MEGA LECTURE

www.megalecture.com · www.youtube.com/@megalecture

Online tutoring for Cambridge IGCSE, O Level & A Level Physics

IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

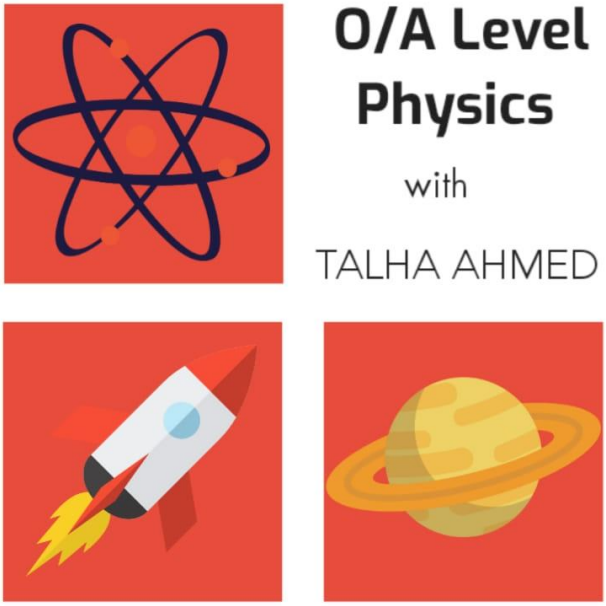
Practical Electricity

Paper 2 — Theory / Structured Questions (topical compilation)

Fahad H. Ahmad

Contact: +92 323 509 4443

M.Eng NUS Singapore · B.Eng NUST · 15+ years of teaching experience in Singapore, UAE & Pakistan · 60,000+ subscribers and 20 million+ video lecture views.



• Practical Electricity

PAPER 2

0323 5342279 | talha.ahmed@hotmail.com |

5054/02/M/J/03/Q6

For Examiner's Use

1 The lamps in a house are connected in parallel to the mains supply.

(a) On Fig. 6.1, draw three lamps and their switches connected to the mains supply.

Fig. 6.1

[3]

(b) Each lamp is labelled 240 V, 30 W. Calculate the current in one lamp when it is operating correctly.

current = ...[2]

(c) State the current from the mains supply when the three lamps are switched on.

current = ...[1]

5054/02 M/J/04/Q9

2 Fig. 9.1 shows the main parts of an electric grill. An electric current in the heating element causes it to become red hot and to emit visible light and infra-red radiation. The infra-red radiation is used to cook food.

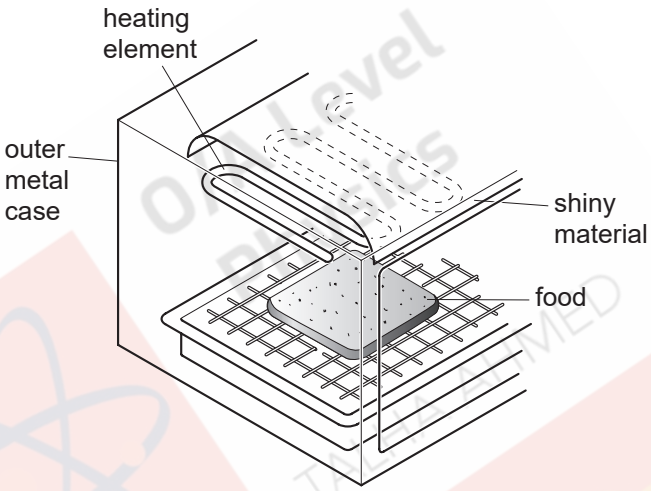


Fig. 9.1

(b) For safety, the electric grill is fitted with an earth wire. State where the earth wire is connected to the electric grill and explain how it acts as a safety device. [4]

(c) The current in the heating element is 8.3 A when it is connected to the 230 V mains supply.

(i) State the equation that links current, power and voltage.

(ii) Calculate the power rating of the heating element when it is working correctly. Give your answer to an appropriate number of significant figures.

(iii) A student thinks that if the heating element is connected to a mains supply of 115 V then the power produced is halved. Explain why the student is wrong.

[4]

5054/02/M/J/05/Q6

For Examiner's Use

3 The table gives information about two household appliances.

appliance	mains supply voltage / V	current through appliance / A	power / W	power / kW	time used per day / h	energy used per day / kW h
television	240	1.20	288	0.288	2.50	0.720
water heater	240	12.6			0.50	

(a) Write the missing values in the empty spaces in the table. [3]

(b) Why is more power needed for the water heater than for the television?

.....

.....

..... [1]

(c) The water heater is connected to the mains supply. Explain why using a 3 A fuse would **not** be suitable.

.....

.....

.....

.....

.....

..... [2]

5054/02/M/J/06

4 Fig.11.1 shows a wiring diagram for two different lamps A and B.

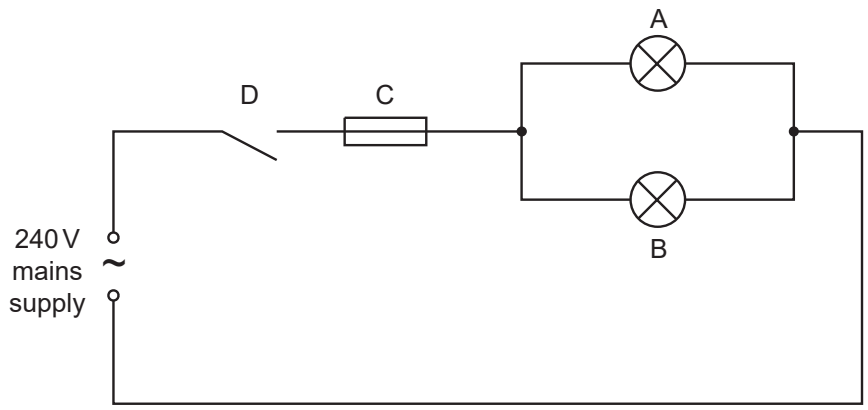


Fig. 11.1

(a) State the names of components C and D and explain the purpose, in this circuit, of each of these components. [4]

(b) When both lamps are working correctly, the current in C is 0.42 A.

Lamp A is marked 240 V, 60 W. Calculate

(i) the current in lamp A, [2]

(ii) the current in lamp B, [2]

(iii) the resistance of lamp A. [3]

(c) The two lamps in Fig. 11.1 are connected in parallel. When wiring the circuit in a house, an electrician makes a mistake and connects the two lamps in series to the mains supply. He switches them on.

(i) Draw a circuit diagram showing the two lamps connected in series to the mains supply. [1]

(ii) State whether the current in the two lamps is larger than, the same as, or smaller than the currents you have calculated in **(b)**. Explain your answer. [2]

(d) Another lamp is made using the same material for the filament as lamp A.

The filament in this new lamp has the same length as the filament in lamp A but has half the cross-sectional area.

State the resistance of the new lamp. [1]

5054/02/M/J/06/Q6

For Examiner's Use

5 Fig. 6.1 shows a mains extension lead. The six sockets allow several electrical appliances to be connected to the mains supply through one cable.

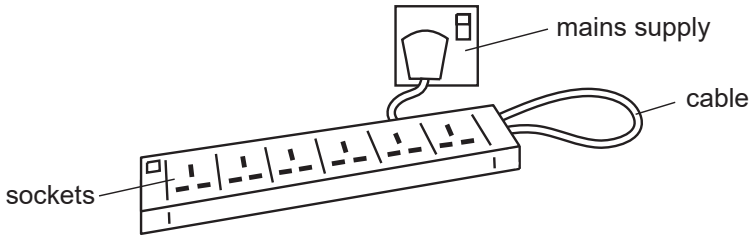


Fig. 6.1

(a) The cable connects the sockets to the mains supply.

The cable contains three wires: live, neutral and earth. State what is meant by

(i) *live*,

.....

..... [1]

(ii) *neutral*,

.....

..... [1]

(iii) *earth*.

.....

..... [1]

(b) Six powerful lamps are plugged into the sockets and switched on, one by one.

(i) State what happens in the cable as the lamps are switched on, one by one.

.....

..... [1]

(ii) Describe why it can be dangerous when a fuse of the wrong value is used in the plug.

.....

.....

..... [1]

(c) Explain why your hands should be dry when you put a plug into a socket.

.....

..... [1]

5054/02/M/J/09/Q9

6 **(a)** A lamp is marked 24V, 100W. Describe an experiment to check that the electrical power supplied to the lamp is 100W when the potential difference (p.d.) across it is 24V.
In your account you should

- include a circuit diagram,
- state the readings that are taken,
- show how the result is calculated from the readings. [4]

(b) Two lamps are connected in parallel to a 240V mains supply, as shown in Fig. 9.1.

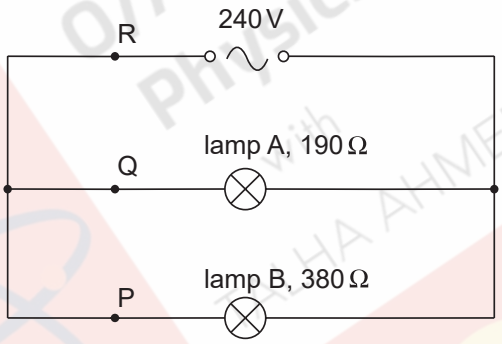


Fig. 9.1

Lamp A has a resistance of 190 Ω and lamp B has a resistance of 380 Ω.

(i) Calculate the current at points P, Q and R. [3]

(ii) Calculate the total resistance of the circuit. [2]

(c) Fig. 9.2 shows the same lamps connected in series to the mains supply.

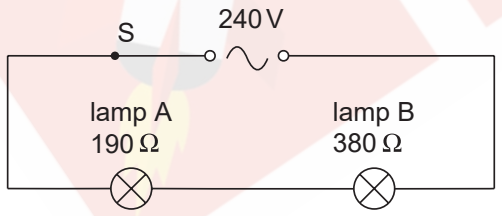


Fig. 9.2

(i) Calculate the current at point S. [2]

(ii) Calculate the p.d. across lamp A. [1]

(d) In a house, all lamps are connected in parallel to the mains supply, not in series.

State and explain two reasons for this.

In your explanation you may refer to the results of your calculations in **(b)** and **(c)**. [3]

5054/21/M/J/11/Q9

(b) **(iv)** An electric drill of power 1000 W is used in a country where the mains voltage is 240 V.
State and explain the most appropriate fuse to use with this drill.
You should select a fuse from the following values: 1 A, 3 A, 4 A, 13 A.

.....

.....

.....

..... [3]

5054/22/M/J/11/Q6

8 The cable from the mains plug to a washing machine contains a live wire, a neutral wire and an earth wire. The earth wire is connected to the metal case of the washing machine.

(a) Explain how connecting the earth wire to the metal case makes the washing machine safer.

.....

.....

.....[2]

(b) When in use, the average input power to the washing machine is 500 W.

Calculate the number of kW h of energy used by the washing machine in 45 minutes of use.

number of kW h = ...[2]

5054/21/M/J/12/Q9

9 Fig. 9.1a shows a room heater. Fig. 9.1b is a diagram of the electric circuit of the heater.

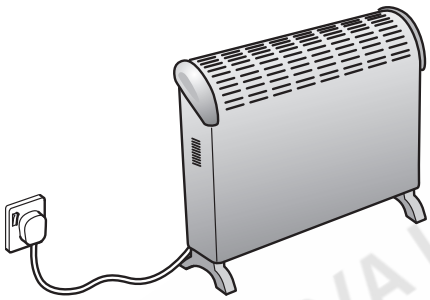


Fig. 9.1a

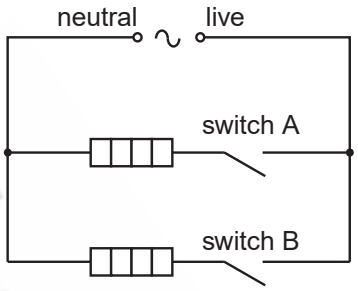


Fig. 9.1b

The fuse has not been drawn on the circuit diagram in Fig. 9.1b.

(a) (i) On Fig. 9.1b, draw the symbol for a fuse in the correct position. [2]

(ii) State the part of the room heater to which the earth wire is connected.

.....[1]

(iii) The earth wire reduces the chance of an electric shock if a fault develops in the room heater.

1. State one fault that causes an electric shock when a person uses the room heater without an earth connection.

.....

.....[1]

2. Explain how using an earth connection prevents an electric shock.

.....

.....

.....[2]

(c) Fig. 9.2 shows the power output of the room heater when each switch is closed.

	power / W
switch A only closed	600
switch B only closed	
both switches closed	2100

Fig. 9.2

(i) Determine the power output of the room heater when only switch B is closed.

power output = ... [1]

(ii) The room heater is used with both switches closed for 2.5 hours.

Calculate the energy output of the room heater

1. in kilowatt-hours,

energy = ... kW h [2]

2. in joules.

energy = ... J [2]

5054/21/M/J/13/Q10

10 **(a)** The average input power to a freezer is 80 W. The cost of 1 kW h is 25 cents.

For Examiner's Use

(i) Explain what is meant by the *kilowatt-hour* (kW h).

.....

..... [2]

(ii) Calculate the cost of running the freezer for one week.

cost = ... [3]

5054/22/M/J/13/Q11

11 A student places a small electrical heater inside a cup of water, as shown in Fig. 11.1.

For Examiner's Use

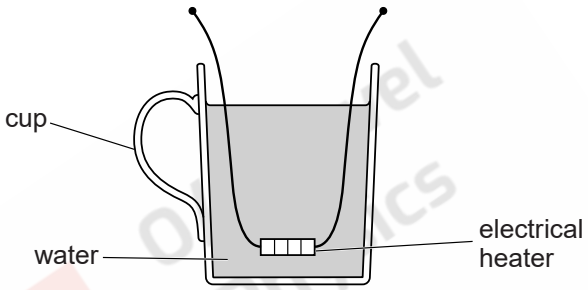


Fig. 11.1

The student determines the electrical power of the heater.

(a) In the space above the cup on Fig. 11.1, draw the electrical circuit that the student uses. Include an ammeter, a voltmeter and a power supply. [2]

(b) The voltage of the power supply is 12V and the current is 4.2A.

(i) Calculate the electrical power input to the heater.

power = ... [2]

(ii) Calculate the energy input to the heater in 8.0 minutes. Give your answer in kWh.

energy = ... kWh [3]

5054/22/M/J/15/Q7

12 An electric hairdryer and an electric heater are connected to the mains supply, as shown in Fig. 7.1.

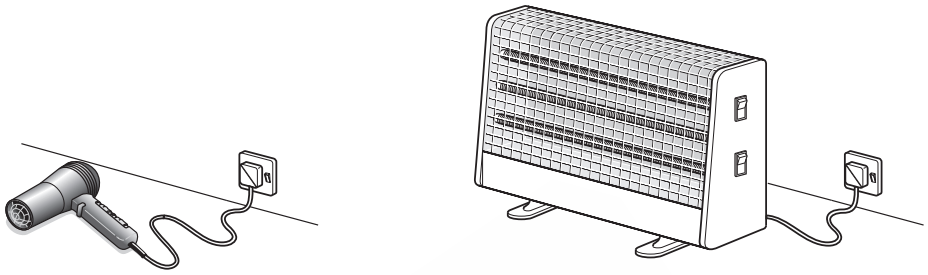


Fig. 7.1

The cable from the heater to the mains supply has a live, a neutral and an earth wire.

(a) State the purpose of the neutral wire.

.....

..... [1]

(b) The live wire in the electric heater touches the outer metal case.

Explain how the earth and the fuse together protect the user from electric shock.

.....

.....

.....

..... [2]

(c) The hairdryer does not have an earth wire. Explain why this hairdryer is still safe to use.

.....

..... [1]

(d) In some modern homes, circuit breakers are used instead of fuses.

Suggest one advantage of using a circuit breaker rather than a fuse.

.....

..... [1]

5054/21/M/J/16/Q11

13 (b) An electrical generator supplies power to a distant factory.

(i) The factory receives 500 kW of electrical power at a voltage of 33 kV.

Calculate

1. the current in the wires supplying the power,

current = ...[2]

2. the electrical energy supplied to the factory in one hour.

energy = ...[2]

5054/21/M/J/17/ 6

14 Fig. 6.1 shows a 240 V a.c. mains supply connected to a television and two lamps.

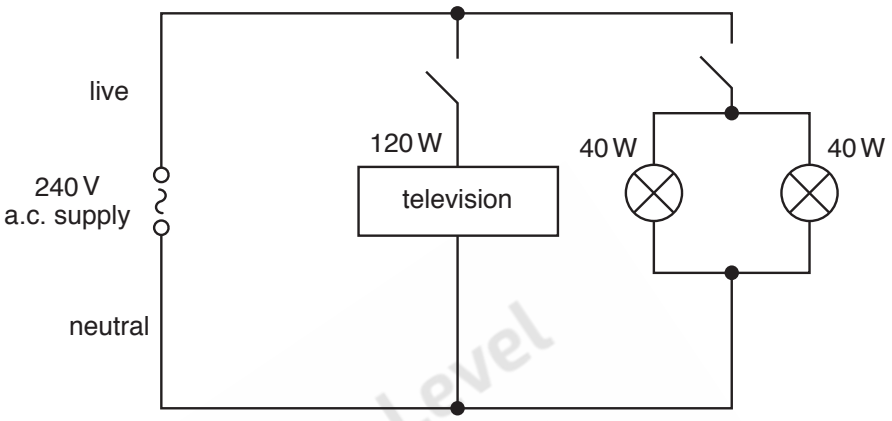


Fig. 6.1

In normal operation, the power supplied to each lamp is 40 W and the power supplied to the television is 120 W.

(a) Calculate, in normal operation,

(i) the total power supplied,

power = ...[1]

(ii) the total number of kilowatt-hours (kW h) of energy supplied to the circuit in 3.0 hours,

number of kW h = ...[2]

(iii) the current in each lamp.

current = ...[2]

(b) Explain why the switches are placed in the live wire and not in the neutral wire.

.....

.....

.....

.....[2]

5054/21/M/J/18/Q5

15 A student has three resistors; each resistor is labelled 3.9 Ω, 3 W.

She checks the value of the resistance of **one** of the resistors.

(a) In the space below, draw a circuit diagram of a circuit that she can use to find this resistance. Include a battery, a variable resistor, a voltmeter and an ammeter in the circuit.

[2]

(b) When the circuit is turned on, the potential difference (p.d.) across the resistor is 4.2 V and the current in the resistor is 1.2 A.

(i) Calculate the resistance of the resistor.

resistance = ...[2]

(ii) Shortly after the circuit is turned on, the resistor overheats and gives off smoke.

Explain why it overheats. Include a calculation in your answer.

.....

.....

.....

.....

.....[2]

(iii) The other two resistors are also labelled 3.9 Ω, 3 W. The first resistor is now removed and the student connects these other two resistors in series to the p.d. of 4.2 V.

State and explain whether these resistors overheat.

.....

.....

.....

.....[1]

5054/22/M/J/18/Q8

16 A fuse is one form of protection in an electrical circuit.

(a) State **two other** forms of protection that are included in household electrical circuits.

These may protect the consumer, the circuit or an electrical appliance.

1. .....

2. .....
[2]

(b) Fig. 8.1 shows a fusebox connected to part of a lighting circuit in a house.

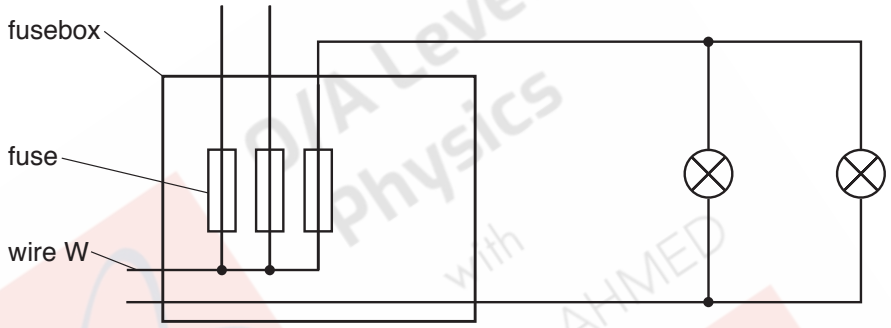


Fig. 8.1

(i) State how Fig. 8.1 shows that wire W is the live wire.

.....

.....[1]

(ii) On Fig. 8.1, mark with a letter s, the correct position for a switch that controls both lamps. [1]

(iii) The rating of the fuse in the lighting circuit is 5A.

Explain what this means.

.....

.....

.....[1]