

National 5 Electricity Practice Test

- 1 Four circuit symbols, W, X, Y and Z, are shown.



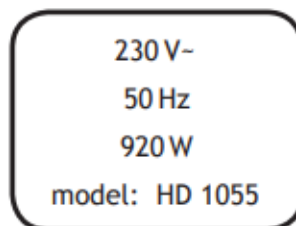
Which row identifies the components represented by these symbols?

	W	X	Y	Z
A	battery	ammeter	resistor	variable resistor
B	battery	ammeter	fuse	resistor
C	lamp	ammeter	variable resistor	resistor
D	lamp	voltmeter	resistor	fuse
E	lamp	voltmeter	variable resistor	fuse

- 2 The voltage of an electrical supply is a measure of the

- A resistance of the circuit
- B speed of the charges in the circuit
- C power developed in the circuit
- D energy given to the charges in the circuit
- E current in the circuit.

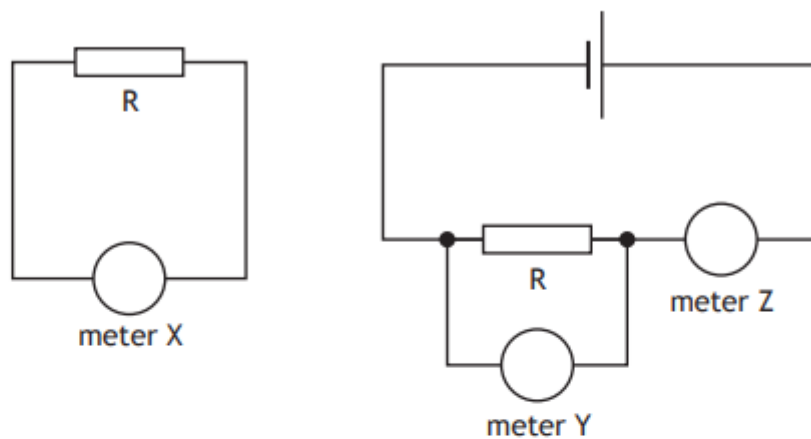
- 3 The rating plate on an electrical appliance is shown.



The resistance of this appliance is

- A 0.017Ω
- B 0.25Ω
- C 4.0Ω
- D 18.4Ω
- E 57.5Ω .

- 4 Two circuits are set up as shown.



Both circuits are used to determine the resistance of resistor R .
Which row in the table identifies meter X , meter Y and meter Z ?

	<i>meter X</i>	<i>meter Y</i>	<i>meter Z</i>
A	ohmmeter	voltmeter	ammeter
B	ohmmeter	ammeter	voltmeter
C	voltmeter	ammeter	ohmmeter
D	ammeter	voltmeter	ohmmeter
E	voltmeter	ohmmeter	ammeter

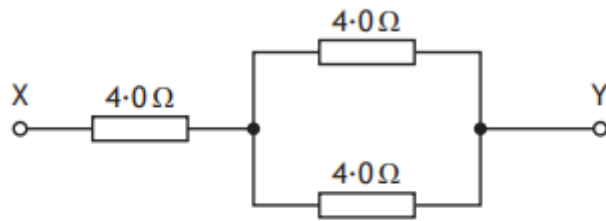
- 5 A student makes the following statements about a.c. and d.c. circuits.

- I In an a.c. circuit the direction of the current changes regularly.
- II In a d.c. circuit negative charges flow in one direction only.
- III In an a.c. circuit the size of the current varies with time.

Which of these statements is/are correct?

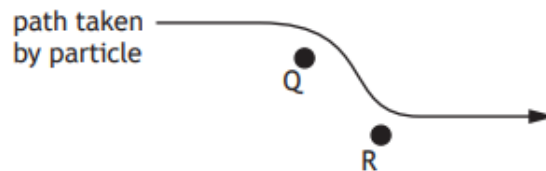
- A I only
- B II only
- C I and II only
- D I and III only
- E I, II and III

- 6 A circuit is set up as shown.



The resistance between X and Y is

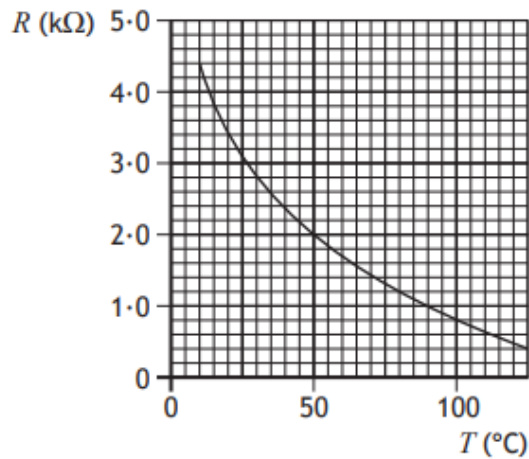
- A $1.3\ \Omega$
 - B $4.5\ \Omega$
 - C $6.0\ \Omega$
 - D $8.0\ \Omega$
 - E $12\ \Omega$.
- 7 An electric field exists around two point charges Q and R.
The diagram shows the path taken by a charged particle as it travels through the field.
The motion of the particle is as shown.



Which row in the table identifies the charge on the particle, the charge on Q and the charge on R?

	<i>Charge on particle</i>	<i>Charge on Q</i>	<i>Charge on R</i>
A	positive	negative	negative
B	negative	negative	negative
C	negative	positive	positive
D	positive	negative	positive
E	positive	positive	negative

- 8 The graph shows how the resistance R of a thermistor varies with temperature T .

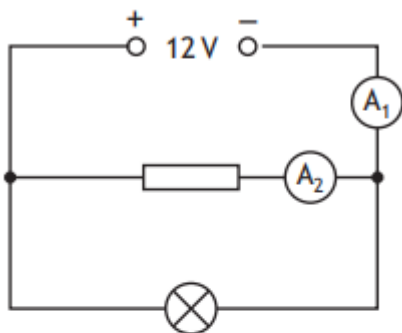


The thermistor is connected in a circuit.

At a temperature of 50°C the current in the thermistor is 0.004 A .

At this temperature the voltage across the thermistor is

- A 0.00002 V
 - B 0.002 V
 - C 0.008 V
 - D 8 V
 - E 500 V .
- 9 A circuit is set up as shown.

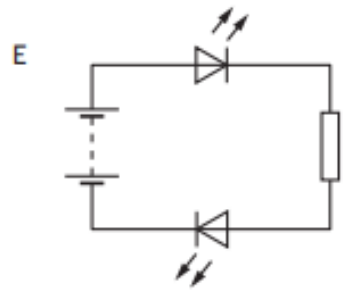
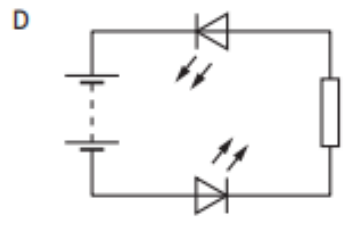
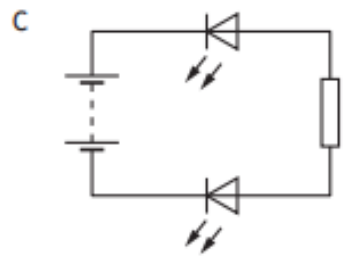
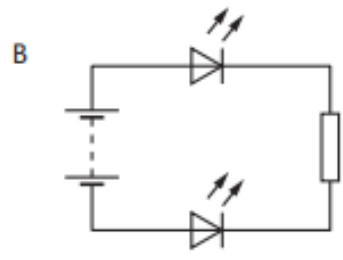
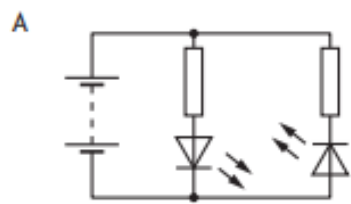


The reading on ammeter A_1 is 5.0 A . The reading on ammeter A_2 is 2.0 A .

The charge passing through the lamp in 30 seconds is

- A 0.1 C
- B 10 C
- C 60 C
- D 90 C
- E 150 C .

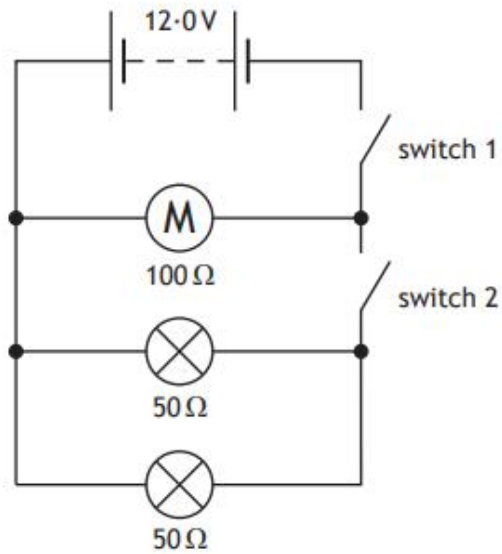
10 A student sets up the circuits shown.
In which circuit will both LEDs be lit?



- 1 A toy car contains an electric circuit which consists of a 12.0V battery, an electric motor and two lamps.



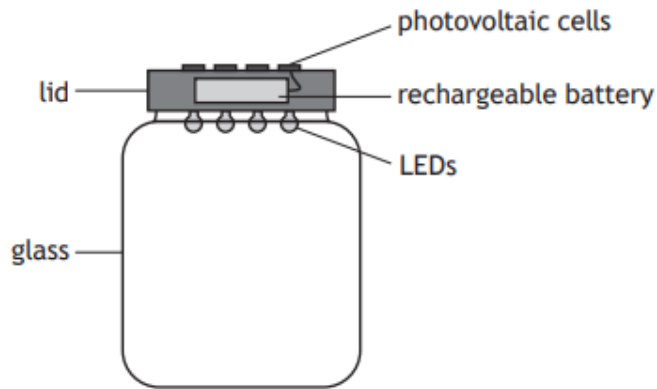
The circuit diagram is shown.



- (a) Switch 1 is now closed.
Calculate the power dissipated in the motor when operating. 3
- (b) Switch 2 is now also closed.
- (i) Calculate the total resistance of the motor and the two lamps. 3
- (ii) One of the lamps now develops a fault and stops working.
State the effect this has on the other lamp.
You must justify your answer. 2

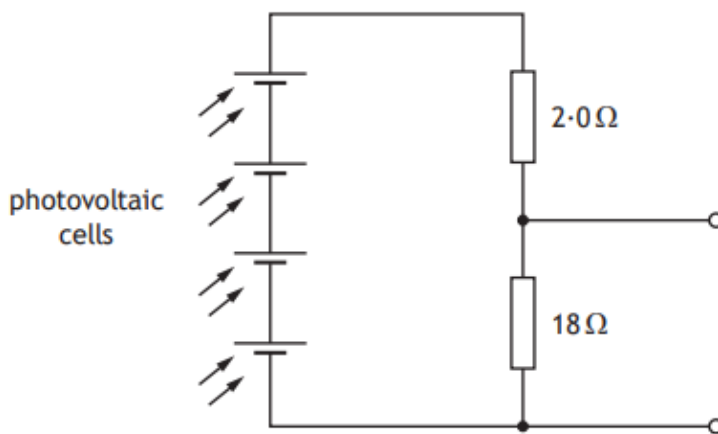
- 2 A solar jar is designed to collect energy from the Sun during the day and release this energy as light at night.

When the solar jar is placed in sunlight, photovoltaic cells on the lid are used to charge a rechargeable battery.



At night, the rechargeable battery is used to power four identical LEDs.

- (a) Part of the circuit in the solar jar is shown.

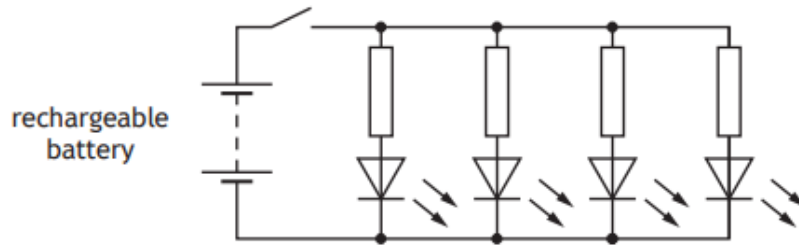


In direct sunlight the photovoltaic cells produce a combined voltage of 4.0 V .

Calculate the voltage across the $18\ \Omega$ resistor.

2 (continued)

(b) Another part of the circuit containing the LEDs is shown.



The switch is now closed and the LEDs light.

(i) State the purpose of the resistor connected in series with each LED.

1

(ii) After a few hours the rechargeable battery produces a voltage of 3.4 V.

At this point in time the voltage across each LED is 1.6 V and the current in each LED is 25 mA.

Determine the value of the resistor in series with each LED.

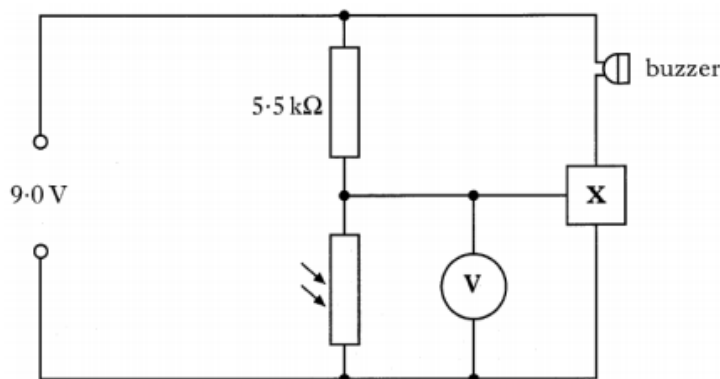
4

(c) When the battery is completely discharged it then takes 6.0 hours of direct sunlight to fully charge the battery. During this time, there is a constant current of 0.135 A to the battery.

Calculate the total charge supplied to the battery during this time.

3

3 A circuit diagram of an electronic system is shown below. The system is designed to sound a warning when the light intensity falls below a certain level.



(a) Component X is a transistor. Two types of transistor are suitable for this system, an NPN transistor and an n-channel enhancement MOSFET. Draw and name the circuit symbol for each transistor.

2

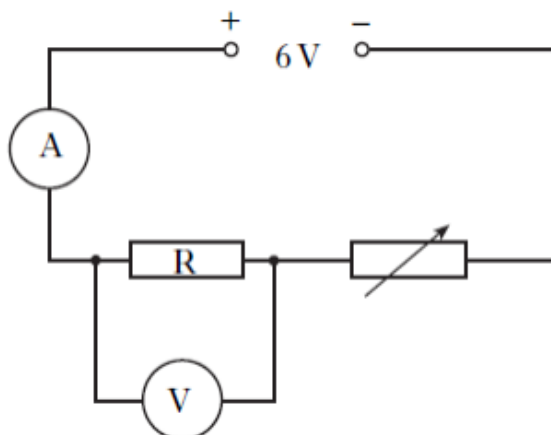
(b) What is the purpose of the transistor in this system?

1

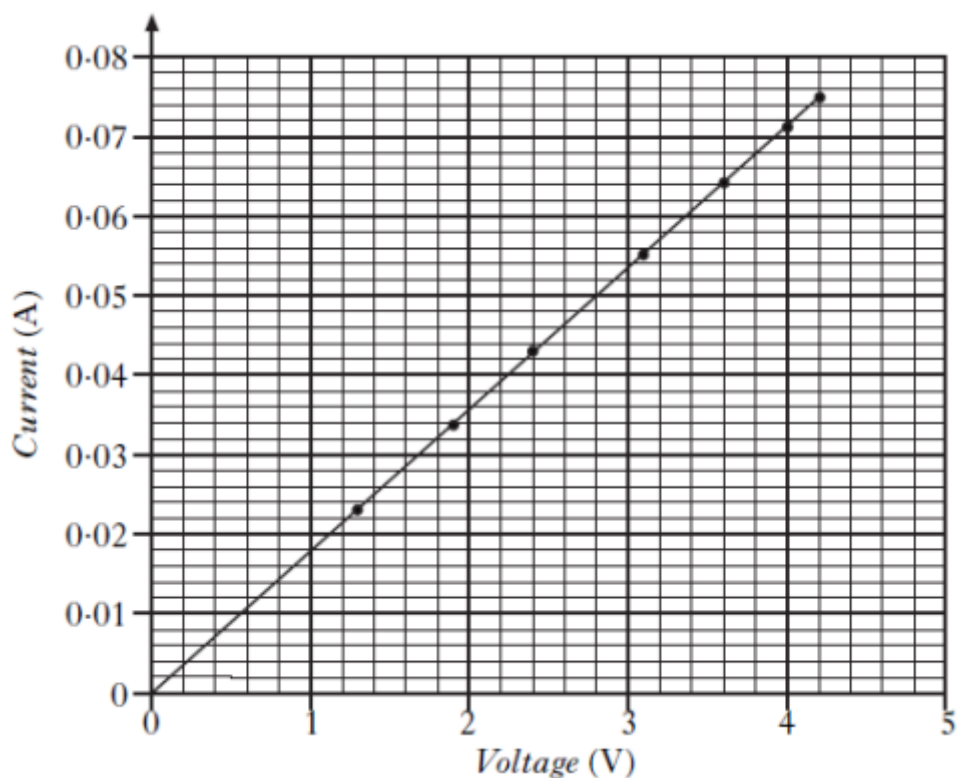
- (c) A MOSFET is used at position X.
 When the light intensity falls, the voltmeter reading rises to 2.4V and the buzzer sounds.
 Calculate the resistance of the LDR when this happens.

4

A student sets up the following circuit to investigate the resistance of resistor R.



The variable resistor is adjusted and the voltmeter and ammeter readings are note following graph is obtained from the experimental results.



Calculate the value of the resistor R when the reading on the voltmeter is 4.2V.

4

End of Question Paper