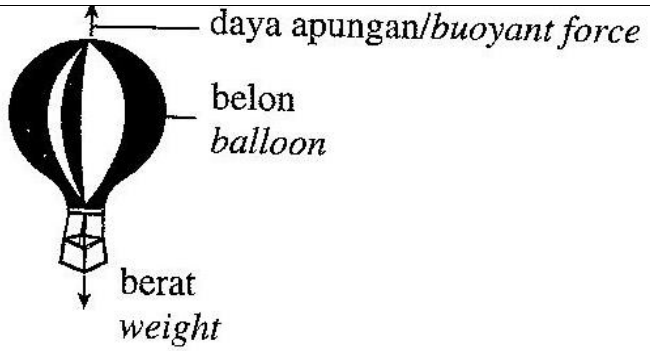
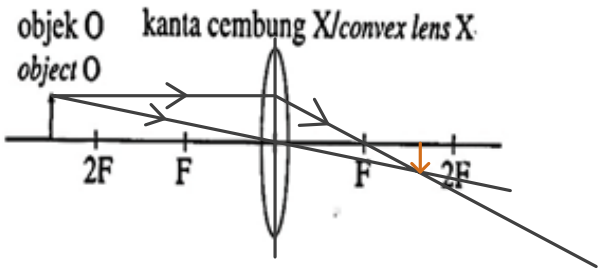
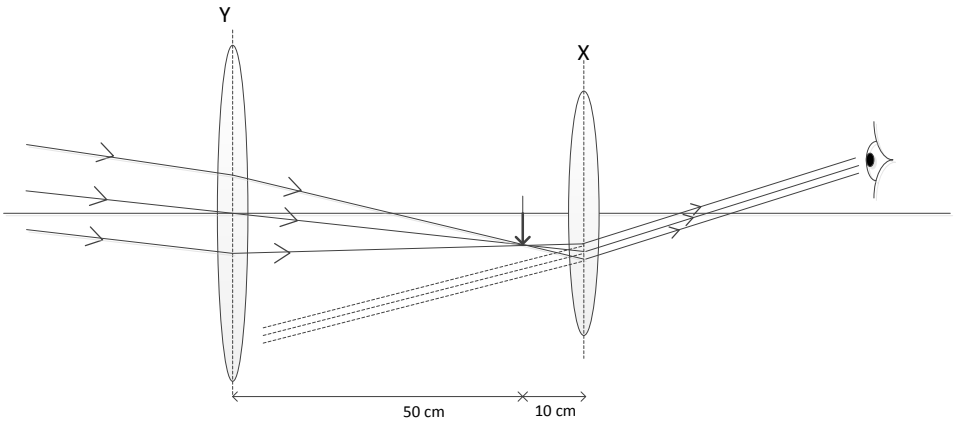
SMJK YU HUA, KAJANG
SKEMA PERMARKAHAN PEPERIKSAAN PERCUBAAN SPM 2017 FIZIK 2

1a	The diameter of a wire differs slightly at different places along the wire. So readings are taken from different places and the average of all the readings is calculated.	1
b	Reading 3	1
c	Average reading = $\frac{6.48 + 6.47 + 6.49}{3}$ = 6.48 Actual reading = 6.48 – (–0.02) = 6.50 mm	1
d	The edge of the jaw is cleaned to remove dirt, so that it will not be measured as well. The ratchet is turned until the first 'tick' is heard.	1
2a(i)	The volume of the balloon increases	1
(ii)	When the temperature increases, the gas expands causing the pressure of the gas to increase. So, the volume of the balloon increases.	2
b(i)	The mass of the system remains the same.	1
(ii)	Change in temperature will only affect the pressure and the volume.	1
3a	Interference	1
b	Non-coherent sources	1
c	$\lambda = \frac{340}{1000}$ = 0.34m	2
d(i)	The distance between two consecutive strong sounds decreases. / The pitch of the sound increases.	1
(ii)	Loudness of sound increases.	1
4a	The process which produces an induced current. / e.m.f. in a conductor when the conductor experiences a change in magnetic flux linked to it.	1
b(i)	The solenoid experiences a change in the magnetic field. An induced current is produced.	1
(ii)	A : North pole, B : South pole	2
c(i)	Increases	1
(ii)	The magnitude of the induced current increases.	2

5a	The mass divided by the volume	1
b(i)	The density of sphere A is less than that of sphere B.	1
(ii)	Sphere A : 0.7 g cm^{-3} or 700 kg m^{-3} Sphere B : 1.0 g cm^{-3} or 1000 kg m^{-3}	2
(iii)	Buoyant Force acting on B is greater than buoyant force acting on B	1
(iv)	The weight of water displaced by A less than that displaced by B.	1
c	Archimedes' principle	1
d	Submarine	1
6a		2
b	Buoyant force = weight	1
c	W = buoyant force mg = Vρg m = 800 × 1.25 = 1000 kg	2
d(i)	Reduce the volume of the air in the balloon.	1
(ii)	The buoyant force is equal to the weight of the balloon.	1
e	Archimedes' principle	1
7a	Rod PQ will move away from the magnet.	2
b(i)	P = IV I = $\frac{100\ 000\ 000\ W}{400\ 000\ V}$ = 250 A	2
(ii)	V = IR = 250 A × 100 Ω = 25 000 V	3
(iii)	P = IV = 250 A × 25 000 V = 6 250 000 W	2

7b (iv)	- A high voltage gives a lower current. Loss of power in transmission line = FR. - As the current flowing through is minimized, the power loss can be reduced. - Lower current allows thinner cables to be used, so that less material is required to make the cables. The cost is reduced.	2
c(i)	Easy maintenance	1
(ii)	Environmental issue	1
8a		2
b	Real, diminished, inverted	1
c	$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$ v = 15 cm	1
d	Objective lens = Y Eyepiece = X	1 1
e		3

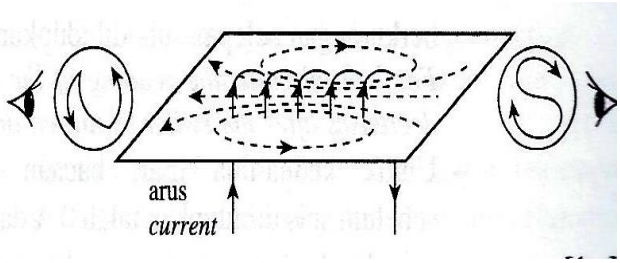
SECTION B

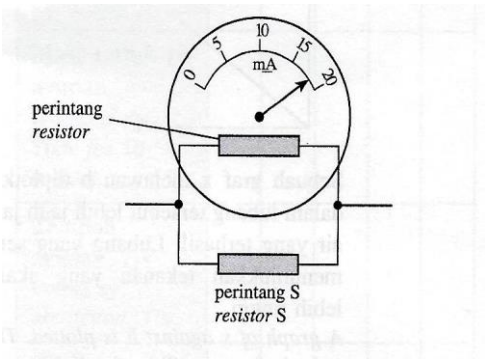
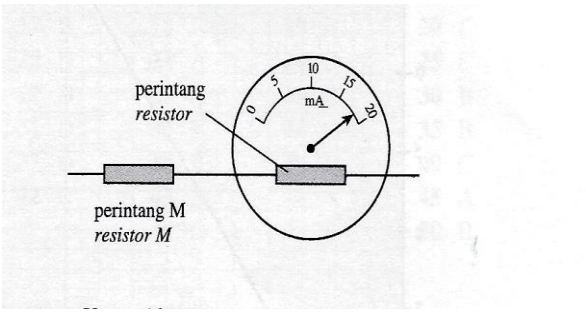
9a (i)	The potential difference between two points is the work done to move a coulomb of charge from one point to another.	1
(ii)	- At the power generator station, the electrical power produced low potential difference. - After passing through substation A, the potential difference of electrical power increases while the current decrease, so that the amount of power lost can be reduced. - Before reaching the consumers, the potential difference is lowered, so that it is suitable for the consumers. - Potential difference can be increased by using a step-up transformer and can be reduced by using a step-down transformer. - When the potential difference is increased, the value of the current will decrease and when the potential difference is decreased, value of the current will increase.	5
b	- Examples of non-renewable sources are coal, natural gas and nuclear energy. - These sources will be depleted if they are used frequently and will normally pollute the environment. - Exanples of renewable sources are hydroelectric power, solar energy, biomass and wind energy. - These sources will not be depleted and their usage usually will not pollute the environment.	4
c(i)	- The poles need to be earthed. - This is to carry the extra charges straight to the Earth. - Glass or porcelain is fixed at the connecting areas of the cable at the poles. - So that the metal poles did not touch the electric cable directly. This will cause the poles to be at potential Earth condition and is safe to touch. - Red light is fixed at high poles. - This is to give warning or signal for helicopters or aeroplanes so that collision does not happen.	1 1 1 1 1 1
(ii)	- Aluminium cable that is cheap and has low resistance is chosen. - So that the amount of power lost when transferring can be reduced. - The cable should be insulated. - So that it is not dangerous when kites of other things got stuck at the cable.	1 1 1 1

10a (i)	Electromotive force is the electrical energy supplied by a source when 1 coulomb of charge flows through the source.	1
(ii)	- For both circuits, the reading of the voltmeter decreases after the switch is turned on. - For both circuits, the ammeter reading before the switch is turned on is 0 A and after the switch is turned on, a reading is obtained. - The voltmeter reading decreases because both batteries have internal resistance. - There is a voltmeter reading because it is the electromotive force of the battery. (both batteries used have the same emf). - There is a bigger loss of potential difference in the circuit of battery B because the internal reisistance of battery B is larger.	5
b	- Connecting batteries in series produces a bigger electromotive force. - When batteries are connected in parallel, the electromotive force produced is the same as the electromotive force produced by one battery only. - But when the batteries are connected in parallel the batteries will last longer. - And a larger current flows.	4
c(i)	- An electromagnet lifter consists of a soft iron core that is coiled with thick copper strips. - Soft iron is used as the core because it can demagnetise easily when the current is stopped. - Steel is not used because it cannot demagnetise easily when the current is stopped.	1 1 1
(ii)	- When a current is supplied, the lifter will become a very strong electromagnet and can attract metals or alloys - With the metal or alloy being attracted to the lifter, the lifter transfers it to another place. - The lifter can also separate metals from non-metals.	1 1 1
(iii)	- Increase the magnitude of the current flowing through the electromagnet. - Increase the number of coils on the copper strips. - Use an electromagnet that is made from an U-shaped iron core. - The two ends must have different poles so that a larger lifting force can be produced.	1 1 1 1

SECTION C

11a (i)	Boiling is the conversion of a liquid to a vapour in the form of gas bubbles. The whole of liquid becomes vapour at the boiling point.	1
(ii)	- Petroleum consists of a number of hydrocarbons that have different boiling points. - Raw oil that is hot (in the form of vapour) is passed through a fractional distillation tube which has an opening at the bottom. - Vapour will rise up. Hydrocarbon that have low boiling points will start to condense at the upper part of the tube. Examples are petrol, kerosene and diesel. - Hydrocarbon that have higher boiling points will condense at a lower part of the tube.	4
(iii)	- Impurities are dissolved in a smaller volume of liquid or no impurities are added. - This is because impurities will made it more difficult for the water molecules to turn into gas molecules. This will raise the boiling points and lengthen the time taken for boiling. - Lower air pressure. - This is because it is easier for the vapour molecules to escape from the liquid inot the air when the air pressure is low. - The higher the place is, the lower the air pressure will be. - The surface area of a liquid does not affect the boiling point of the liquid. - The rate of heating is faster. - More energy is supplied to the water molecules so that more water molecules can escape from the water to the air. - Method M is chosen. - This is because there are no impurities dissolved in the liquid, the air pressure is low as it is located at a high area and has a high rate of heating.	10
b(i)	$P_1V_1 = P_2V_2$ $(1 \times 10^5)V_1 = P_2(\frac{1}{3}V_1)$ $P_2 = 3 \times 10^5$ Pa	2
(ii)	$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ $\frac{(2.7)V_1}{(27+273)} = \frac{(3)(40)}{37+273}$ - The original volume of the container is 43.011 cm^3.	3

12a (i)	A type of conductor or coil that will produce a magnetic field around it when a current flows through it.	1
(ii)	- The shape of the magnetic field of a solenoid that has current flowing through it is like a bar magnet that has magnetic poles at the end of the solenoid.  - The direction of the magnetic field is determined by observing the direction of the current flowing, from the edge of the solenoid. - If the direction of the current is clockwise, then that edge of the solenoid is the south pole. If the direction of the current is anticlockwise, then that edge of the solenoid is the north pole.	4
(iii)	- The magnitude of the current that flows through solenoid. - The larger the current is, the stronger the electromagnet will be. - Number of turns of the coil of the solenoid. - The more the number of turns in the coil of the solenoid, the stronger the magnetic field will be. - Shape of the electromagnet. - A U-shaped metal produces a stronger magnetic force compared to a metal rod. - Area of the coil. - A coil with a larger area will also produce a stronger electromagnet. - Choose solenoid U. - Because solenoid U has a large current as it is supplied with a high power supply, the number of turns of the coil of the solenoid is more, the metal is U-shaped and the coild has a larger area.	10

b(i)	- One more resistor is arranged in parallel with the milliammeter. The resistor is labelled resistor S as shown in the diagram.  - The current passes through resistor S = 2 A – 20 mA = 1.98 A - Potential difference across the resistor = potential difference across resistor S. $0.02 \times 5 = 1.98 \times S$ $S = 0.0505\ \Omega$	1 1
(ii)	- One more resistor is arranged in series with the milliammeter. The resistor is labelled resistor M as shown in the diagram.  - $R = \frac{V}{I} = \frac{10}{0.02}$ $= 500\ \Omega$ So, the value of resistor M, M = 500 – 5 = 495 Ω	1 1 1