1. 0625/31/M/J/19/No.9

A student makes a circuit to switch on a 6.0 V lamp from two different switches X and Y.

Fig. 9.1 shows the circuit.
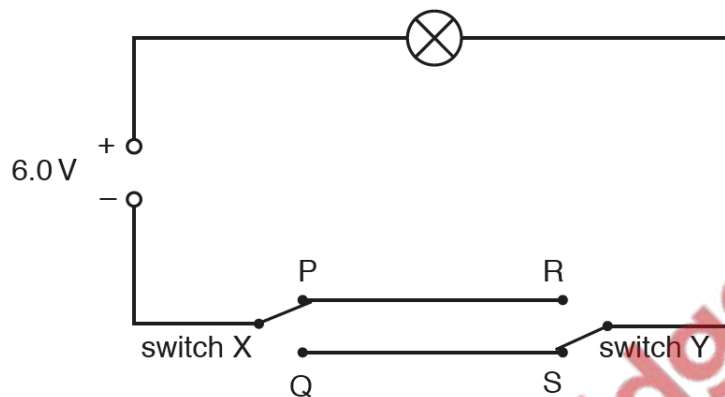

Fig. 9.1

(a) Switch X is in position P. State the position of switch Y for the lamp to be lit.

.... [1]

(b) The current in the lamp is 0.50 A when the potential difference (p.d.) across the lamp is 6.0 V. Calculate the resistance of the lamp. Include the unit.

resistance = ... [4]

(c) The student connects another 6.0 V lamp in parallel with the first lamp, as shown in Fig. 9.2.
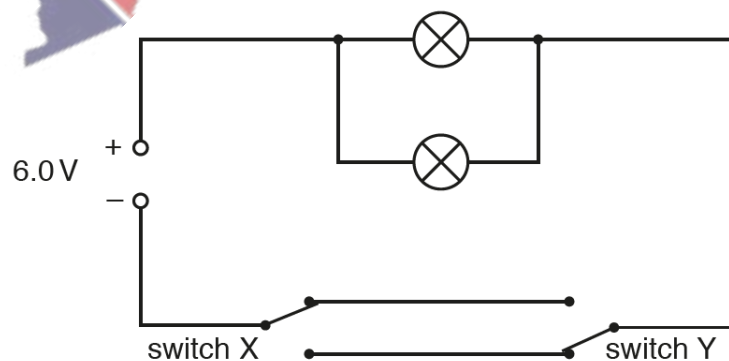
Fig. 9.2

Give **two** advantages of connecting the lamps in parallel.

....

....

.... [2]

[Total: 7]

2. 0625/31/M/J/19/No.10

(a) A teacher demonstrates the action of a device. Fig. 10.1 shows the symbol for the device.

Fig. 10.1

State the name of this device.

.... [1]

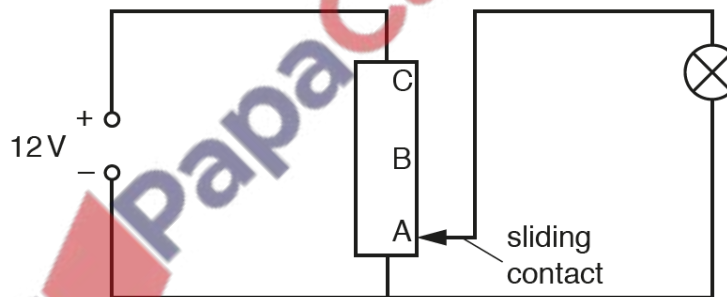(b) Fig. 10.2 shows another device being used in a circuit. The circuit contains a 6.0 V lamp.

Fig. 10.2

(i) The sliding contact of this device is at position A, as shown in Fig. 10.2.

Describe and explain the brightness of the lamp when the sliding contact is in this position.

brightness of lamp ....

explanation ....

[2]

(ii) The teacher moves the sliding contact from position A to position B. Describe and explain what happens to the brightness of the lamp.

....

.... [2]

(iii) The teacher moves the sliding contact from position B to position C. Suggest what happens to the lamp.

.... [1]

[Total: 6]

3. 0625/32/M/J/19/No.10

Fig. 10.1 shows an incomplete circuit diagram for two identical lamps arranged in parallel. The circuit contains an ammeter and a voltmeter.
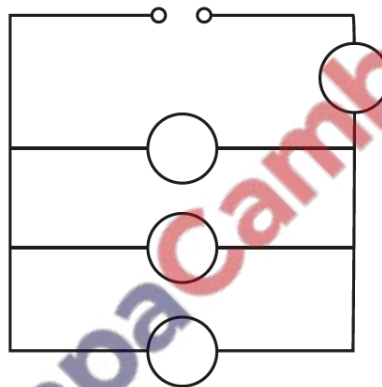

Fig. 10.1

(a) On Fig. 10.1, complete the symbols for two lamps, an ammeter and a voltmeter positioned correctly. [5]

(b) One of the lamps breaks.

State the effect, if any, this has on the brightness of the other lamp. Explain your answer.

effect ....

explanation ....

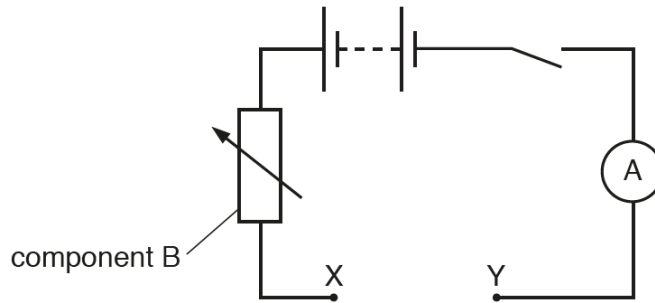...
[2]

[Total: 7]

(a) A student tests some materials to find which ones are electrical conductors.
He uses the circuit in Fig. 9.1.

component B

X   Y

(i) State the name of component B.

.... [1]

(ii) Describe how the student can use the circuit in Fig. 9.1 to test whether a material is an electrical conductor.

....

....

....

.... [2]

(iii) State which materials are electrical conductors.

Put a tick in the box next to each material that is an electrical conductor.

plastic ☐   copper ☐

rubber ☐   gold ☐   [1]

(b) The student connects a resistor R, between X and Y. The student determines the resistance of the resistor.

(i) Name the instrument he uses to measure the potential difference (p.d.) across resistor R.

.... [1]

(ii) The current in resistor R is 0.2A when the p.d. across the resistor is 6.0 V. Calculate the resistance of resistor R.

resistance = ... Ω [3]

[Total: 8]

5.

Fig. 7.1 shows a circuit diagram that includes component X.
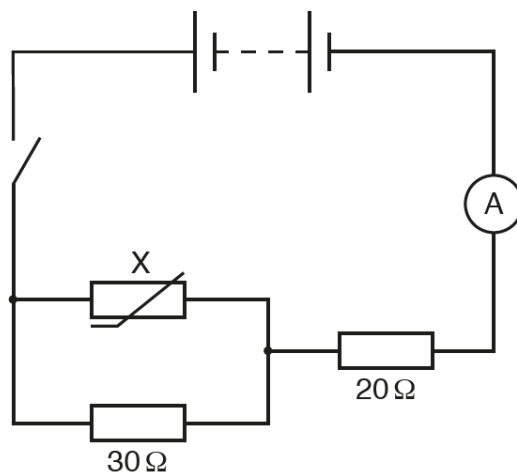
Fig. 7.1

(a) State the name of component X.

.... [1]

(b) The electromotive force (e.m.f.) of the battery is E. The switch is closed.

The potential difference (p.d.) across the 30 Ω resistor is V_{30}.
The p.d. across the 20 Ω resistor is V_{20}.
The p.d. across component X is V_X.

State an equation that relates V_X to:

(i) V_{30}

.... [1]

(ii) E and V_{20}.

.... [1]

(c) The e.m.f. of the battery is 6.0 V and the resistance of component X is 15 Ω.

Calculate:

(i) the total resistance of the circuit

resistance = ... [3]

(ii) the ammeter reading.
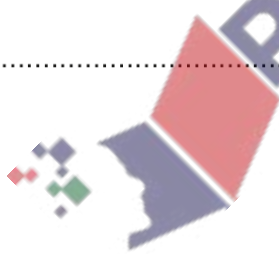
reading = ... [2]

(d) The temperature of component X increases.

State and explain what happens to the ammeter reading.

....

....

.... [2]

[Total: 10]

6. 0625/42/M/J/19/No.10

Fig. 10.1 shows a circuit containing a filament lamp of resistance $0.30\,\Omega$ and two resistors, each of resistance $0.20\,\Omega$.
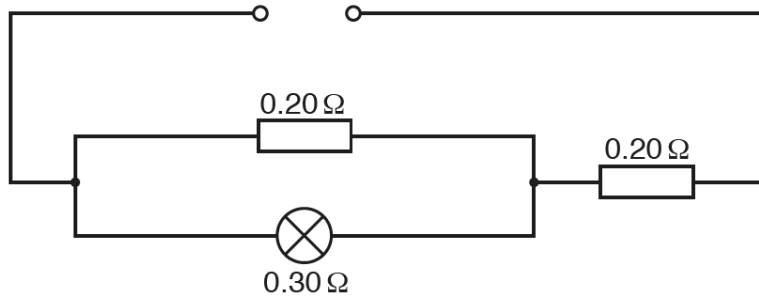

Fig. 10.1

(a) Calculate the combined resistance of the lamp and the two resistors.

resistance = ... [3]

(b) The potential difference (p.d.) of the supply is increased so that the current in the lamp increases.

State and explain any change in the resistance of the lamp.

Statement ....

Explanation ....

....
[2]

[Total: 5]

Fig. 8.1 shows a 240 V mains supply connected to an air-conditioning unit and a freezer. A fuse X is placed in the circuit as shown.
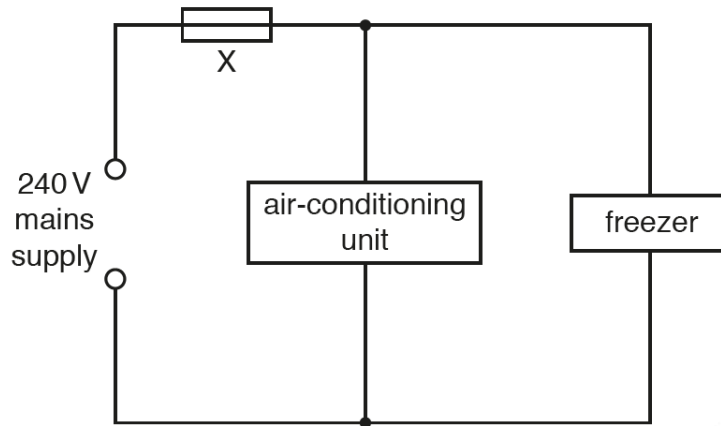

Fig. 8.1

The freezer has an operating power of 700 W.

(a) Calculate the current in the freezer.

current = ... [2]

(b) The maximum operating current of the air-conditioning unit is 7.5 A.

Fuses of current rating 1 A, 3 A, 5 A, 10 A, 13 A and 30 A are available.

Suggest a suitable rating for fuse X. Give **two** reasons for your answer.

fuse rating ....

Reason 1 ....

....

....

Reason 2 ....

....

.... [3]

(c) A fuse is made out of a short length of wire.

Explain why fuses of a higher rating are made of thicker wire.

....

....

....

....

.... [3]

(d) Electrical energy can be obtained from renewable and non-renewable sources of energy.

(i) State **two** renewable sources of energy.

Source 1 ....

Source 2 .... [2]

(ii) State **one** social, economic or environmental disadvantage of one of your answers to **(d)(i)**.

....

....

.... [1]
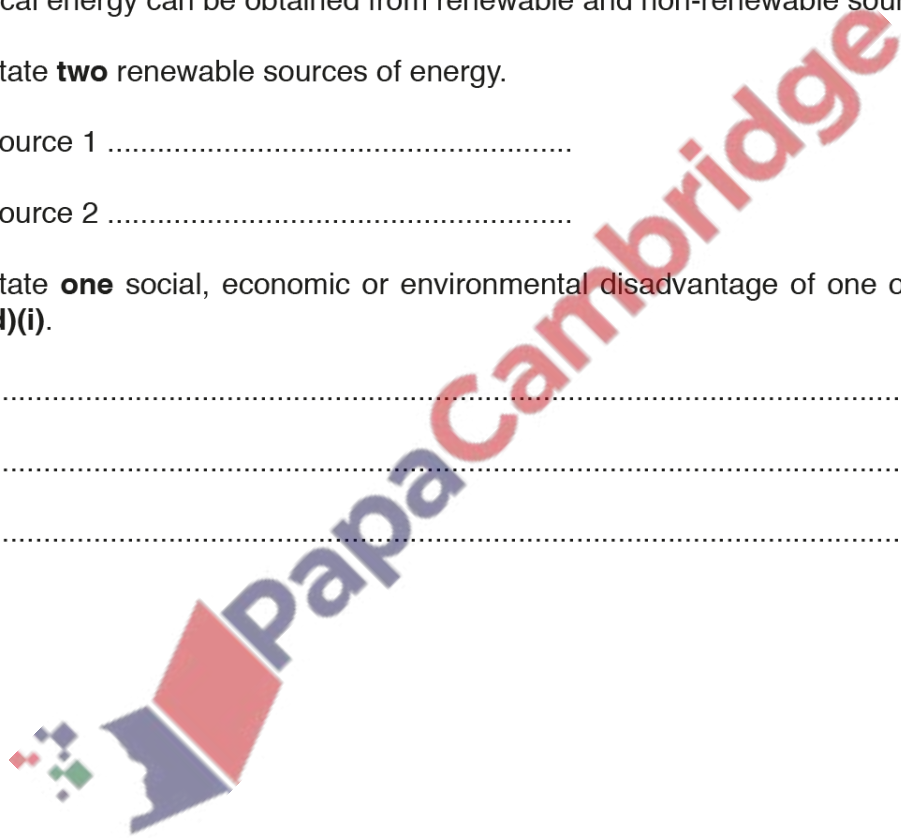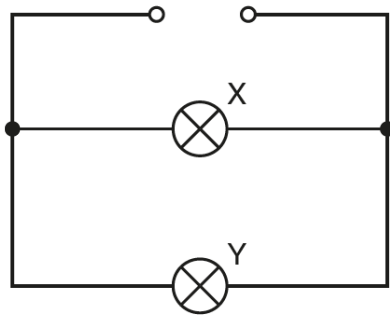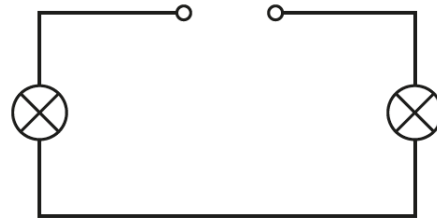
[Total: 11]

8.

Fig. 9.1 and Fig. 9.2 each show an electrical circuit. Each circuit has two lamps connected to an electrical supply.

.... circuit   .... circuit

Fig. 9.1   **Fig. 9.2**

(a) State the term used to describe each electrical circuit. Write the term under each circuit.   [2]

(b) State **two** disadvantages of the circuit in Fig. 9.2.

1. ....

2. ....
                                                                      [2]

(c) Redraw the circuit in Fig. 9.1 with switches that will turn lamps X and Y on and off independently of each other.

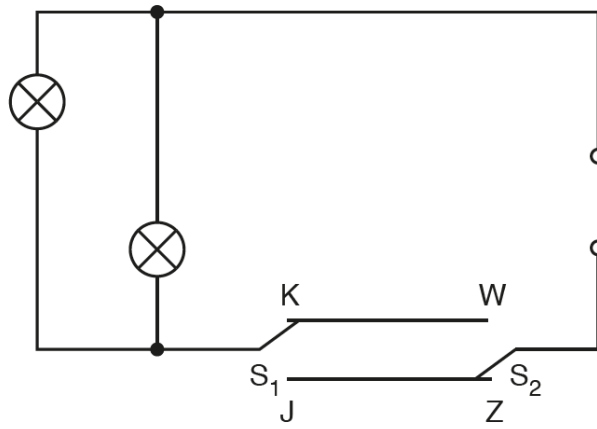   [2]

(d) Fig. 9.3 shows another circuit.

Fig. 9.3

The lamps can be turned on and off using two different switches S_1 and S_2.

Complete the table stating when the lamps are on or off. The first one has been done for you.

switch positions		lamps on or off
S_1	S_2	
K	Z	off
K	W	
J	W	
J	Z	

[3]

[Total: 9]

9. 0625/42/F/M/19/No.9

Fig. 9.1 shows current-potential difference (p.d.) graphs for a resistor and for a thermistor.
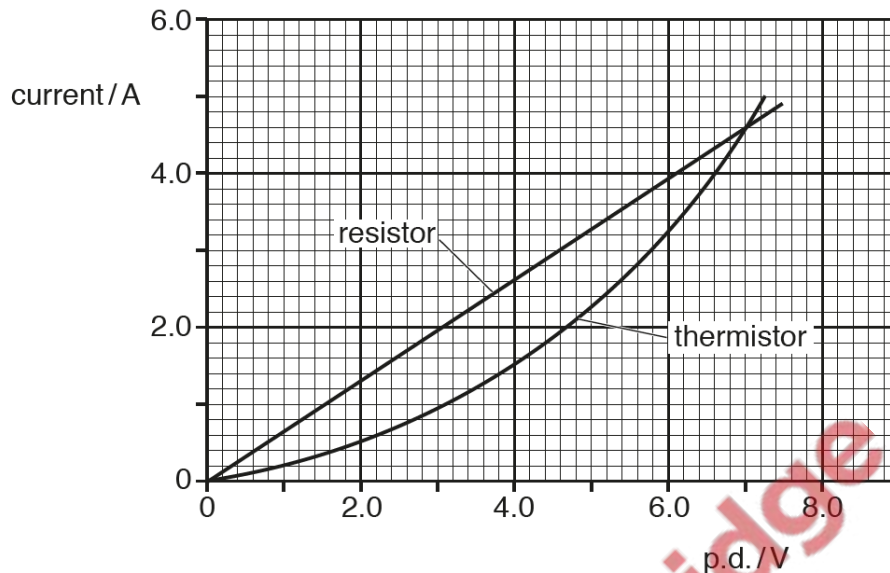
Fig. 9.1

(a) Calculate the resistance of the thermistor when the p.d. across it is 7.0 V.

resistance = ... [2]

(b) In Table 9.1, tick the boxes that indicate the effect on the resistances of the resistor and of the thermistor when the p.d. across them is increased from 0 to 7.0 V.

Table 9.1

component	resistance increases	resistance is constant	resistance decreases
resistor			
thermistor			

[2]

(c) The thermistor and the resistor are connected in **parallel** to a 7.0 V supply.

Calculate:

(i) the current from the supply

current = ... [2]

(ii) the energy transferred from the supply in 5.0 minutes.

energy = ... [2]

[Total: 8]