



Melbourne High School Science

Year 10 Semester 1 2007



Worksheet Booklet

Name:

Class:

Teacher:

All course information can be obtained from the Science web site:

<http://resources.mhs.vic.edu.au/science/>

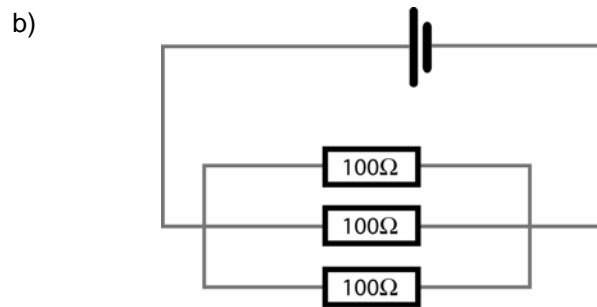
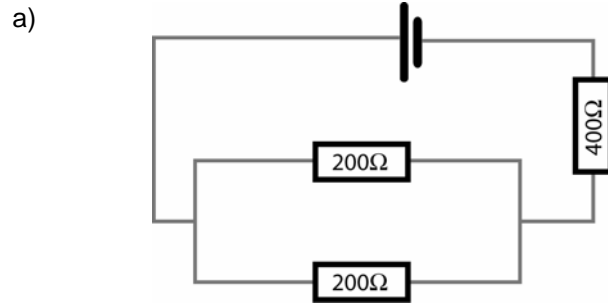
Electronics & Electromagnetism

1. Explain the difference between current and voltage.

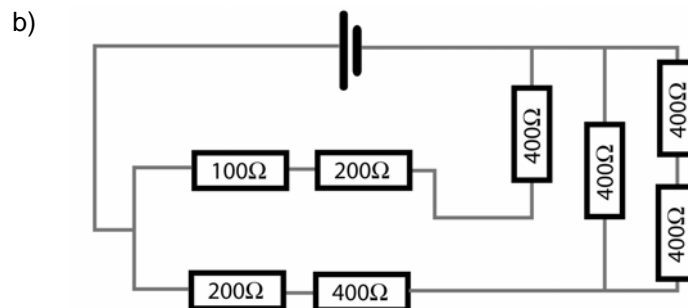
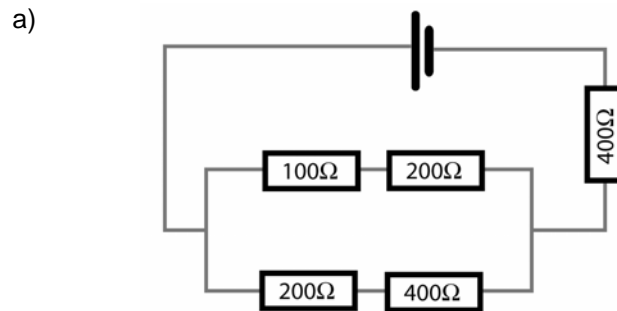
2. Draw the circuit symbols for:

- | | | |
|----------------------|--------------|---------------|
| a) cell | b) battery | c) voltmeter |
| d) diode | e) LED | f) resistor |
| g) variable resistor | h) capacitor | i) transistor |

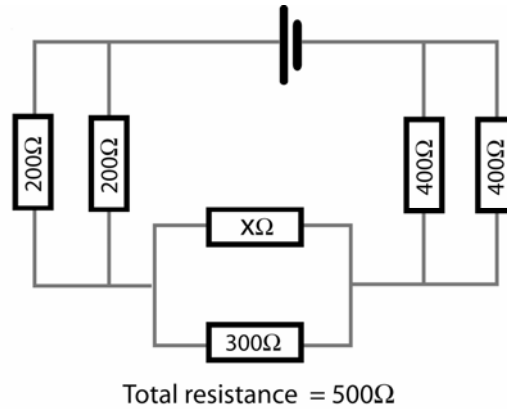
3. Calculate the resistance of the following circuits:



4. Calculate the resistance of the following circuits:



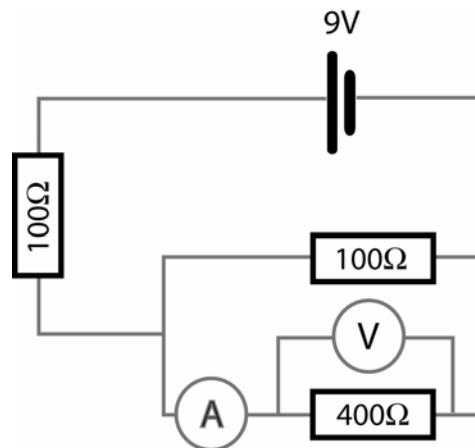
5. Explain the effect that adding resistors a) in series and b) in parallel has on the current flow through a circuit.
6. Find the resistance $X\Omega$ of the unknown resistor.



7. Draw a diagram to show how you could use exactly four separate 2Ω resistors to make an effective resistance of:

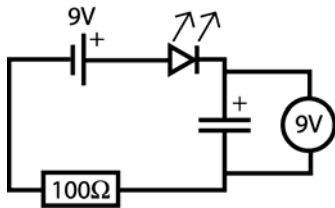
- | | |
|----------------|--------------|
| a) 0.5Ω | b) 8Ω |
| c) 5Ω | d) 2Ω |

8. Resistors are identified by using a series of coloured bands
 - a) Determine the resistance of a resistor that is colour-coded green black blue.
 - b) Determine the resistance of a resistor that is colour-coded red red black.
 - c) Determine the colour code of a $36\text{ k}\Omega$ resistor.
 - d) Determine the colour code of a $47\ \Omega$ resistor.
9. For the circuit shown below, calculate the readings on the ammeter (marked A) and the voltmeter (marked V).

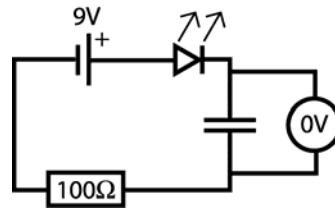


10. In which of the following circuits will the LED be glowing? Explain why the LED will **not** glow in the other three examples.

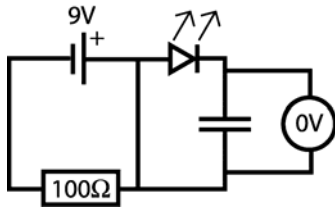
a)



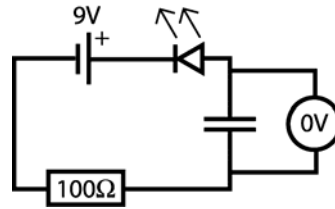
b)



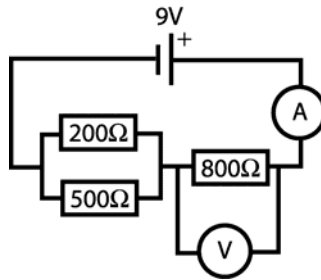
c)



d)

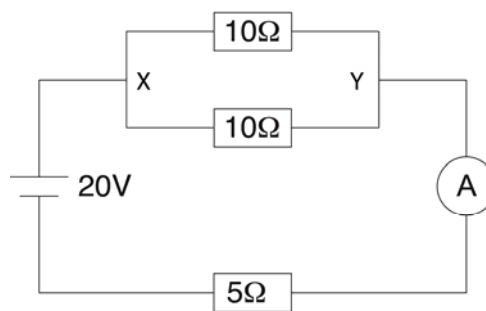


11. A circuit is constructed as is shown in the diagram below.



- Find the total resistance of the circuit
- Find the reading on the ammeter.
- Find the reading on the voltmeter.
- What fraction of the total current will pass through the 500Ω resistor?

12. For the circuit below, calculate:

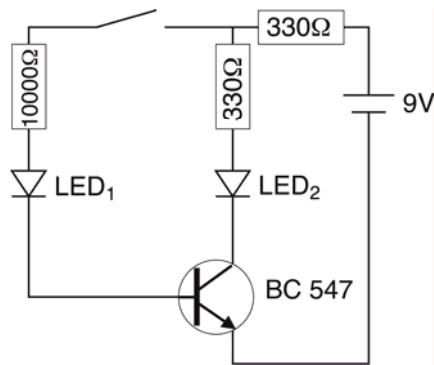


- the total resistance of the circuit.
- the current as measured by the ammeter.
- the voltage drop across the 5Ω resistor.
- the voltage drop between points X and point Y.

13. Explain the purpose and use of a capacitor.

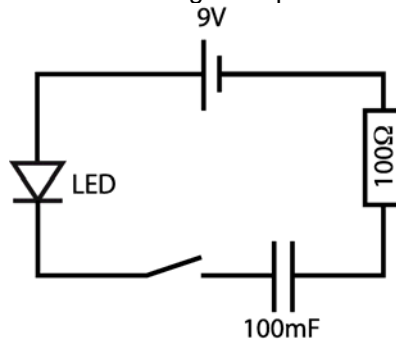
14. Explain the purpose and use of a transistor.

15. Considering the following electronic circuit.



- What type of component is a BC 547?
- Which LED will glow the brightest, when the switch is closed (on)?
- What will happen to LED 2 when the switch is opened (off)?
- In which direction do the ELECTRONS flow in the circuit? Clockwise or anticlockwise?

16. The circuit below shows a circuit used to charge a capacitor. The capacitor is initially uncharged.



- Describe what happens to the LED over time once the switch is closed to complete the circuit.
- How could you decrease the time that it takes for the capacitor to charge?
- How could you discharge the capacitor?

17. Explain how a speaker works.

18. Explain how a DC motor works.

Genetics

Questions

1. Compare *mitosis* and *meiosis* according to the following chart:

	MITOSIS	MEIOSIS
purpose of the process		
type of cells involved (location in the body)		
# of cells produced		
name and general # of chromosomes in the parent cells		
name and general # of chromosomes in the daughter cells		

2. Why can there be only two forms of a gene in any one cell?
3. How can you exhibit genetic characteristics that neither your mother nor father show?
4. Explain what is meant by each of the following types of inheritance and give an example:
a) dominant/recessive b) incomplete dominance c) co-dominance d) sex-linked
5. Stem length in peas is caused by a single gene with two alleles - T (tall) is dominant to t (short).
a) List all possible genotypes and their corresponding phenotypes for this characteristic.
b) Use a Punnet square to show the expected offspring from a cross involving a TT plant and a tt plant.
c) Use a Punnet square to show the expected offspring from a cross involving a Tt plant and a tt plant.
d) Use a Punnet square to show if it would be possible for a cross involving two tall plants to produce any short-stemmed offspring.
6. The dominant gene *G* causes grey body in flies, and the gene *g* causes black body. A cross produced 5664 grey bodied offspring only. Use a Punnet squares to show which of the following genotype combinations is most likely to have been the parents in the cross:
a) Gg X Gg.
b) Gg X gg.
c) GG X Gg.
7. In pea plants, the allele for green seeds (*G*) is dominant over the allele for yellow seeds (*g*).
a) List all possible genotypes and their corresponding phenotypes for the characteristic seed colour.
b) Using a Punnett Square, determine the phenotypic and genotypic ratios for the types of seeds that will be produced if:
i) homozygous green seed plants are crossed with homozygous yellow seed plants.
ii) heterozygous green seed plants are crossed among themselves.
8. In vinegar flies, red eye colour (*R*) is dominant over white eyes (*r*).
a) List all possible genotypes and their corresponding phenotypes for the characteristic eye colour.
b) Predict the colour of the eyes of the offspring from the following crosses:
i) homozygous red eyed and heterozygous red eyed flies.
ii) heterozygous red eyed and white eyed flies.
9. The ability to taste a bitter chemical called PTC is due to a dominant gene (*P*). Predict the ability to taste PTC among children of parents who are:
a) homozygous tasters (*PP*) and non-tasters.
b) both heterozygous tasters .
10. In snapdragons, red flower colour allele (*R*) and white flower colour allele (*R'*) combine to produce pink flowers (*RR'*).
a) What kind of inheritance is this? How do you know?

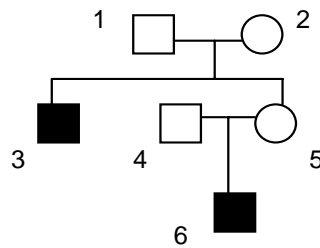
- b) Why do you have to use the kinds of letters shown?
- c) List all possible genotypes and their corresponding phenotypes for the characteristic flower colour.
- d) Determine the phenotype of the offspring from the following crosses:
 - i) red and pink
 - ii) both pink.

11. In shorthorn cattle, crossing red (RR) and white (WW) coloured cattle produces cattle in which both the red-coloured hairs and the white-coloured hairs are present. The colour of this type of cow is called roan (RW).

- a) What kind of inheritance is this?
- b) Why do you have to use the kinds of letters shown?
- c) Determine the phenotype of the offspring that would be produced if:
 - i) red cattle and white cattle are crossed.
 - ii) two roan cattle are crossed.

12. The condition shown in the pedigree below is haemophilia, in which the gene, *h*, is recessive and on the X-chromosome.

- a) What type of inheritance is this?
- b) Give the phenotype for each of the following genotypes :i) X_HX_h ii) X_HY iii) X_hX_h iv) X_hY v) X_HX_H
- c) Work out the possible phenotypes and genotypes for the people in the pedigree.



- 13. The gene for human blood groups has three alleles, *A*, *B* and *O*. Alleles *A* and *B* are co-dominant; allele *O* is recessive to both *A* and *B*. Two parents, one blood group *A* and the other blood group *B*, had one child who was blood group *O* and another child who was blood group *AB*. Using a Punnett square or pedigree, explain the genotype of the parents in this cross and the genotypes of the *O* and *AB* children.

Materials

Questions

1. Explain why it is that silver and gold can be found in nuggets, but sodium and magnesium can not.
2. Where on the periodic table would you find the most reactive metals?
3. Describe one method by which a metal can be extracted from its ore.
4. Explain what is meant by the term *alloy*. List five alloys and their uses.
5. Explain why the exhaust pipe on a car will corrode over time.
6. What conditions are necessary for iron to rust. Why can't rusting be reversed?
7. Describe (in a number of steps) the process of electroplating. What is electroplating used for?
8. What is meant by the term plastic?
9. Describe the relationship between a monomer and polymer.
10. The vinyl chloride acts as monomer in the formation of a polymer.
 - a) What is the name of the polymer formed?
 - b) Draw the structure of this polymer.
11. Describe the differences between a thermoplastic and a thermosetting plastic. What advantages does each type of plastic have?
12. Describe at least three processes by which plastic can be extruded and moulded.
13. How can plastics be recycled? Why must different plastics be separated for recycling?
14. Plastics have different properties. Describe how you could test these four different plastics for strength, density and flammability.

