 (WAVE)**

<b>BIL</b>	<b>ASPECT/CHARACTERISTIC/ MODIFICATION</b>	<b>REASON/EXPLANATION</b>
1	Build near bay	Waves are calmer due to divergence of energy/ Convergence of waves at the cape/The bay is shallower . The speed of waves decreases./The amplitude of waves at the bay is small.
2	Build retaining walls	Reduce direct impact of the waves on the shore. To reflect the waves from the shore./Protect the area from large waves /avoid erosion
3	Concrete barrier structure with a gap in between	Waves passing through the gap will be diffracted in the children's area/the smaller amplitude of the diffracted waves causes the sea to be calmer there energy of waves decreases.
4	Build high retaining wall	To ensure the water not overflow.
5	Thick area at the base of the wall	To withstand high pressure at the base
6	Long wavelength	Easy to diffract
7	Short Slit	Diffraction more obvious
8	Ultrasonic wave	Can transfer more energy

**Chapter 7/8 (ELECTRIC & ELECTROMAGNET)**

<b>BIL</b>	<b>ASPECT/CHARACTERISTIC/ MODIFICATION</b>	<b>REASON/EXPLANATION</b>
1	The electric appliances are connected in parallel	Allow each electric appliances to be switched on and off independently/Higher voltage One appliances damage the another can still function
2	Fit fuse at the live wire in the fuse box/Use miniature circuit breakers (mcb's)	To stop the flow of current by melting when a high voltage of electric current flows through the circuit // switches itself off very quickly if the current exceeds
3	Earth connection to the metal case of electrical appliances	Earth wire connected to earth, so that when a fault occurs and a current flows through the live wire and the earth wire, the fuse in the live wire will blow and cut off the supply.
4	Use low power lamps / install fluorescent lamp	To reduce the energy use/do not waste the electrical energy
5	Regularly cleaning and removing dust from the air filters of air conditioners	To make sure the appliances function effectively
6	Low power lamp	Safe cost//electric bill
7	High efficiency	The room looks brighter//high output power//less power wastage
8	Long life span	No need to replace often
9	Low price/cost	Save money/cost
10	Smaller surface area	the resistance is higher
11	High melting point	not easy to melt
12	Long (coiled) metal	to increase the resistance
13	Low rate of oxidation	Does not oxidize easily / can be used for a longer period
14	Low resistance	Current will increase / more heat will be produced
15	Low resistivity	To reduce heat loss in the cables

16	Low rate of thermal expansion	The cables will not expand under hot weather
17	use thin diaphragm	Easy to vibrate
18	Use strong material	Not easy to break
19	More number of turns of coil	Increase the rate of change of magnetic flux linkage // The magnitude of the induced current or is also increased
20	Thicker diameter of wire of coil	reduce the resistance of the coil
21	Using more powerful magnet to increase the strength of the magnetic field	Increase the rate of change of magnetic flux linkage // The magnitude of the induced current or induced electromotive force is also increased
22	Change slip rings with commutator	To reverse contact with brushes so that the current flow in same direction in external circuit
23	Use stronger magnet	To increase the magnetic field strength
24	Use more number of turn for the coil/ Increase the speed of rotation	Increase the rate of change of magnetic field/increase the induced current
25	Diameter should be large	to reduce the resistance of the cables
26	The rate of expansion should be low	So there is less expansion and less sagging in the cables during hot days
27	Use capacitor	To smoothen the current produced/to store electric charge
28	Using concave surface soft iron	Produce radial magnetic field to ensure smooten rotation
29	Using a laminated iron core	Reduce Eddy current in iron core
30	Thick copper wire	reduce the resistance of the coil
31	Using soft iron for the core	Reduce the hysteresis loss. Easy to magnetize and demagnetize
32	Winding the secondary and primary coils on top each other.	Reduce Leakage of Magnetic Flux

### Chapter 9 (RADIOACTIVE)

<b>BI L</b>	<b>ASPECT/CHARACTERISTIC/ MODIFICATION</b>	<b>REASON/EXPLANATION</b>
1	The half-life should be a few days long	This allows for the location to be detected and thereafter the radioactive contamination is reduced
2	The source should emit $\gamma$ particles	This enables the radiation to be detected above the ground/high penetrating power
3	The detector should be able to detect $\gamma$ particles (low ionising particles)	High ionising particles like $\alpha$ and $\beta$ particles are absorbed by the ground
4	Has a long half-life	Can be used for a long time hence save cost
5	Emits beta	Can penetrate box and liquid and is less dangerous than gamma
6	Solid form	Easy to handle and contain.
7	Low ionising power	Does not change the state and taste of juice
8	Higher ionising power	Easy for the medium to conduct electricity

**QUESTIONS ON UNDERSTANDING**

**FORM 4**

**CHAPTER 1**

1. Explain the differences between accuracy and consistency of a measuring instrument by using suitable examples.

- Accuracy is the ability of the instrument to give readings close to the actual value.
- The value determined is accurate if it is near to the actual value
- The consistency of a measuring instrument is the ability of instrument to record consistent readings for each measurement with little deviation among readings.
- The measurement is consistent if the values determined are close to each other.

**CHAPTER 2**

2. To accelerate 2 objects with the same acceleration, the heavier object needs a bigger force. Explain the statement.

- Higher mass, higher inertia
- To accelerate an object, need to overcome the inertia first.
- Therefore, more force is needed for heavier object.

3. Can you explain why the passenger thrown forward when the bus suddenly stop and the head of the passenger were thrown back when the car started moving.

- When the bus was moving, the passenger were also moving at the same speed as the bus.
- When the bus stopped, the passengers continued moving. Hence, they were thrown forward.
- The people in the car tried to remain in their state of rest when the car started moving. Hence, they were thrown back.
- In both situations, the passengers were resisting a change in their state of motion and also known as Inertia.
- The concept of inertia also known as Newton's First Law of Motion, which states that "an object will remain at rest or continue with a constant speed in a straight line unless an external forces acting on it

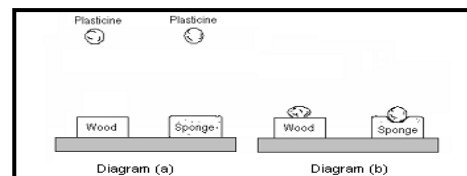
4. Can you explain why a maximum speed of supertanker might need to stop its engine over a distance of about 3 km before it can come to stop.

- A supertanker at a state of motions and have a maximum velocity.
- A supertanker has a larger mass.
- A larger mass have a lot/larger inertia.
- When the engine stop, the supertanker will continue it state of motions.
- So it take a longer distance/time to stop due to its has a larger inertia.

5. Explain why a softball player moves his hand backwards while catching a fast moving ball. Other situation: bend our knee after jump?

- A soft ball has a high velocity.
- A soft ball has a high momentum.
- The soft ball player move his hand backward to increase time impact.
- The higher the time impact will reduce impulsive force.
- So we will not feel hurt.

6. Diagram (a) shows two identical spherical plasticine balls before being released from the same height. Diagram (b) shows the



state of the plasticine balls when they hit the wood and the sponge. It was observed that the plasticine stopped more quickly when it hit the wood.

Explain the changes in energy that occur from the moment the plasticine ball is released until reaches the position in Diagram (b)

- Before released, the plasticine has Gravitational Potential energy .
- When falling , Gravitational Potential energy changes to Kinetic energy
- When the plasticine hits the surface of wood , the Kinetic energy changes to Heat energy // Sound energy
- The energy / work done is use to changes the shape of sponge

7. Explain how the forces between the molecules caused the elasticity when the spring is compressed and stretched.
- There are two types of force; attraction and repulsive force between the particles of the solid.
  - When the solid is stretched, the molecules displaced away from each other
  - Attractive forces are acting to oppose the stretching
  - When the solid is compressed, the molecules displaced closer to each other
  - Repulsive forces are acting to oppose the compression
8. *Terangkan bagaimana anda boleh menentukan ketumpatan bagi penyumbat gabus.*
- *timbang jisim gabus*
  - *ikat gabus dengan pemberat dan masukan dalam silinder penyukat*
  - *perubahan isipadu air bersamaan dengan isipadu gabus*
  - *ketumpatan gabus = jisim perisipadu*
9. Using the principle of conservation of momentum, explain the working principle of the rocket.
- Fuel burns in the combustion chamber
  - Hot gases expelled at high speed backwards
  - A large backwards momentum is produced
  - The rocket gains forwards momentum of equal magnitude
10. Why the boy with mass 40kg slides down the flume when the angle of inclination is  $30^\circ$  and remains stationary when the angle of inclination is  $17.5^\circ$ . (the frictional force is 120N)
- Boy slide down when component of weight parallel to the slope is higher than frictional force
  - Resultant force acting to produced acceleration
  - Boy remain stationary when component of weight parallel to the slope is equal to frictional force
  - Resultant force is equal to zero make the boy in force equilibrium
11. Explain why the boat moves away from the jetty as a boy jumps out of the boat onto the river bank.
- When the boy jumps onto the river bank, his momentum is forward.
  - Using the Principle of conservation of momentum
  - the total momentum before and after jumping is equal
  - The boat moves backward to balance the forward momentum
12. Explain why the need of steel structure and the separate compartments to build in lorry carrying heavy load.
- The inertia of lorry and load is very big when it is moving
  - The separate compartments make the load divided into smaller mass, thus reducing the inertia of each unit.
  - The momentum of lorry and load is very big when it is moving and produce a bigger impulsive force.
  - The steel structure will prevent the loads from smashing into the driver's compartment during emergency braking.
13. Why we feel easier to pull the wheel barrow compared to push the wheel barrow?
- The object on the wheel barrow has a weight
  - When we push the wheel barrow there is a force acting on the ground in the same direction as the weight.
  - So the total force acting on the ground is the weight and the force produced when we push the wheel barrow.
  - When we pull the wheel barrow the force produced is in opposite direction with the weight.
  - So the total force acting on the floor is a weight less the force produced when we pull the wheel barrow



14. Explain why the wooden block move upwards and then float on the water surface when it release from the above of the water surface.

- Buoyant force increase when the volume of water displace increase.
- Buoyant force higher than weight of block.
- Boyant force pushed the wooden block upward.
- The wooden block then float because the buoyant force is equal to the weight of the wooden block
- The concept involve is archimedes principle

15. Explain how the brake system operates when the car needs to slow down.

- When the brake is pressed ,a force is applied to the piston and pressure is exerted.
- Pressure is transmitted uniformly throughout the brake fluid.
- Force is exerted on the piston of the brake pads
- Brake pads will press against the brake discs.

16. The toothpaste flows out of it's tube while squeezing at the bottom end  
Explain how the toothpaste flows out and name a physics principle related to it.

- Force is applied to the toothpaste (tube)
- Will produced a pressure
- The toothpaste carry the pressure
- and apply the pressure of the equal magnitude to the whole tube

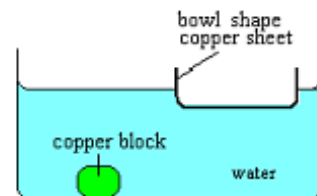
17. Explain how a submarine is able to submerge into deep sea water

- Valve release air from ballast tank.
- Sea water flooded ballast tank
- The weight of water displaced is smaller.
- Buoyant force < Weight of the submarine

18. Explain why a balloon filled with helium gas rises up in the air.

- The balloon acted by two forces: Upthrust and the weight of the balloon
- The density of helium gas is less than the density of surrounding air
- Upthrust equals to the weight of the air displaced by the ballloon
- Upthrust is higher than the weight of the balloon

19. Diagram shows a copper block and a bowl shape copper sheet of same mass.

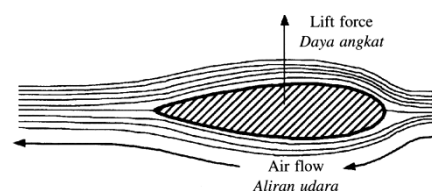


shape copper sheet of same mass.

Explain why the copper block sink in water but the bowl shape copper sheet floats on water

- two forces act on the copper block and bowl are uptrust and weight
- Uptrust small because small volume // vise versa
- Block sink because weight > uptrust
- Sheet float because weight = uptrust

20. Diagram shows a cross-sectional of a wing of a moving aeroplane. The wing of the aeroplane experiences a lift force. Explain why the lift force acts on the wing of the aeroplane.



- Higher velocity on the upper surface and lower velocity on the lower surface
- Thus produced lower pressure on the upper surface and higher pressure on the lower surface
- Lift force = difference in pressure x area of surface

21. Explain the principle of Insect Piston Spray

- When the piston is pushed, air is forced out through the jet of gas at a high speed.
- According to Bernoulli's Principle, the pressure of the moving air decreases as the speed of the air increases.
- The higher atmospheric pressure in the insect poison container will push the insect poison liquid up through the narrow metallic tube.

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

- the fan blow air out of the vent
- produce a partial vacuum area in the vacuum cleaner
- difference in pressure occurs/atmospheric pressure is higher than the pressure inside the vacuum cleaner
- forced is exerted in/pushed in the dirt.

23. Bunsen burner burning with yellow flame. Explain how a blue flame can be produced.

- High velocity of gas produce low pressure at the jet
- Higher atmospheric pressure pushes the air inside and mix with the gas
- Complete mixture of combustion will produce blue flame
- Enlarge the orifice to allow more air

24. The roof of a house being lifted by strong winds. Explain why.

- the strong wind above the roof is moving very fast
- While the air in the house is at rest
- according to Bernoulli principle the higher the velocity, the lower the pressure
- pressure inside the house is higher than the outside.
- a force is generated by the difference in pressure which is strong enough to lift the roof.

25. Explain why the hovercraft moves with constant velocity in terms of the force acting on it

- The forward force = friction // forward thrust = drag
- The resultant force is zero
- The hovercraft is in force in equilibrium

#### CHAPTER 4

26. Water is used as a cooling agent in a radiator. Explain how water is used as a cooling agent in the radiator.

- Water has high specific heat capacity
- When water in tube passes through the engine it can absorb large amount of heat energy
- Once water reach the radiator, the heat of the water absorbed by the fin blade of the radiator
- The same time the fan in the radiator push the heat out of the car.

27. Terangkan bagaimana proses sejatan mengakibatkan suhu cecair berkurang.

- Di dalam air terdapat molekul yang sentiasa bergerak pada halaju berbeza
- Dipermukaan air molekul-molekul berhalaju tinggi memperoleh tenaga kinetik tinggi
- Ikatan antara molekul diatasi dan terbebas ke udara
- Air kehilangan molekul berhalaju tinggi jadi TK air rendah, suhu berkurang

28. According to the principle of thermal equilibrium and the working principle of a thermometer, explain how a doctor can check his patient temperature during medical treatment.

- Thermometer is placed in the mouth of patient,
- Heat is transferred from patient's body to the thermometer.
- Thermal equilibrium between the thermometer and patient's body is reached when the net rate of heat transfer is zero.
- The thermometer and the patient's body are at the same temperature. The thermometer
- reading shows the temperature of the patient's body.

29. Explain the changes which occur in the liquid naphthalene when it is cooled until it changes from the liquid to the solid state.
- As liquid naphthalene cools, it loses energy to surroundings
  - Its temperature begins to fall until it reaches freezing point  $80^{\circ}\text{C}$
  - At its freezing point, naphthalene begins to solidify.
  - Although it is losing its energy to surroundings, its temperature remains constant because the average kinetic energy remains constant
30. Why the ice cube stick to the wet finger. Not to dry Finger?
- Ice cube melt will absorb the heat
  - The heat is known as latent heat of fusion
  - When our finger wet it has a small amount of heat and it will absorb by the ice cube.
  - The heat release from water cause it to be frozen.
  - So the ice cube and finger will stick together due to the frozen of water
  - Further more finger have a rough surface and it helps the ice stick to our finger
31. *Apabila beberapa titik ether terkena tangan seorang pelajar, tangannya merasa sejuk. Terangkan bagaimana ini berlaku.*
- *takat didih eter adalah rendah*
  - *suhu tangan lebih tinggi dari suhu eter*
  - *menyebabkan haba mengalir dari tangan ke eter*
  - *eter meruap//membawa haba pendam pengewapan*
  - *menyebabkan suhu tangan turun dan terasa sejuk*
32. Your body sweats when you are feeling hot. How does sweating helps to cool down your body?
- When we do the activity using the movement of our body a sweat will produce.
  - Actually water evaporates from the skin when we sweat.
- In the process of evaporation the change of phase of matter from liquid to steam occur.
  - The heat is needed to change this phase is call the latent heat of vapourisation.
  - So we feel cool when evaporation occur due to the release of heat in our body.
  - Factor influence the process: air velocity, temperature and humidity.
33. We cannot use a cooling system of a refrigerator to cool the hot room. Explain why?
- Cooling system of a refrigerator is smaller
  - Less cool air from refrigerator flow out compare to the hot air flow in
  - Position of refrigerator is on the floor
  - The cool air does not flow upward
34. Why we put the fishes in the ice cube rather than cold water?
- Ice melts need heat known as latent heat of fusion
  - Heat is absorb from the fish.
  - Fish will release it heat until the temperature equal to 0
  - Cold water not experience a change of phase
  - So just the process of thermal equilibrium happen when they in thermal contact.
  - The lower temperature not to be 0 degree.
35. *Cuaca yang paling sejuk dialami pada penghujung musim sejuk, iaitu apabila salji mulai melebur. Jelaskan kenapa?*
- *salji perlukan haba untuk melebur*
  - *haba tersebut adalah haba pendam tentu iaitu untuk menukarkan fasa pepejal kepada cecair*
  - *lebih banyak haba diserap dari persekitaran*

36. Using kinetic theory of gasses, explain how the pressure increase when the temperature increase in the pressure cooker.

- Molecules moving freely in random motion
- When temperature increase, kinetic energy//velocity increase
- Molecules strike the walls of pressure cooker more frequently
- The rate of change of momentum increase
- Force exerted on the walls increase, pressure ( $P = F/A$ ) increase

37. In the morning feel hot at the sea .Explain why this phenomenon happens?

- During the day,the land and the sea receive the same amount of heat from the sun
- Water has a higher specific capacity than the land
- The land is heated to a higher temperature than the sea
- The density of the air above the sea is higher than the density of the air above the land
- The air above the land flows up and the air above the sea flows towards the land

## CHAPTER 5

38. Toustist at a beach observing the sunset. Explain why the tourist can still able to see the sun even though it has already set.

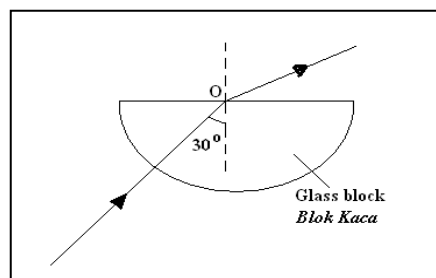
- Refraction of light ray occurs
- Light travels from less dense to a denser medium
- The light will bend towards the normal
- In the observer eyes, the sun is still not setting as they can still see the image from refraction

39. While driving a car on a hot day, you may see a mirage on the road. Explain how mirage occurred.

- 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

40. Diagram shows a ray of light directed perpendicularly at a side of the semi circular glass block. The ray passes through the glass block to a point O before leaving the glass block. The angle of incidence in the glass block is  $30^\circ$  .



Explain how total internal reflection occurs in diagram above?

- Increase the angle of incidence,  $i$ , then angle of refraction,  $r$  will also increase
- Keep on increasing the angle of incidence until angle of refraction is  $90^\circ$
- The angle of incidence is called critical angle
- Increase the angle of of incidence more than the critical angle, the ray will be reflected.

41. Explain why a piece of paper burns when placed under a convex lens aimed towards hot sun rays.

- The parallel rays of the sun will pass through the a convex lens
- After entering the lens, the light rays is focused at the principal focus of the lens
- At the principal focus, the light ray is focused on one small area
- Heat energy causes an increase in temperature, the paper starts to burn

42. Explain how you would estimate the focal length of a convex lens in your school laboratory .

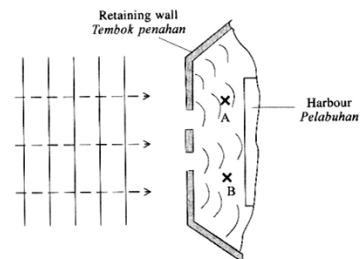
- The convex lens is aimed/focused to a distant object (infinity)
- The screen is adjusted until a sharp image is formed on the screen
- The distance between the screen and the lens is measuredl

- Focal length = distance between the screen and the lens
43. It is known that the sky is red during sunset and the formation of rainbow on the sky always appeared after raining. Explain these phenomena.
- Light consisting of seven colours.
  - Red has the longest wave length and the last to refracted during sunset.
  - A droplet of water trap in the atmosphere after raining acts a lens.
  - Light travel through this water droplet and undergo the process of refraction ,total internal reflection and dispersion of light occurred.
44. The sound wave from the train(etc) can be heard loudly and clearly at night. Why?
- Air near the ground colder tha above air
  - Air layer the ground more denser
  - Sound travel slower in cold air/wavelength decrease in cold air
  - Sound bend toward the observer/sound bend away to normal
- The wave will bend and change their direction(refraction occurs).
  - So, wave front of sea water will follow the shape of the shore.
47. Explain why strong double-glazed glass is used as walls of the observation tower in an airport.
- All particles in a material/matter/glass vibrate at its natural frequency
  - The airplane engine produces noise which cause the air to vibrate
  - Due to resonance, the glass vibrate at a higher/maximum amplitude
  - Need strong glasses to withstand the effect of resonance which vibrate with high amplitude
  - so that it does not brek easily
48. How can when the oprah singer sing can make the glass break.
- The singer sing with a certain frequency and produce sound energy
  - The energy is transferred to the glass
  - Resonance occures when the forced frequency made by the singer is the same as the natural frequency of the glass
  - The glass will vibrate with maximum amplitude
  - Increase in energy transferred may cause the glass to break

## FORM 5

### CHAPTER 6

45. Terangkan bagaimana kedalaman laut boleh diukur.
- kedalaman laut boleh diukur menggunakan peralatan OSK dan hidrofon
  - hidrofon boleh mengesan gelombang ultrasonik dalam air yang dipancarkan
  - OSK boleh menyukat masa pantulan gelombang selepas dipancarkan dan kembali semula kepada penerima.
  - Kedalaman boleh dihitung menggunakan rumus  $v = (2d/t)$
46. Can you explain why the wave front of sea water will follow the shape of the shore when it approaches the shore?
- The depth of the water decreasing as it travel towards the shore.
  - The velocity and wavelength is decreasing due to the wave travel from the depth to the shallow area.



49. Descibe the movement of two similiar ships that are located at A and B. Explain?
- The ship at A will move up and down
  - Because constructive inteferece happens at point A
  - The ship will remain calm at location B
  - Because destructive inteferece happens at point B

**CHAPTER 7**

50. Explain the advantages of parallel circuit in a house wiring system.
- A parallel circuit can run several devices using the full voltage of the supply.
  - If one device fails, the others will continue running normally
  - If the device shorts, the other devices will receive no voltage, preventing overload damage.
  - A failure of one component does not lead to the failure of the other components.
  - More components may be added in parallel without the need for more voltage.
  - Each electrical appliance in the circuit has its own switch
51. Explain why a three pin plug is more suitable compared with a two pin plug.
- Two pin plug has no earth wire while three pin plug has earth wire
  - Using 2 pin plug, if there is leakage of current it will also flow through the metal body while using 3 pin plug if there is leakage of current it will flow to the ground
  - The person who touches the metal body will experience electric shock while using 3 pin plug, the current will be earthed
  - Using 2 pin is not safe to the consumer while using 3 pin plug is more safer to the consumer
52. What happens to the candle flame when it is placed between 2 metal plates supplied with Extra High Tension (EHT).
- Candle flame spreads into two
  - Heat from candle produces ions
  - Positive charge is attracted to negative plate while negative charge is attracted to positive plate
  - Candle flame spreads wider to negative plate because positive charge is more mobile than negative charge
53. Pembakar roti T bertanda 240 V, 650 W dan pembakar roti U bertanda 240 V, 840 W. Tentukan pembakar roti yang manakah mempunyai elemen pemanas dengan rintangan yang lebih kecil.
- pembakar roti U
  - kedua-dua pembakar roti mempunyai voltan kerja yang sama
  - kuasa elemen pemanas =  $V^2/R$   
//kuasa elemen pemanas berkadar songsang dengan rintangan
  - pembakar roti dengan kuasa yang lebih tinggi mempunyai elemen pemanas dengan rintangan yang lebih kecil
54. Explain why the bulb connected to two dry cells lights up brighter than one bulb connected to one dry cell.
- The two dry cells are connected in parallel
  - The effective e.m.f. remains the same
  - The effective internal resistance of the two cells is smaller
  - A larger current will flow through the bulb to make it brighter
55. Sebuah bateri yang terdiri daripada dua buah sel kering berlabel 1.5 V disambungkan kepada sebuah mentol 2.5V 0.3 A. Didapati bahawa mentol itu menyala dengan kecerahan normal apabila suis dihidupkan. Terangkan mengapa mentol itu menyala dengan kecerahan normal walaupun d.g.e bateri lebih besar daripada voltan mentol itu.
- bateri mempunyai rintangan dalam
  - sebahagian daripada d.g.e bateri hilang di dalam bateri/sebahagian digunakan untuk mengatasi rintangan dalam
  - voltan//beza keupayaan yang dibekalkan kepada mentol hampir sama dengan voltan kerja mentol



**CHAPTER 8**

56. The acceleration of a magnet that drops vertically into a solenoid is much smaller than the gravitational acceleration. Explain the statement.

- Magnetic flux change in the solenoid
- Induced current generates in the solenoid
- Direction of induced current always flows in the direction to generate magnetic pole to oppose the pole of the falling magnet.
- Therefore, acceleration is lower

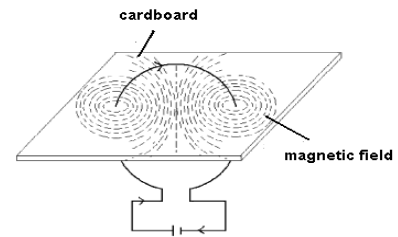
57. Explain how the electromagnet crane can be used to lift scrap metal.

- Current flow through the solenoid, magnetic field is produced
- Soft iron core will be magnetized
- The scrap metal attracted to the iron core
- No current flow soft iron demagnetized or metal scrap fall down

58. Most of our electric energy comes from hydroelectric power stations and thermal power station. These power station are connected by cables to transmit electricity to users in industries, offices, schools and houses. This system is called the national grid network.

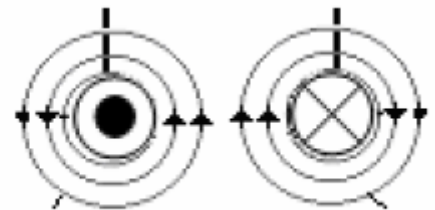
Explain briefly the importance of the national grid network system in distributing electric energy to the users.

- The electrical supply is continuous, although there is faulty in one of the power station
- The electrical energy from other station is directed to the the affected areas
- The electrical energy from other area is directed to the areas that need more energy
- The overall cost of production of electricity can be reduced



59. Diagram shows the pattern of magnetic field formed when current flows in a coil. Explain why the magnetic field strength is greater at the center compared to the edge.

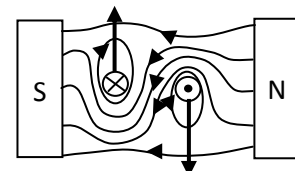
- The direction of the magnetic field on the left coil is anti clockwise
- The direction of the magnetic field on the right coil is clockwise



- As the result the magnetic fields in the middle of the coil are in the same direction, ie upward.
- So the magnetic field will be stronger in the middle.

60. Using the concept of the magnetic effect of an electric current, explain with the aid of diagrams how forces are produced on a wire in the coil of direct current electric motor?

- The (magnate) magnets produce a magnetic field / diagram
- The current in the wire produces a magnetic field / diagram
- The two magnetic fields interact/combine to form a resultant / catapult field / diagram
- The motor will rotate due to the differences of force produce//turning effect from this two forces



61. Explain how the generator works to produce direct current.

- rotate the coil in clock wise direction
- the coil cut across the magnetic field
- current is induced in the coil
- the commutator change the direction in the coil so that the direction of current in external circuit always the same.

62. Explain the working principle of a transformer.

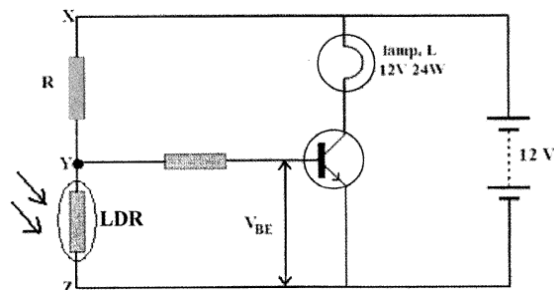
- When a.c. voltage is supplied to primary coil, (alternating current will flow) and
- the soft iron core is magnetized.
- The magnet produced varies in magnitude and direction.
- This causes a changing magnetic flux pass through the secondary coil.
- An induced e.m.f. across the secondary coil is produced

63. Explain the working principle of an electric bell.

- When the bell is pressed, a current flows in the coils of the electromagnet, causing the electromagnet to be magnetized.
- The magnetized electromagnet attracts the soft-iron armature, causing the hammer to strike the gong.
- The movement of the armature breaks the circuit and causes the electromagnet to lose its magnetism.
- The light spring pulls the armature back, remaking the contact and completing the circuit again.
- The cycle is repeated so long as the bell push is pressed and continuous ringing occurs.

64. Explain how the green shadow produced in the CRO screen?

- 6V heater supply produced electron on its surface
- When 3 kV power supply are connected Cathode rays/electron accelerate in a straight line.
- Cathode rays carry kinetic energy and
- converts to light energy when they hit the screen .



65. Explain why the bulb light up at night

- At night resistance LDR increases
- $V_{BE}$  increases (higher than 0.7 V for Si)
- $I_b$  increases and switch on transistor
- $I_c$  increases and lights up bulb

## CHAPTER 10

66. Radioisotope Strontium-90 is used to measure the thickness of paper in a paper industry Explain how Strontium-90 is used to measure the thickness piece of paper?

- Put the radioactive source opposite the detector
- Detector is connected to the thickness indicator
- Detector detect the reading of the changes in counts
- Thickness is measured with the thickness indicator
- If the reading of the detector is less than the specified value, the thickness of the paper
- is too tick/ vice versa

67. Nuclear fission produces a chain reaction.

## CHAPTER 9



Describe how the chain reaction occurs in a nuclear fission of an atom of Uranium-235.

- Neutron bombarded a uranium nucleus and produced three neutral neutron
- The new neutron bombarded a new uranium nucleus
- For every reaction, the neutrons produced will generate a chain reaction
- Diagram of chain reaction

68. *Runut alfa yang diperhatikan di dalam kebuk awan resapan adalah lurus dan tebal. Jelaskan bagaimanakah runut alfa terbentuk dan mengapakah runut itu tebal dan lurus.*

- *Zarah  $\alpha$  mengionkan molekul-molekul udara*
- *Wap lampau tepu memeluwap pada ion-ion yang terbentuk*
- *Runut tebal disebabkan kuasa pengionan zarah alfa adalah tinggi//zarah alfa menghasilkan banyak ion.*
- *Runut lurus kerana zarah alfa mempunyai jisim yang lebih tinggi*

69. Explain how radioisotopes can be used to detect the location of the leakage

- Radioisotope is injected into the pipe
- The water in the pipe flow with the radioisotope
- G-M tube as detector is used to find the leakage across the pipe
- Reading on detector increases when near a leakage

\*\*\*\*\*

**KNOWLEDGE/DEFINATION**

1. What is meant by momentum  
*Product of mass and velocity//  $p = mv$  , where  $p$  = momentum,  $m$  = mass and  $v$  = velocity*
2. What is the meaning of specific heat capacity?  
*The amount of energy that must be transferred to change the temperature of one kilogram material by  $1^{\circ}\text{C}$  or  $1\text{K}$ //  $c = Q/m\theta$ , where  $Q$  = heat,  $m$  = mass and  $\theta$  = rise in temperature*
3. What is meant by pressure?  
*The force acting normally per unit area //  $P = F/A$ , where  $P$  = Pressure,  $F$  = Normal force and  $A$  = area*
4. What is meant by density?  
*The mass devided with volume //  $\rho = m/V$ , where  $\rho$  = density,  $m$  = mass and  $V$  = volume*
5. What is meant by work?  
*The product of force and displacment //,  $W = Fs$ , where  $W$  = work,  $F$  = force and  $s$  = displacment.*
6. What is meant by **thermal equilibrium**?  
*Thermal equilibrium states that the net rate of heat flow from one medium to another medium and vice versa is zero// temperature for both medium is the same.*
7. What is meant by **spring constant**?  
*Ratio of force to the extension //  $F/x$  where  $F$  = Force and  $x$  = extension*
8. What is meant by diameter?  
*The distance between two sides of a sphere through the centre of the sphere*
9. Explain the meaning of fluid.  
*Fluid is either liquid or gas*
10. State Bernoulli's principle  
*When the speed of a fluid increases its pressure decreases  
When the speed of a fluid decreases its pressure increases.*
11. What is meant by *transverse waves* and  
*A wave in which the particles of the medium oscillates the direction perpendicular to the direction in which the wave move*
12. What is meant by *longitudinal waves* ?  
*A wave in which the particles of the medium oscillates the direction parallel to the direction in which the wave move*
13. What is meant by *critical angle* ?  
*the angle of incidence which produces an angle of refraction of  $90^{\circ}$ .*
14. What is meant by power of lens?  
*Reciprocal of focal length in meter //  $P = 1/f$ , where  $P$  = power of lense, and  $f$  = focal length in meter*
15. What is meant by temperature?  
*Temperature is the measure of the degree of hotness of an object.*
16. What is meant by potential difference ?  
*Potential difference is defined as work done in moving a unit electric charge between two points.//  $V = E/Q$  , where  $V$  = potential difference,  $E$  = energy and  $Q$  = cas*