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IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

Uses of an Oscilloscope

Paper 1 — Multiple-Choice Questions (topical compilation)

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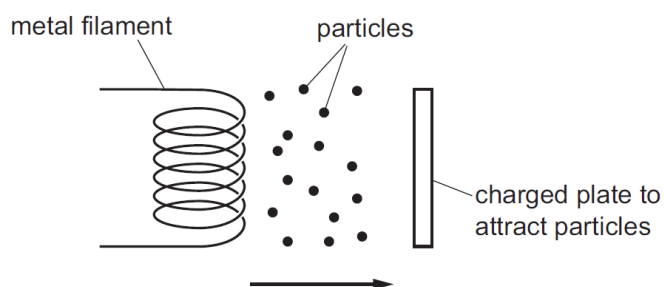
INTRODUCTORY ELECTRONICS

PAPER 1 QUESTIONS

Thermionic emission, cathode-rays, and uses of an oscilloscope

QUESTION # 1: M/J 16 P12

35 The diagram represents thermionic emission from a metal filament.



The particles are attracted by a charged plate.

Which row shows the charge on the plate, and the temperature of the metal filament?

	charge on plate	temperature of metal filament
A	negative	high
B	negative	low
C	positive	high
D	positive	low

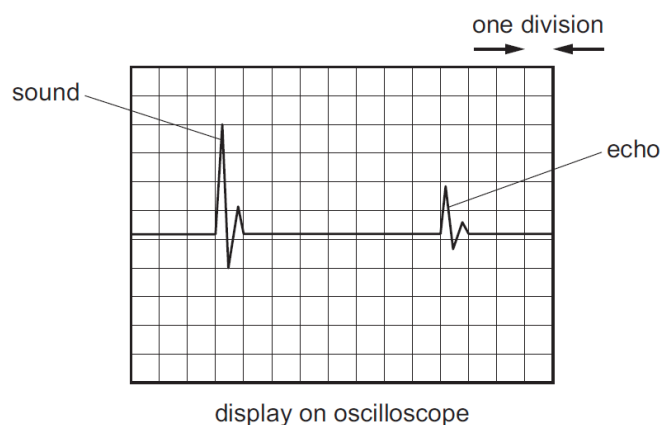
QUESTION # 2: M/J 18 P11

- 34 A loudspeaker and a microphone are placed in front of a wall.



The loudspeaker makes a sound which is detected by the microphone.

The microphone is connected to an oscilloscope which is set so that each division on the screen represents 0.01 s. The microphone detects the original sound and the echo.



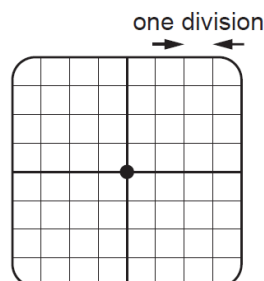
The speed of sound in air is 300 m/s.

What is the distance between the loudspeaker and the wall?

- A** 6.0 m **B** 12 m **C** 24 m **D** 48 m

QUESTION # 3: M/J 18 P12

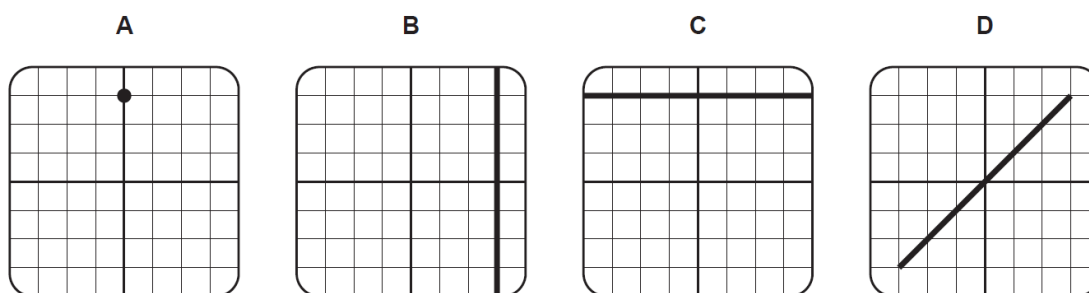
- 39** An oscilloscope is used to measure potential difference (p.d.). The trace with no input connected is shown.



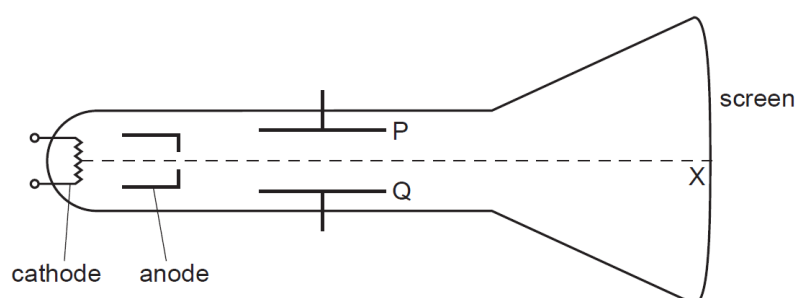
A 1.5 V d.c. supply is connected to the oscilloscope.

The Y-gain is set at 0.5 V/div. The time-base is set at 0.5 ms/div.

Which trace shows a supply of 1.5 V d.c.?

**QUESTION # 4: O/N 16 P11**

- 36** The diagram shows a cathode-ray tube. The dotted line shows the path of a beam of electrons. The beam hits the screen at point X and produces a bright spot. P and Q are horizontal plates on each side of the beam.



Which change will move the bright spot to a different position on the screen?

- A** Apply a voltage between metal plates P and Q.
- B** Decrease the positive voltage of the anode.
- C** Increase the positive voltage of the anode.
- D** Increase the voltage between the terminals of the cathode.

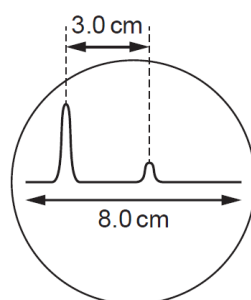
QUESTION # 5: O/N 17 P11

35 Which particles are emitted by a hot metal filament?

- A** alpha-particles
- B** electrons
- C** neutrons
- D** protons

QUESTION # 6: O/N 18 P11

36 The diagram shows the trace on an oscilloscope screen. The first peak occurs when a pulse of sound is emitted. The second, smaller peak is the echo received from a wall.



The trace moves across the screen in a time of 24 ms.

How long does it take for the sound to travel to the wall?

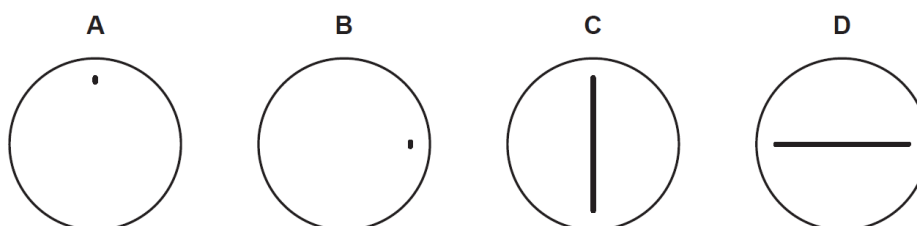
- A** 4.5 ms **B** 9.0 ms **C** 12 ms **D** 32 ms

QUESTION # 7: O/N 18 P12

36 An oscilloscope is connected to a d.c. power supply.

The time-base on the oscilloscope is switched off.

What is seen on the screen of the oscilloscope?



QUESTION # 8: O/N 19 P11

38 A student suggests four conditions for the production of a continuous flow of electrons from a metal filament.

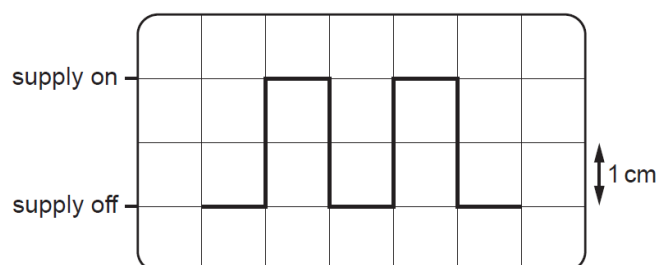
- 1 The filament is hot.
- 2 A high-pressure gas is present.
- 3 A high positive electrical potential is present.
- 4 A strong magnetic field is present.

Which of the four conditions are needed?

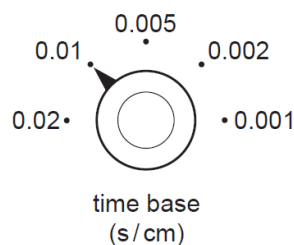
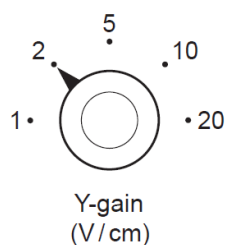
- A** 1 and 4 **B** 2 and 3 **C** 1 and 3 **D** 2 and 4

QUESTION # 9: O/N 19 P11

39 The diagram shows the trace on an oscilloscope screen when connected to a d.c. supply which is being switched on and off.



The settings of the Y-gain control and the time base control are shown.



The voltage of the supply is v .

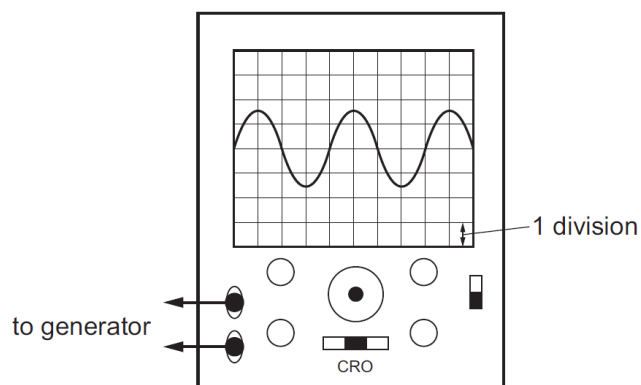
The supply is switched on f times per second.

What are the values of v and of f ?

	v/V	f
A	2	50
B	2	100
C	4	50
D	4	100

QUESTION # 10: O/N 20 P12

37 A cathode-ray oscilloscope with the Y-gain set at 2 V/division is connected to a generator.



Which row describes the signal from the generator and its amplitude?

	signal	amplitude / V
A	a.c.	3
B	a.c.	6
C	d.c.	3
D	d.c.	6

Action and use of circuit components

- resistor colour codes
- thermistors and light-dependent resistors
- variable potential divider/potentiometer
- diode and light-emitting diode
- relays
- light-sensitive switches and temperature-operated alarms

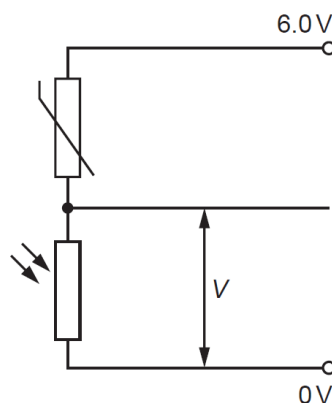
QUESTION # 1: M/J 16 P11

36 Which component, when used in a circuit, allows current to pass in only one direction?



QUESTION # 2: M/J 16 P11

37 A potential divider consists of a thermistor and a light-dependent resistor (LDR).

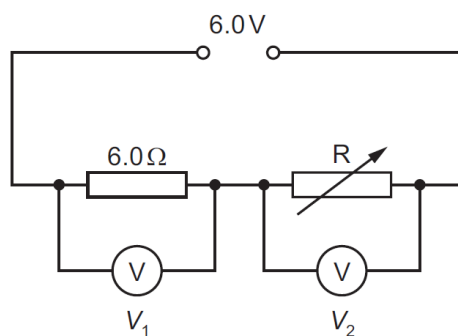


Which conditions give the smallest voltage V across the LDR?

- A cold and dark
- B cold and light
- C hot and dark
- D hot and light

QUESTION # 3 : M/J 16 P12

36 A potential divider is connected across the terminals of a 6.0V supply.



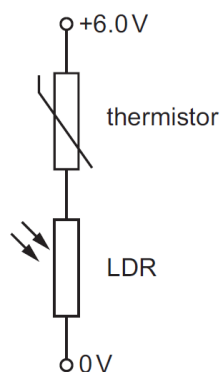
When R is adjusted to 6.0Ω , the voltmeter readings V_1 and V_2 are equal.

What happens to the readings when the resistance of R is then increased?

	V_1	V_2
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

QUESTION # 4: M/J 17 P11

- 35** A thermistor and a light-dependent resistor (LDR) are connected in series. A potential difference (p.d.) of 6.0 V is applied across them as shown.



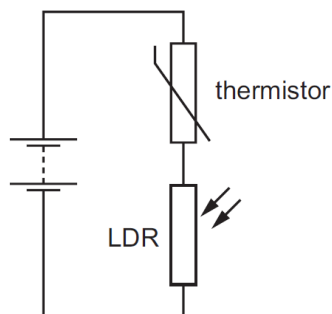
The thermistor has a resistance of 6000Ω in a cold room and 1000Ω in a warm room. The LDR has a resistance of 2000Ω in dim light and 500Ω in bright light.

When is the p.d. across the LDR equal to 2.0 V ?

- A** in a cold room with bright light
- B** in a cold room with dim light
- C** in a warm room with bright light
- D** in a warm room with dim light

QUESTION # 5: M/J 18 P11

- 30** In the circuit shown, the temperature of the room and the amount of light affect the current.

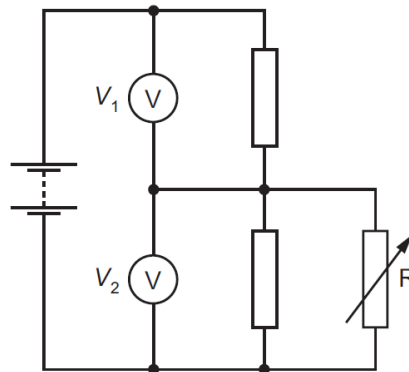


Under which conditions is the current in the circuit the largest?

	temperature	amount of light
A	high	in bright light
B	high	in the dark
C	low	in bright light
D	low	in the dark

QUESTION # 6: M/J 18 P11

- 35** The circuit diagram shows a variable resistor R connected in parallel to the lower half of a potential divider.



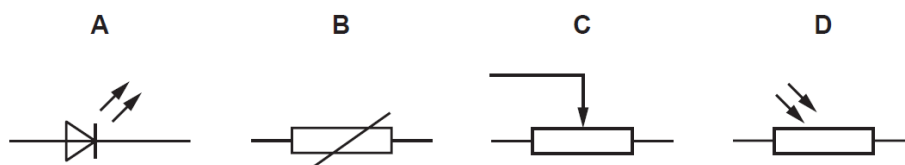
The resistance of R increases.

What happens to the two voltmeter readings?

	V_1	V_2
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

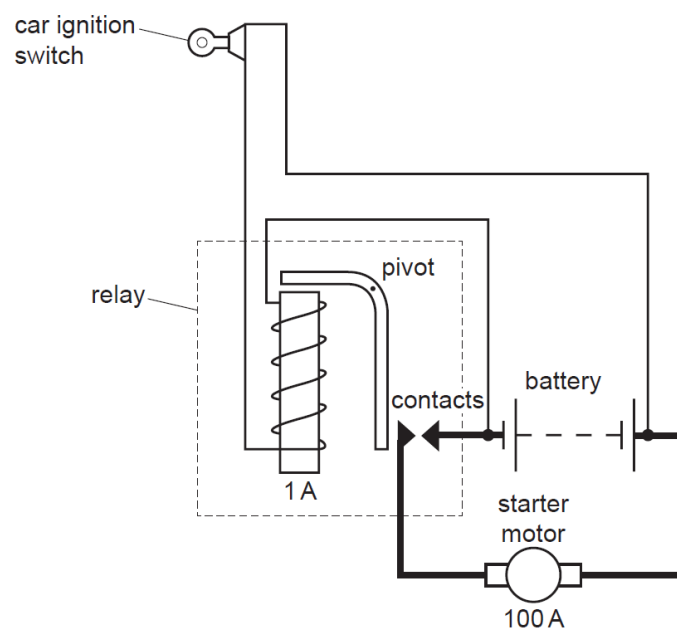
QUESTION # 7: M/J 18 P12

- 37** Which symbol is used for a light-dependent resistor?



QUESTION # 8: M/J 19 P11

30 The diagram shows a car ignition switch and starter motor.



The ignition switch is in a circuit with long, thin wires. The starter motor is in a circuit with short, thick wires.

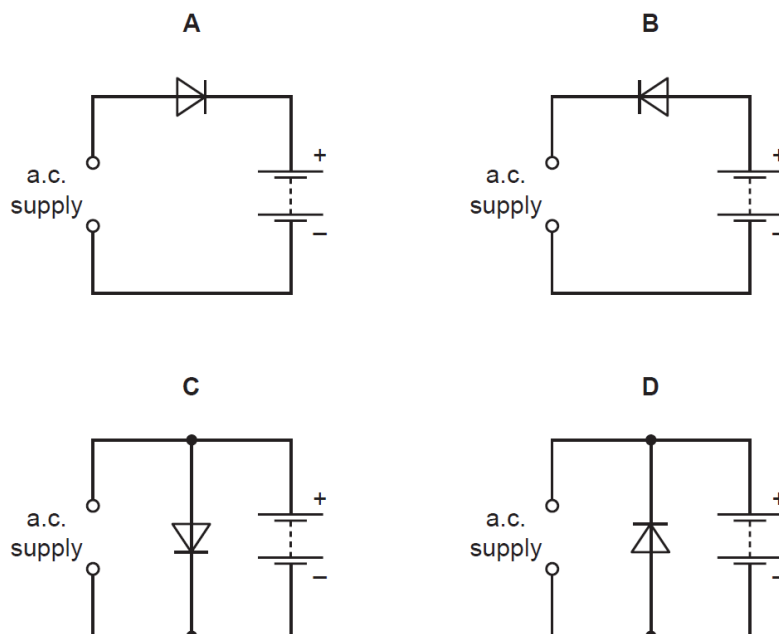
What is the explanation for the choice of wires?

- A** Each circuit needs to contain the same total mass of wire.
- B** Thicker wires heat up more quickly when the relay is switched on.
- C** Thin wires have lower resistances.
- D** The ignition switch circuit carries a smaller current than the starter motor circuit.

QUESTION # 9: M/J 19 P11

- 39** A car battery supplies a current in one direction. A current in the opposite direction recharges the battery.

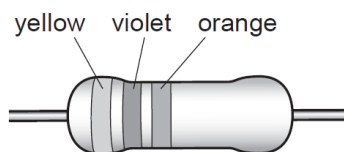
Which circuit recharges the battery, using an alternating current (a.c.) supply and a diode?

**QUESTION # 10: O/N 16 P11**

- 37** The table gives the colour code used for marking resistors.

black	brown	red	orange	yellow	green	blue	violet
0	1	2	3	4	5	6	7

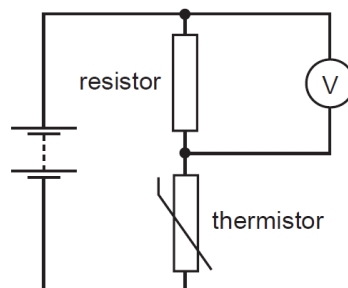
What is the resistance of the resistor in the diagram?



- A** $4.73\ \Omega$ **B** $473\ \Omega$ **C** $4700\ \Omega$ **D** $47\ 000\ \Omega$

QUESTION # 11: O/N 16 P12

- 38** A resistor of constant resistance and a thermistor are connected in series with a battery. A voltmeter is connected in parallel with the resistor.



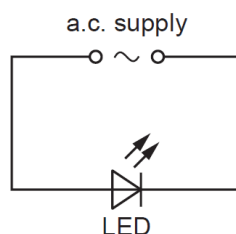
The temperature falls.

What are the correct changes?

	resistance of thermistor	voltmeter reading
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

QUESTION # 12: O/N 17 P11

- 36** A light-emitting diode (LED) is connected to an alternating current (a.c.) supply.



The LED flashes on and off.

What is the direction of the current in the LED when it emits light?

- A** towards the left only
- B** towards the right only
- C** towards the left or towards the right
- D** there is no current in the LED

QUESTION # 13: O/N 17 P12

36 A circuit includes a thermistor and a light-dependent resistor (LDR).

The resistance of the thermistor and the resistance of the LDR both increase.

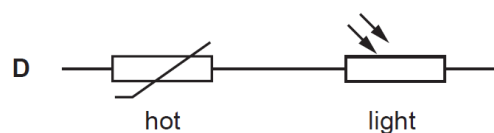
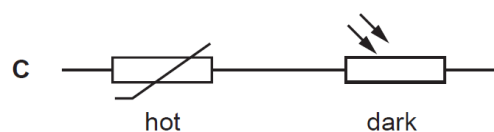
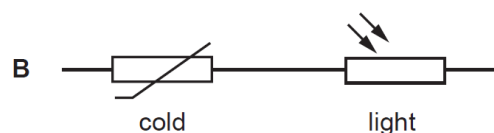
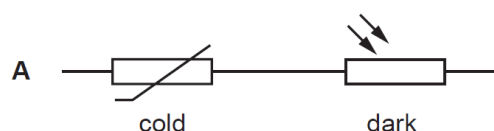
Which changes cause this?

	change to thermistor	change to LDR
A	decrease in temperature	decrease in brightness
B	decrease in temperature	increase in brightness
C	increase in temperature	decrease in brightness
D	increase in temperature	increase in brightness

QUESTION # 14: O/N 18 P12

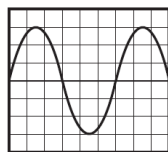
35 A thermistor and a light-dependent resistor are connected in series.

Which conditions give the least resistance?

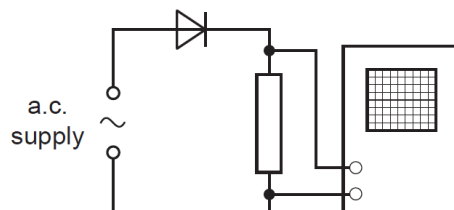


QUESTION # 15: O/N 19 P11

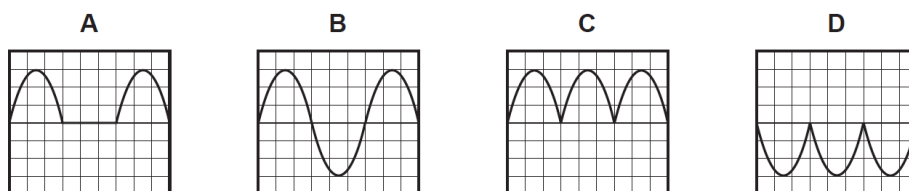
33 An a.c. supply connected to an oscilloscope produces the trace shown.



A diode is now connected in series to the circuit as shown.

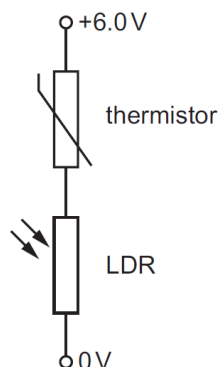


What is the new trace on the screen?



QUESTION # 16: O/N 20 P11

- 38 A thermistor and a light-dependent resistor (LDR) are connected in series. A potential difference (p.d.) of 6.0 V is applied across them as shown.



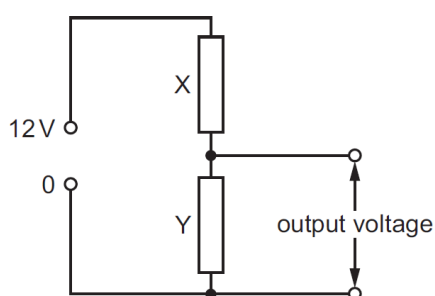
The thermistor has a resistance of $6000\ \Omega$ in a cold room and $1000\ \Omega$ in a warm room. The LDR has a resistance of $2000\ \Omega$ in dim light and $500\ \Omega$ in bright light.

When is the p.d. across the LDR equal to 2.0 V?

- A in a cold room with bright light
- B in a cold room with dim light
- C in a warm room with bright light
- D in a warm room with dim light

QUESTION # 17: O/N 20 P12

- 38 A potential divider uses a power supply of voltage 12 V. The resistors X and Y initially have equal resistances.



The resistance of X is halved.

What is the change in the output voltage?

- A -3.0 V
- B -2.0 V
- C +2.0 V
- D +3.0 V