1	(a)	State the correct SI unit for pressure **Pascal // Pa // Nm^{-2}**	Reject : kPa // pascal
	(b)	Underline the correct statement in the bracket **Pressure at point X is same as pressure at point Y**	Reject : selain garis
	(c)	State the physics principle involved. **Pascal's // Prinsip Pascal // Pascal**	Reject : pascal
	(d)	State one application correctly **Hydraulic jack / brake / system / arms / press (machine) / car system / chair**	Reject : Toothpaste // car brake

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2	(a)	State the meaning of real image correctly **Image that can be formed / seen on screen**	
	(b) (i)	Determine image distance correctly **(40.0 - 30.0) cm // 10.0 cm** (awu)	Reject : No decimal point
	(b) (ii)	Calculate focal length correctly **1/f = 1/30 + 1/10** **f = 7.5 cm // 7.50 cm** (awu)	
	(c)	State the change of image correctly **Image is brighter**	Reject : clearer

CamScanner

3	(a)	Name the process involved correctly **Thermionic emission**	Reject: wrong spelling
	(b) (i)	Calculate maximum velocity of electron correctly $(1.6 \times 10^{-19})(1500) = 1/2\,(9.11 \times 10^{-31})(v^2)$ $v = 2.295 \times 10^{7}\ m\ s^{-1}$ (awu)	
	(b)(ii)	Complete the path correctly	
	(c)	State what happen **Deflect upwards greater / more/ bigger/ higher / increase** Give reason correctly **Stronger electric field**	

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4	(a)	State Kepler's third Law correctly **The square of the orbital period of any planet is directly proportional to the cube of the radius of its orbit.**	
	(b) (i)	Determine radius of satellite M and N correctly **Satellite M = 4.237 x 10^7 m** **Satellite N = 2.637 x 10^7 m** (a.w.u)	
	(b)(ii)	Determine orbital period Satellite N correctly $\frac{24^2}{(4.237\times10^7)^3} = \frac{T_N^2}{(2.637\times10^7)^3}$ ✓1 $T_N = 11.784\ h$ // $11°47'2.4$ ✓2 (a.w.u)	

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4	(c)(i)	Compare distance A to B and C to D correctly **Distance AB is longer / greater / bigger than CD**	
	(c) (ii)	Label the symbol correctly **Area AB - X** **Area CD - Y**	
	(c) (iii)	Explain your answer correctly **X maximum velocity because distance / path AB is longer //** **Y minimum velocity because distance/ path CD is shorter //** **gravitational force greater at AB** **The time for both motion of planet K from A to B and C to D is the same**	

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5	(a)	State the meaning correctly **1.5 J work is done /1.5 J of energy required / transferred by an electrical source to move 1C of charge in a complete circuit.**	
	(b)(i)	Compare arrangement of batteries **Arrangement of batteries in 5.1 is series // arrangement of batteries in 5.2 is parallel**	
	(b)(ii)	Compare the total e.m.f. of batteries correctly **Total e.m.f. in Diagram 5.1 is greater // vice versa**	
	(b)(iii)	Compare the gradient of the graph correctly **Gradient of the graph in Diagram 5.1 is greater // vice versa**	Reject : lebih cerun // steeper

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5	(c)(i)	State the relatioship of batteries arrangement and e.m.f correctly **When the arrangement of batteries is series, the total e.m.f. Is greater // vice versa**	
	(c) (ii)	State relationship of batteries and gradient correctly **When arrangement of batteries is series, the gradient is bigger // vice versa**	Reject : steeper
	(d)(i)	Calculate internal resistance correctly **E = V + Ir** **6 = 5.8 + (0.5 r)** **r = 0.4 Ω** ✓1 ✓2 (a.w.4)	
	(d)(ii)	State what happen to internal resistance correctly **Increase // bigger**	Reject : more

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6	(a)	Underline the correct answer **.....(perpendicular / parallel) .....**	
	(b) (i)	Compare angle of incidence correctly **Angle of incidence in both Diagrams are the same**	
	(b)(ii)	Compare wavelength correctly **Wavelength in Diagram 6.1 is greater // vice versa**	
	(b) (iii)	Compare frequency correctly **Frequency in Diagram 6.1 is lower / smaller // vice versa**	
	(c)	Relate wavelength and frequency correctly **The higher the wavelength the lower the frequency // vice versa**	Reject: $f \propto \frac{1}{\lambda}$

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6	(d)	Name the wavelength phenomenon correctly **Reflection of water wave**	Reject : reflaction
	(e) (i)	Give reason why ultrasonic is used correctly **High frequency // high energy // can travel / move / propagate further**	Reject : penetrate further
	(e)(ii)	Calculate wavelength correctly **1500 = (6.0 x 10^5)** **λ = 0.0025 m @ 2.5 x 10^{-3} m**	

1

2

(a.w.y)

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7	(a)	State the meaning correctly **Quantum of energy is discrete energy packet and not a continuous energy.**	
	(b)(i)	Determine photon energy correctly $E = [(6.63 \times 10^{-34})(3 \times 10^{8})] / (486 \times 10^{-9})$ $= 4.0926 \times 10^{-19}$ J @ 4.093×10^{-19} J ✓1 ✓2 (a.wu)	
	(e)(ii)	Calculate output power correctly $P = nhf$ $= 3.37 \times 10^{18} \times 4.0926 \times 10^{-19} = 1.3792$ W @ 1.379 W ✓1 (a.w.u)	

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7	(c)(i)	State the specification correctly **Work function small** State reason correctly **Less energy required for a photoelectron to be emitted from metal surface // photoelectric occur easily // photoelectron release easily**	Reject : Small threshold frequency more photoelectron release
	(c) (ii)	State the specification correctly **Big surface area** State reason correctly **Received more light // Expose to more light //more photoelectron emitted // more sunlight can illuminated** easily	Reject : trap more light // absorbed more light // larger electrical energy
	(d)	Choose the most suitable solar panel **A**	

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8	(a)	Tick the correct answer ✓ **The rate of change of momentum**	
	(b)	Calculate impulsive force correctly **F = (mv - mu)/t** **= [60 (0 - 5)] / 0.8 = - 375 N** ✓1 ✓2 (a.wu)	
	(c)(i)	State the modification correctly **Thickness of mattress higher // thicker,** State reason correctly **Longer time of impact // reduce / lower impulsive force**	Reject : thick // reduce injury // absorbed impact

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8	(c)(ii)	Suggest the material correctly **Natural fiber // rubber // latex // sponge //polyfoam // polyester // memory foam // cotton // wool** **State reason correctly** **Longer time impact // smaller impulsive force // not easy to tear**	Reject : soft material // reduce injury // absorbed impact // nylon // absorbed force
	(c) (iii)	Suggest the surface area correctly **Higher // larger // bigger // wider** **State reason correctly** **More space to land // prevent from fall off to ground when bounce // prevent from stumble to ground**	Reject : reduce injury // land safely

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9	(a)	State the meaning of half life **Time taken for a sampel of radioactive nuclei to decay to half of its initial number**	
	(b)	Explain Uranium decay process correctly - Amount of Uranium decreases with time - Decay mass / mass of Lead-206 increase - Undecayed mass / mass of Uranium- 238 decreases - The amount of Uranium become half at T1/2 - The ratio of Lead-206 to Uranium-238, can determine the age of substance	Max : 4 M

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9	(c)(i)	Calculate time correctly 100% ① → 50 ② → 25% ✓1 t = 2 x 4.5 x 10^9 = 9.0 x 10^9 years ✓2 (a.wu)	
	(c)(ii)	Calculate the age correctly Undecayed Uranium = 100% - 0.73% = 99.27% ✓1 $N = \left(\frac{1}{2}\right)^n N_0$ $99.27 = \left(\frac{1}{2}\right)^n 100$ $\log 0.9927 = n \log 0.5$ ✓2 $n = \frac{\log 0.9927}{\log 0.5}$ $n = 0.01057$ Age = 0.01057 x 4.5 x 10^9 ✓3 = 4.76 x 10^7 years #	

Reject : most ancient

Aspect	Characteristic	Reason
Quantity of Argon	Low 1	More stable // nukleus become stable 2
Quantity of Potassium	High 3	Lower quantity of undecayed nukleus // nukleus become stable 4
Ratio of potassium to Argon	High 5	Greater decay // more decay occurs // nuclei become stable 6
Activity of radioactive	Low 7	Rock is more stable // rock not radioactive 8
Choice :	Q 9	Low quantity of Argon, High potassium, High ratio, low activity 10

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d)

Aspect	Characteristic	Reason
Quantity of Argon	High	~~Beo~~ Argon-40 ~~was found~~ is the at original number
Quantity of Potassium	~~H~~ Low	Potassium-40 is ~~already~~ had been decayed from its original
Ratio of Potassium to Argon	Low	Argon-40 is more than Potassium-40
Radioactive activity	High	Argon-40 Decay ~~much~~ more ~~faster~~ until ~~to~~ be Potassium-40

The most ancient rock is rock P because it is high quantity of Argon, low quantity of ~~pot~~ Potassium, low ratio of Potassium to Argon and high radioactive activity.

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10	(a)(i)	Name the concept correctly **Electromagnetic induction**	
	(a)(ii)	State one factor correctly **Increase speed / motion / movement of magnet/ copper rod // increase strength of magnet // decrease distance between the pole magnet**	Refer Diagram
	(b)	Explain lighting up the bulb correctly 1- When shaken the coil will cut the magnetic flux 2- e.m.f is induced in the coil 3- induced current flow in the circuit 4- kinetic energy change to electrical energy 5. The greater the cutting / changing of magnetic flux, the greater the induced emf / induced electric current 6- more charge stored in capacitor on the circuit board.	Max : 3M Reject : light up longer time Wajib 1 dan 2

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10	(c)(i)	Determine the ratio of primary turns to secondary turns $\frac{N_p}{N_s} = \frac{240}{5} \Rightarrow N_p : N_s$ @ $\frac{N_p}{N_s} = \frac{48}{1}$ $48 : 1$	
	(c)(ii)	Calculate the secondary current correctly **P = VI** **5 = 5I** **I = 1 A**	
	(c)(iii)	Calculate the input power correctly **Power input = Power output** **= 5 W**	

Rej: heat up faster

Aspect	Characteristic	Reason
Material of stove top	Ceramic 1	High specific heat capacity // low increase in temperature // Easy to be clean 2
Material of coil	Copper 3	Low resistivity // low resistance // greater current flow 4
Coil oxidation rate	Low 5	Not easy to rust // not easy to oxidized 6
Source of power supply	~ AC 7	Produced changing of magnetic flux 8
Choice :	M 9	Ceramic top, copper coil, low oxidation rate and AC power supply 10

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Aspect	Characteristics	Reason
material of stove top	ceramic	- High specific heat capacity
		-absore more heat
material of coil	Nichrome coil	-Heat more faster in Q
coil oxidation rate	Low	~~Not oxidise~~ slow rate of oxidising.
Power supply		- can use more longer. - continuous power supply

K because it have all these ~~etc~~ characteristic.

It has high specific capacity.

5

(d)

Aspects	Characteristics	Reason
Material of stove top	Ceramic	It is a good heat insulator
Material of coil	Nichrome	Good heat conductor
Coil oxidation rate	Low	To reduce the chance to get rust
Power supply	Alternating current	Can supply power more efficient

Induction cooker K is the most suitable. It is because it use ceramic as the material of the stove top which is a good heat insulator, nichrome as the material of the coil that can conduct heat efficiently, has low coil oxidation rate that can reduce the rate of rusting and use alternating current power supply which can supply current more efficient.

5

11	(a)	State the meaning of pressure correctly **Force per unit area // ratio of force to unit area**	
	(b)	Observed and compare **1-Volume of trapped air in Diagram 11.1(a) is higher than Diagram 11.1(b)** **2-Reading of pressure gauge in Diagram 11.1(a) is lower than Diagram 11.1(b)** **3-Reading of thermometer in Booth Diagrams are equal / same** Relate the volume and the pressure exerted **The greater the volume of trapped air, the lower the pressure exerted.** Name the law involved. **Boyle's Law**	Reject : 11.1(a) > 11.1(b)

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11	(c)	Explain the above situation 1-there is thermal Contact betweeen the boy and the fire 2- heat transfer from fire to the body of the boy 3- heat tranfer through radiation from fire to the boy 4- temperature of body increases 5- net heat transfer is not equal to zero 6- temperature of the fire is not equal to body temperature of the boy. Thermal equilibrium is not achived.	Max : 4M

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Rej: maintain hotness

Aspect	Modification	Reason
Inner layer	High specific heat capacity	Longer time to increase temperature.
Inner layer	Made from heat insulator // polistyrene	Prevent heat lost to surrounding
Inner layer	Shiny colour	Heat reflected to the food
Outer layer	Many layers	Reduce heat loss to the surrounding
Outer layer	Polyester	Waterproof // not wet easily

Wajib disini

Wajib disini

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Rej: easy to carry - Motor carry

Aspect	Modification	Reason
Mass of the bag	Low	Lighter
Density of bag	Low	Lower mass
Safety of the bag	Have zip-lock	Heat trap inside the bag
Size of Bag	Big	Can carry more food at one time.
Safety measure	Bright color bag	Reflect light // easy to be seen by other drivers

Wajib 1 dibuat

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d)

Aspect	Characteristics	Reason
Inner layer	Shiny surface	- To reflect the heat ~~- to reduce loss of heat~~ to food
Outer layer	- dark colour ~~Plastic no~~	- to absorb heat
	- Plastic material	- to reduce loss of heat
mass of the bag	Small	- to reduce release of heat
Material of inner layer	Aluminium	Heat insulator
~~Ba~~ ~~of~~ ~~surface of the bag~~ the outer bag	Put zip	So the top of the bag do~~not~~ not open easily

1 ✓ 2 ✗ 3 ✓ 4 ✗ 5 ✓ 6 ✗ 7 ✓