

Name..... Set..... Don.....



Winchester College Physics

3rd year Revision Test

Electrical Circuits

Common Time 2011

Mark multiple choice answers with
a cross (X) using the box below.

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D

Answer all the questions.
Total 44 marks.

Allow 40 minutes.

Remember to show your working
where applicable.
Calculators are allowed.

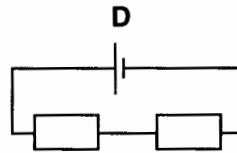
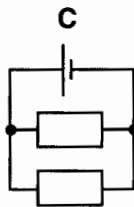
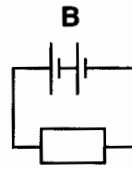
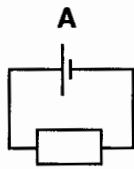
1 The table shows the voltage and current ratings for four light bulbs.

Which bulb has the greatest resistance when used normally?

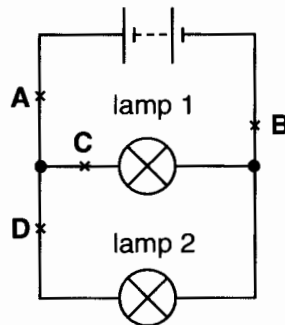
	voltage / V	current / A
A	2	0.5
B	3	0.2
C	6	12
D	12	1.0

2 In the following circuits, the resistors have the same value and the cells are identical.

Which circuit has the smallest resistance?

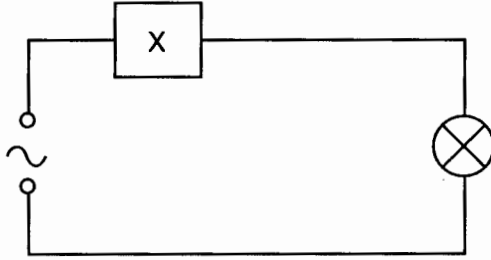


3 The diagram shows a circuit, with four possible positions to place a switch.



At which labelled point should a switch be placed so that lamp 1 remains on all the time and lamp 2 can be switched on and off?

- 4 The device X in this circuit is designed to cut off the electricity supply automatically if too much current flows.

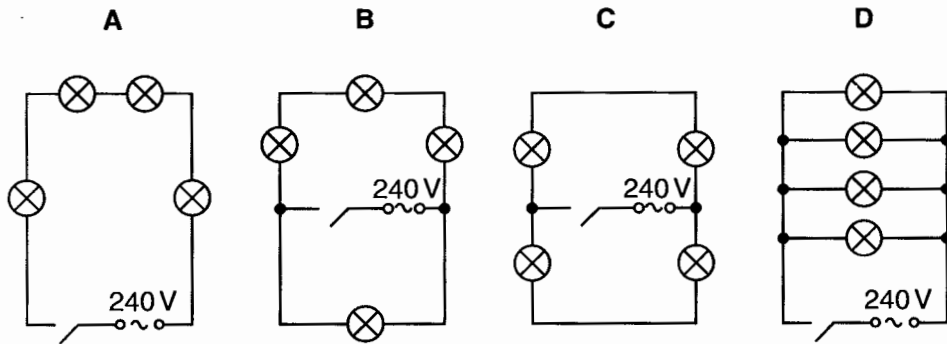


What is device X?

- A a fuse
- B a relay
- C a resistor
- D an ammeter

- 5 A classroom has four lights, each fitted with a lamp marked 240 V, 100 W.

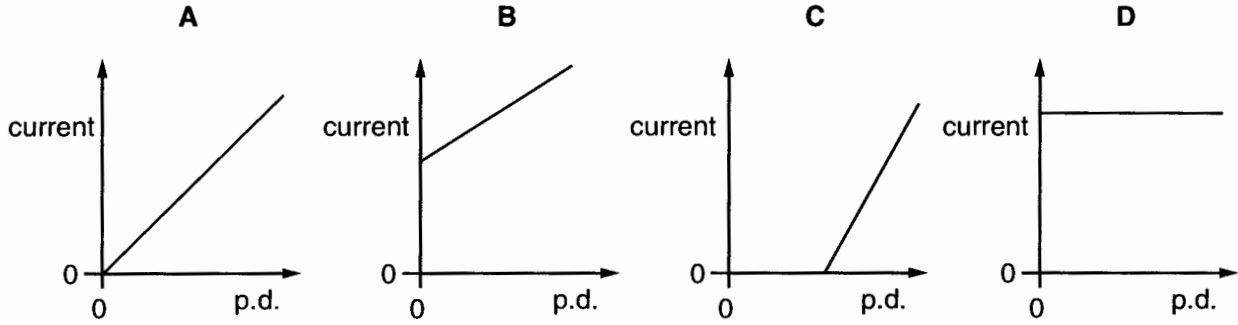
Which circuit is most suitable for the classroom?



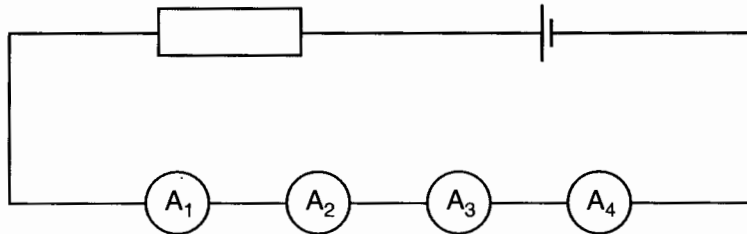
6 When the potential difference (p.d.) across a piece of resistance wire is changed, the current through the wire also changes.

The temperature of the wire is kept the same.

Which graph shows how the p.d. and current are related?



7 Two faulty ammeters and two perfect ammeters are connected in series in the circuit shown.



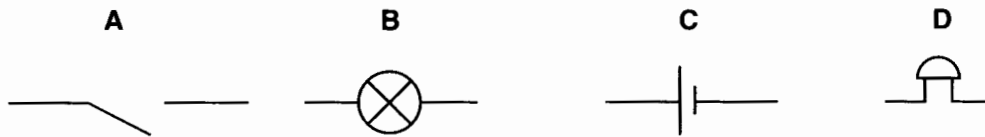
The readings on the ammeters are

- A₁ 2.9 A
- A₂ 3.1 A
- A₃ 3.1 A
- A₄ 3.3 A

Which two ammeters are faulty?

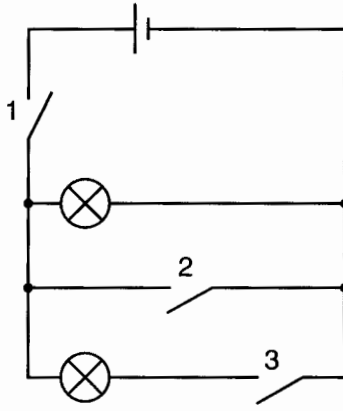
- A** A₁ and A₂ **B** A₁ and A₄ **C** A₂ and A₃ **D** A₃ and A₄

8 Which electrical component would **not** normally be found in a battery-operated torch (flashlight)?



4

9 A student connects two lamps in the circuit shown.

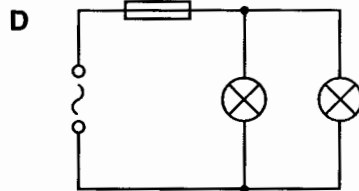
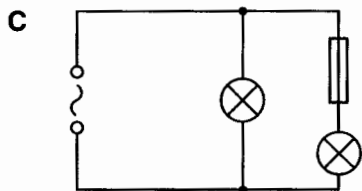
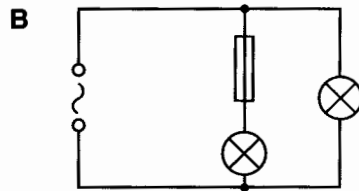
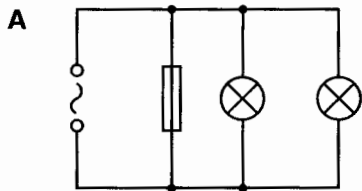


Which switches must he close to light both lamps?

- A 1 and 2
- B 1, 2 and 3
- C 1 and 3
- D 2 and 3

10 A student makes four circuits.

In which circuit are both lamps protected by the fuse?



11 Fig. 7.1 shows a 12 V battery connected to a number of resistors.

For
Examiner's
Use

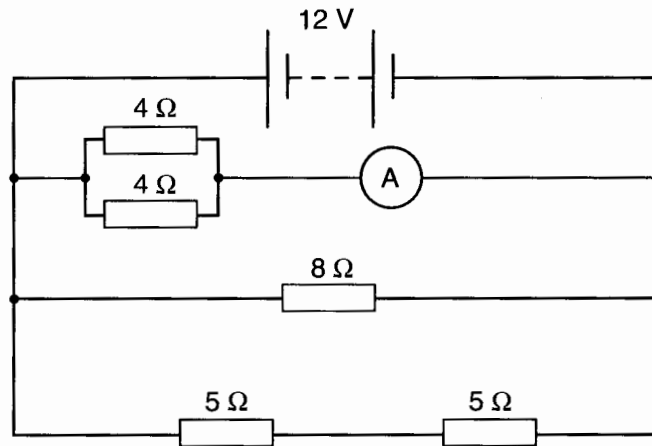


Fig. 7.1

(a) Calculate the current in the $8\ \Omega$ resistor.

current =[2]

(b) Calculate, for the resistors connected in the circuit, the combined resistance of

(i) the two $5\ \Omega$ resistors,

resistance =

(ii) the two $4\ \Omega$ resistors.

resistance =
[2]

(c) The total current in the two $4\ \Omega$ resistors is 6 A.
Calculate the total power dissipated in the two resistors.

power =[2]

b

(d) What will be the reading on a voltmeter connected across

(i) the two $4\ \Omega$ resistors,

reading =

(ii) one $5\ \Omega$ resistor?

reading =

[2]

(e) The $8\ \Omega$ resistor is made from a length of resistance wire of uniform cross-sectional area. State the effect on the resistance of the wire of using

(i) the same length of the same material with a greater cross-sectional area,

.....

(ii) a smaller length of the same material with the same cross-sectional area.

.....

[2]

For
Examiner's
Use

12 (a) Fig. 9.1 shows an a.c. supply connected to a resistor and a diode.

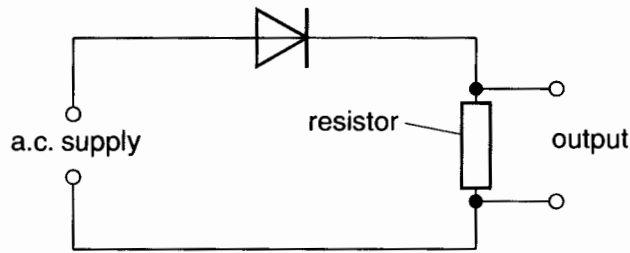


Fig. 9.1

(i) State the effect of fitting the diode in the circuit.

.....
 [1]

(ii) On Fig. 9.2, sketch graphs to show the variation of the a.c. supply voltage and the output voltage with time.

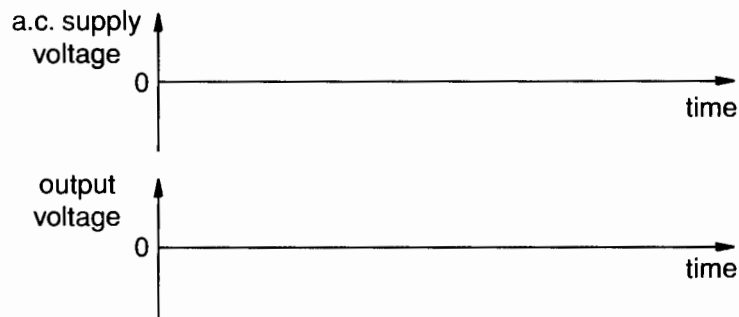


Fig. 9.2

[2]

(b) (i) In the space below, draw the symbol for a NOT gate.

[1]

(ii) State the action of a NOT gate.

.....

 [2]

- 13 (a) Fig. 10.1 shows the faces of two ammeters. One has an analogue display and the other a digital display.

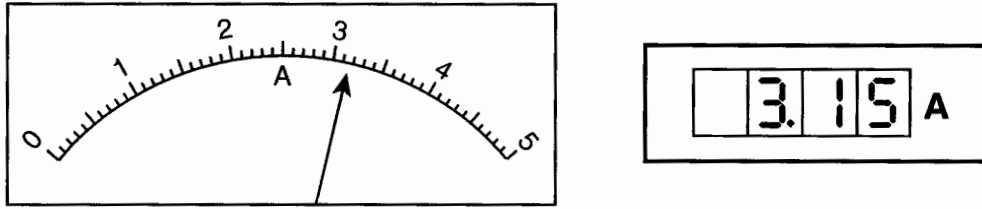


Fig. 10.1

State what is meant by the terms *analogue* and *digital*.

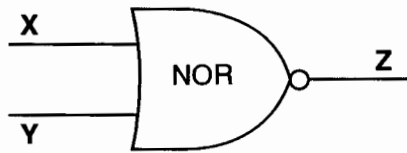
.....

.....

.....[2]

- 14 This question is about NOR gates.

- (a) Complete the truth table for a NOR gate.



input X	input Y	output Z
0	0	

[2]

15

(a) (i) What is the function of a transistor when placed in an electrical circuit?

.....

(ii) Describe the action of a transistor.

.....

.....

.....

[3]

(b) (i) In the space below, draw the symbol for an OR gate. Label the inputs and the output.

[1]

(ii) Describe the action of an OR gate that has two inputs.

.....

.....

.....

[2]

For
Examiner's
Use

16 Fig. 8.1 shows a battery with a resistor connected across its terminals. The e.m.f. of the battery is 6.0 V.

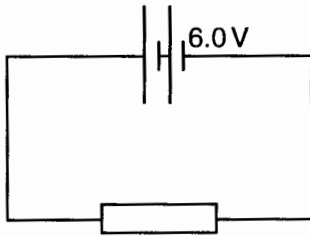


Fig. 8.1

The battery causes 90 C of charge to flow through the circuit in 45 s.

(a) Calculate

(i) the current in the circuit,

current =

(ii) the resistance of the circuit,

resistance =

(iii) the electrical energy transformed in the circuit in 45 s.

energy =

[6]

(b) Explain what is meant by the term *e.m.f. of the battery*.

.....

.....

..... [2]