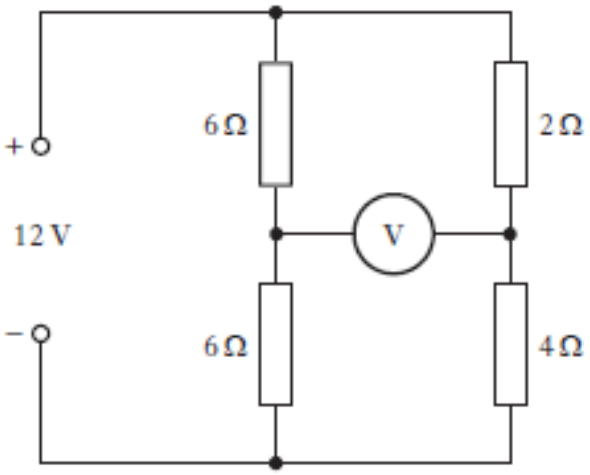
Past Paper Multiple Choice Questions by Topic - Electricity

1. The following circuit is set up.



The reading on the voltmeter is

A 0 V
B 2 V
C 6 V
D 8 V
E 12 V.

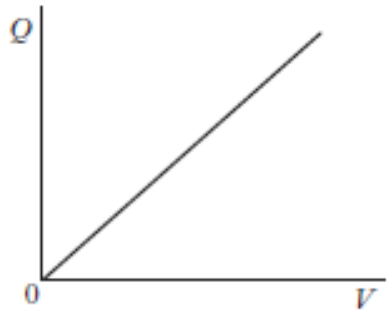
2. The capacitance of a capacitor is 1000 μF. The potential difference (p.d.) across the capacitor is 100 V. The charge stored by the capacitor is 0·10 C.

The charge on the capacitor is now reduced to half its original value.

Which row in the table shows the capacitance of the capacitor and the p.d. across the capacitor, for this new value of charge?

	Capacitance/μF	*p.d.*/V
A	1000	200
B	500	100
C	1000	100
D	500	50
E	1000	50

3. The graph shows how the charge, Q, stored on a capacitor varies with the potential difference, V, across the capacitor.



Which of the following statements is/are correct?

I The gradient of the graph represents the capacitance of the capacitor.

II The area under the graph represents the work done in charging the capacitor.

III The energy, E, stored in the capacitor is given by the equation $E = QV$.

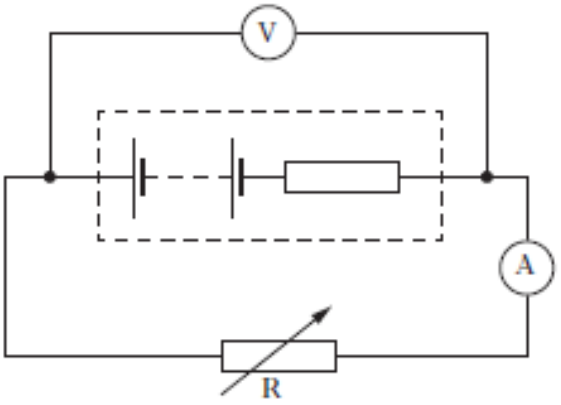
A I only
B II only
C III only
D I and II only
E I, II and III

4. A crystal of silicon is "doped" with arsenic. This means that a small number of the silicon atoms are replaced with arsenic atoms.

The effect of the doping on the crystal is to

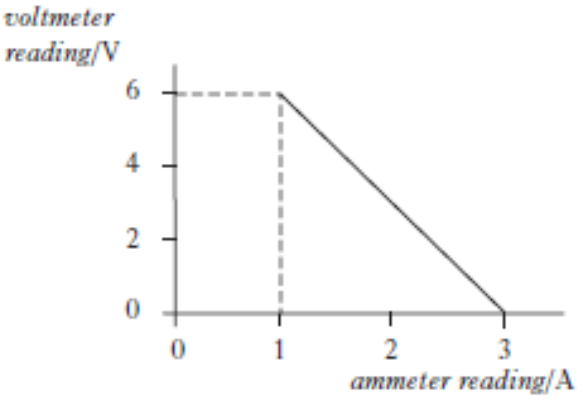
A make it into a photodiode
B make it into an insulator
C increase its resistance
D decrease its resistance
E allow it to conduct in only one direction.

5. A circuit is set up as shown.



The variable resistor R is adjusted and a series of readings taken from the voltmeter and ammeter.

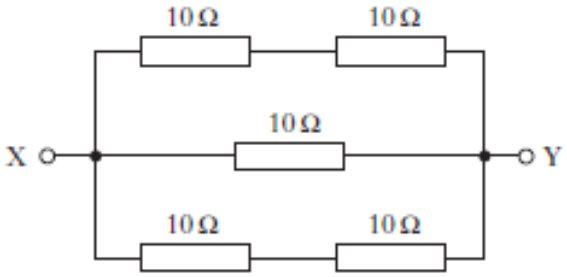
The graph shows how the voltmeter reading varies with the ammeter reading.



Which row in the table shows the values for the e.m.f. and internal resistance of the battery in the circuit?

	e.m.f./V	*internal resistance/Ω*
A	6	2
B	6	3
C	9	2
D	9	3
E	9	6

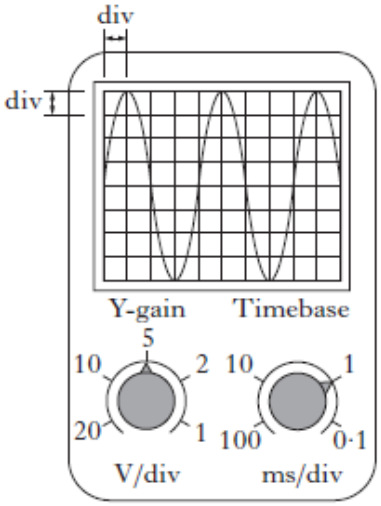
6. The diagram shows part of an electrical circuit.



What is the resistance between X and Y?

A 0·2 Ω
B 5 Ω
C 10 Ω
D 20 Ω
E 50 Ω

7. An alternating voltage is displayed on an oscilloscope screen. The Y-gain and the timebase settings are shown.



Which row in the table gives the values for the peak voltage and frequency of the signal?

	Peak voltage/V	*Frequency/Hz*
A	10	100
B	10	250
C	20	250
D	10	500
E	20	1000

8. The letters **X**, **Y** and **Z** represent missing words in the following passage.

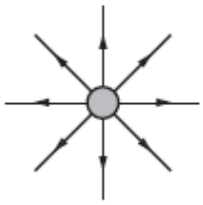
Solids can be categorised as conductors, semiconductors or insulators.

*In . . . **X** . . . the energy gap between the valence band and the conduction band is . . . **Y** . . . , allowing . . . **Z** . . . conduction to take place at room temperature.*

Which row in the table shows the missing words?

	X	Y	Z
A	conductors	large	no
B	semiconductors	small	no
C	conductors	large	some
D	semiconductors	small	some
E	insulators	small	no

9. The diagram represents the electric field around a single point charge.



A student makes the following statements about this diagram.

I The separation of the field lines indicates the strength of the field.

II The arrows on the field lines indicate the direction in which an electron would move if placed in the field.

III The point charge is positive.

Which of these statements is/are correct?

A I only

B II only

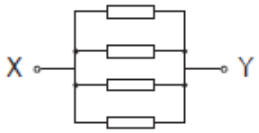
C I and III only

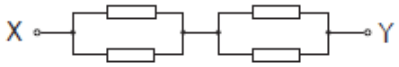
D II and III only

E I, II and III

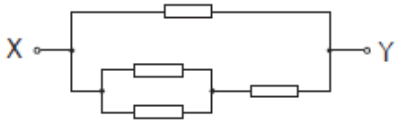
10. In the diagrams below, each resistor has the same resistance.

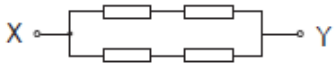
Which combination has the least value of the effective resistance between the terminals X and Y?

A 

B 

C 

D 

E 

11. A student makes the following statements about charges in electric fields.

I An electric field applied to a conductor causes the free electric charges in the conductor to move.

II When a charge is moved in an electric field work is done.

III An electric charge experiences a force in an electric field.

Which of these statements is/are correct?

A II only

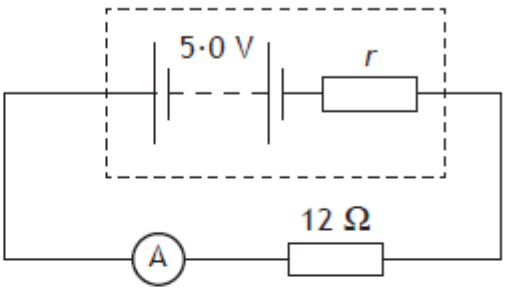
B III only

C I and II only

D II and III only

E I, II and III

12. A circuit is set up as shown.



The e.m.f. of the battery is 5·0 V.

The reading on the ammeter is 0·35 A.

The internal resistance r of the battery is

A 0·28 Ω

B 0·80 Ω

C 1·15 Ω

D 2·3 Ω

E 3·2 Ω.

13. The e.m.f. of a battery is

A the total energy supplied by the battery

B the voltage lost due to the internal resistance of the battery

C the total charge that passes through the battery

D the number of coulombs of charge passing through the battery per second

E the energy supplied to each coulomb of charge passing through the battery.

14. The r.m.s. voltage of the mains supply is 230 V.

The approximate value of the peak voltage is

A 115 V

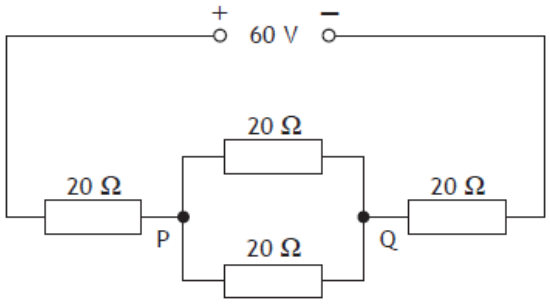
B 163 V

C 325 V

D 460 V

E 651 V.

15. Four resistors each of resistance 20 Ω are connected to a 60 V supply of negligible internal resistance as shown.



The potential difference across PQ is

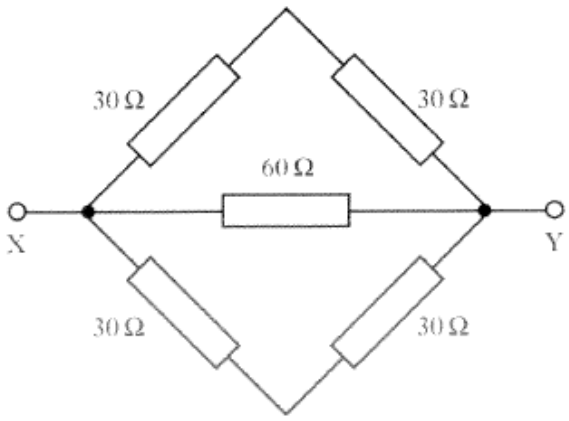
A 12 V
B 15 V
C 20 V
D 24 V
E 30 V.

16. Photons with a frequency of $4{\cdot}57 \times 10^{14}$ Hz are incident on a p-n junction in a solar cell.

The maximum potential difference these photons produce across this junction is

A 1·34 V
B 1·89 V
C 2·67 V
D 3·79 V
E 5·34 V.

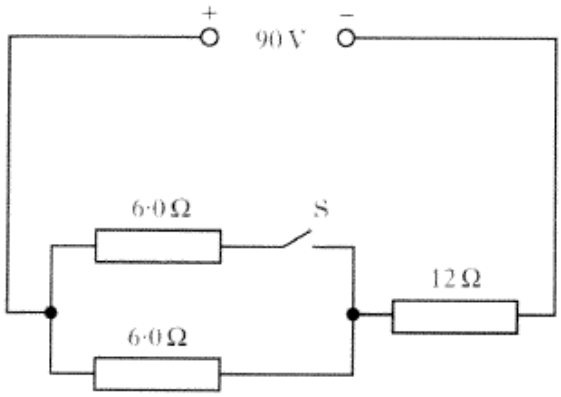
17. Five resistors are connected as shown.



The resistance between X and Y is

A 12 Ω
B 20 Ω
C 30 Ω
D 60 Ω
E 180 Ω.

18. A circuit is set up as shown.



The internal resistance of the supply is negligible.

Which row in the table shows the potential difference (p.d.) across the 12 Ω resistor when switch S is open and when S is closed?

	p.d. across 12 Ω resistor when S is open/V	*p.d. across 12 Ω resistor when S is closed/V*
A	30	18
B	45	45
C	60	45
D	60	72
E	72	60

19. The letters **X**, **Y** and **Z** represent missing words from the following passage.

Solids can be divided into 3 broad categories: conductors, insulators and semiconductors.

*In ..... **X** ..... the conduction band is not completely full and this allows electrons to move easily.*

*In ..... **Y** ..... the valence band is full.*

*In ..... **Z** ..... electrons can move from the valence to the conduction band at room temperature.*

Which row in the table shows the missing words?

	X	Y	Z
A	conductors	insulators	semiconductors
B	semiconductors	insulators	conductors
C	insulators	semiconductors	conductors
D	conductors	semiconductors	insulators
E	insulators	conductors	semiconductors

20. A student makes the following statements about p-n junction devices.

I In solar cells, a potential difference is produced when photons are incident on the junction.

II The photovoltaic effect occurs in solar cells.

III In LEDs, photons are emitted from the junction when a current is passed through it.

Which of these statements is/are correct?

A I only

B III only

C I and II only

D I and III only

E I, II and III

21. A ball is dropped several times from the same height.

A student records the following times for the ball to reach the ground.

1·15 s 1·13 s 1·09 s 1·13 s 1·05 s

Which row in the table shows the mean time for the ball to reach the ground and the approximate random uncertainty in this mean?

	Mean time/s	*Approximate random uncertainty/s*
A	1·11	0·02
B	1·11	0·10
C	1·13	0·02
D	1·13	0·10
E	4·71	0·94

Answers and Original Source of Question

Question Number	Answer	Source
1	B	Revised Higher 2013 Q17
2	E	Revised Higher 2013 Q18
3	D	Revised Higher 2013 Q19
4	D	Revised Higher 2013 Q20
5	D	Revised Higher 2012 Q17
6	B	Revised Higher 2012 Q18
7	C	Revised Higher 2012 Q19
8	D	Revised Higher 2012 Q20
9	C	CfE Higher Specimen Q13
10	A	CfE Higher Specimen Q14
11	E	CfE Higher Specimen Q15
12	D	CfE Higher Specimen Q16
13	E	CfE Higher Specimen Q17
14	C	CfE Higher Specimen Q18
15	A	CfE Higher Specimen Q19
16	B	CfE Higher Specimen Q20
17		Revised Higher 2014 Q16
18		Revised Higher 2014 Q17
19		Revised Higher 2014 Q18
20		Revised Higher 2014 Q19
21		Revised Higher 2014 Q20
22		