



Year 10 Science

Semester One Examination - 2008

TIME ALLOWED
15 MINUTES READING
1 HOUR AND 15 MINUTES WRITING

Instructions to candidates:

- 1) Do not write or mark the examination script in any way during reading time.
- 2) Please check that, aside from this test booklet, you also have a double sided multiple-choice answer and data sheet.
- 3) There are 14 pages in this booklet including this one. Please check to ensure that this is so.
- 4) Note that the time allocated for the common test is 75 minutes and that 75 marks have been allocated: this should give you a guide as to how much time you should spend on each section.
- 5) There are 4 sections in this booklet: multiple choice, true/false, definitions and extended questions. Check the marks allocated to each section to work out how many minutes you should spend on each.
- 6) Only a scientific calculator may be used. Graphic calculators or dictionaries must not be used.**
- 7) If you finish early please do not waste your time: you only get examination time once so it should not be wasted. Check your work thoroughly: calculations, grammar and spelling. Re-read the questions and check your answers to ensure that you have actually answered the questions asked.
- 8) When the signal to write is given fill in your name, teacher and form details on this booklet (below) **and** on the multiple choice answer sheet before you begin answering any questions.

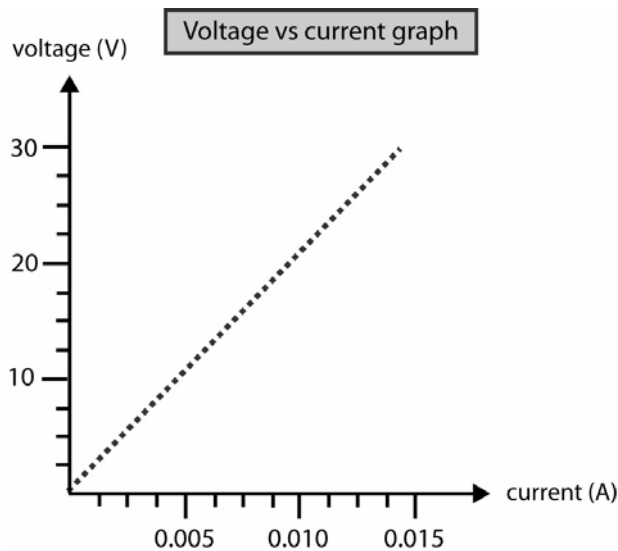
Name.....
Form.....
Teacher.....

Section 1: Multiple Choice

Write your selections on the answer sheet supplied. Please place the answer sheet in this booklet when you hand in this exam. This section is worth 25 marks.

- The measurement of electric current is best described as:
 - the measurement of how much energy passes through a point in a period of time.
 - the measurement of how much charge is stored in a battery.
 - the measurement of how much energy is carried by each amount of charge.
 - the measurement of how much charge passes through a point in a period of time.
- Which of the following statements about parallel components is UNTRUE?
 - Two parallel components will always have the same current passing through them.
 - Two parallel components will always have the same voltage across them.
 - Two parallel components will always have a combined resistance lower than either individually.
 - Power points in a house are all connected in parallel.

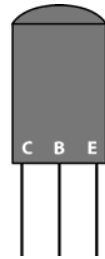
The graph below shows the relationship between voltage and current measured across a resistor.



- The resistance of this resistor is:
 - 0.005Ω .
 - 0.5Ω .
 - 200Ω .
 - 2000Ω .
- A coil of copper wire in which a magnet moves:
 - is known as an electromagnet.
 - generates an electric current.
 - is known as a solenoid.
 - can act as a capacitor.
- A 40Ω resistor in parallel with another 40Ω resistor would have a combined resistance of:
 - 80Ω .
 - 40Ω .
 - 20Ω .
 - 0.05Ω .

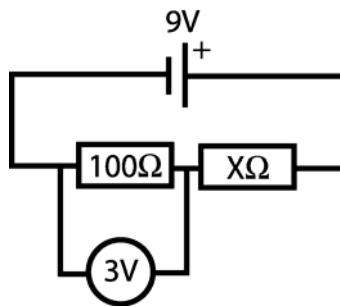
6. The letters E, B and C on a transistor represent:

- | | | |
|------------------|------|-------------|
| a) electron flow | base | capacitance |
| b) electron flow | base | conductor |
| c) emitter | base | conductor |
| d) emitter | base | collector |



The following 2 questions refer to the circuit below.

7. In the circuit drawn below, the value of the second resistor ($X\Omega$) is:



- a) 50Ω .
 b) 100Ω .
 c) 200Ω .
 d) 6Ω .
8. The current flowing through the second resistor ($X\Omega$) is
 a) less than that flowing through the 100Ω resistor.
 b) equal to that flowing through the 100Ω resistor
 c) greater than that flowing through the 100Ω resistor
 d) not able to be determined because the value of x is unknown
9. A pea plant described as TT and another pea plant described as Tt must have the same:
 a) phenotype.
 b) alleles.
 c) parents.
 d) genotype.
10. The haploid number of chromosomes in humans is:
 a) 23.
 b) 32.
 c) 42.
 d) 46.
11. If a sperm carrying an X chromosome fertilized an egg, the resulting individual would have which chromosome pair and sex combination?
 a) XX-female
 b) XY-female
 c) XY-male
 d) XX-male

12. Haemophilia is caused by a sex-linked, recessive gene. Which of the following statements are true of a woman who carries the haemophilia gene?
- There is a 50% chance that each of her sons will have the trait.
 - There is a 50% chance that each of her daughters will have the trait.
 - All of her children will be carriers.
 - 50% of her sons will be carriers.
13. In humans, brown eyes are dominant over blue eyes. If a brown-eyed man, whose mother had blue eyes, marries a blue-eyed woman, what is the probability of them having children with blue eyes?
- 25%
 - 50%
 - 75%
 - 100%
14. Genes are made up of patterns of nucleotides. The correct matching strand for ATTCGACTG is:
- ATTCGACTG.
 - UAACGUCAG.
 - TAAGCTGAC.
 - GCCATGACT.
15. A mother with blood type O and a father of blood type AB can have children with blood type:
- A or B.
 - O or B.
 - AB or B.
 - AB or O.
16. Dominant characteristics are so named because they:
- are pure breeding.
 - mask the effects of an alternative allele that is also present.
 - are more desirable than recessive genes.
 - occur more often than recessive genes.
17. Meiosis is a type of cell division that results in:
- 2 haploid cells.
 - 2 diploid cells.
 - 4 haploid cells.
 - 4 diploid cells.
18. Sometimes additions, deletions or alterations occur spontaneously in a gene. Such spontaneous changes are known as:
- alleles.
 - amino acids.
 - mutations.
 - evolution.
19. Which of the following statements is incorrect for the metallic bonding model?
- Valence electrons are free to move.
 - Metal atoms exist in a 3D lattice.
 - Electrostatic forces of attraction exist between positively and negatively charged particles.
 - Electrons are lost from the outer shell of each metal atom.

20. The rusting of an iron horseshoe over a period of time is due to:
- a reaction between the iron and oxygen in the air.
 - a reaction between the iron and water vapour in the air.
 - a series of reactions between the iron, oxygen and water.
 - a reaction between the iron and salt.
21. Which of the following does NOT decrease the rate of rusting of iron?
- The use of a sacrificial anode.
 - Contact with salt water.
 - The application of an electric current.
 - A reduction in temperature.
22. In which part of the Periodic Table are the most reactive metals found?
- Towards the top of Group VII.
 - Towards the top of Group I.
 - Towards the bottom of Group I.
 - In the middle of the transition elements.
23. Magnesium reacts with oxygen to produce the compound magnesium oxide, as described by the reaction below.
- $$2Mg(s) + O_2(g) \rightarrow 2MgO(s)$$
- Which of the following statements best describes this reaction?
- Magnesium is being oxidised and oxygen is being reduced.
 - Oxygen is being oxidised and magnesium is being reduced.
 - Magnesium is being oxidised, as it is gaining electrons.
 - Oxygen is being reduced, as it is losing electrons.
24. Anodising is a process that:
- protects metals.
 - purifies metals.
 - extracts metals.
 - corrodes metals.
25. As the chain length of polymers increases, the polymer tends to:
- be less flexible.
 - melt at higher temperatures.
 - become less dense.
 - become more soluble in water.

Section 2: True and False

Indicate whether the following statements are true or false by placing 'T' for true or 'F' for false in the boxes following each statement. This section is worth 5 marks.

1. An LDR's resistance increases with decreasing light intensity.
2. Transistors can be used to amplify current.
3. The chromosomes in an ovum determine the sex of the child.
4. An individual with 2 recessive alleles for a particular trait is said to be homozygous for that trait.
5. Roasting is required to extract metals high in the electrochemical series.

Section 3: Definitions

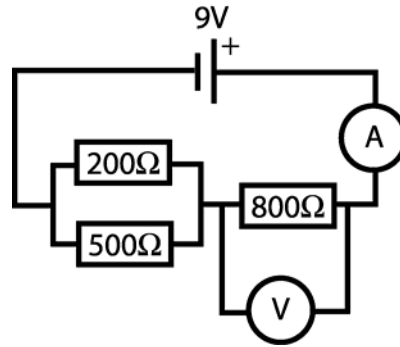
Part A. Give a term to fit each of the following definitions. This section is worth 2 marks.

1. The field created when a current flows through a wire.
2. The descriptive name given to the shape of the DNA molecule.
3. The physical description of a trait.
4. A group of atoms which when bonded together produce a polymer.

Part B. Give a clear definition of each of the following terms together with an example, which illustrates the meaning of the term. This section is worth 3 marks.

1. AC electricity
2. Amino acid
3. Alloy

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



a) Show with appropriate working out the total resistance of the circuit.

 Ω

b) Find the reading on the ammeter.

 A

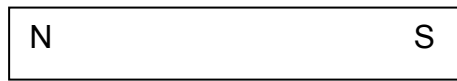
c) Find the reading on the voltmeter.

 V

d) What fraction of the total current will pass through the 500Ω resistor?

(2 + 1 + 1 + 1 = 5 marks)

3. a) Show the magnetic field that exists around a typical bar magnet shown below.



- b) Explain what is meant by the “right hand grip rule” in relation to electromagnetism.

(1 + 2 = 3 marks)

4. The following table shows the colour coding for resistors.

Colour	Value	Colour	Value
black	0	green	5
brown	1	blue	6
red	2	purple	7
orange	3	grey	8
yellow	4	white	9
gold	5%	silver	10%

- a) Determine the colour code on a 3500Ω resistor.

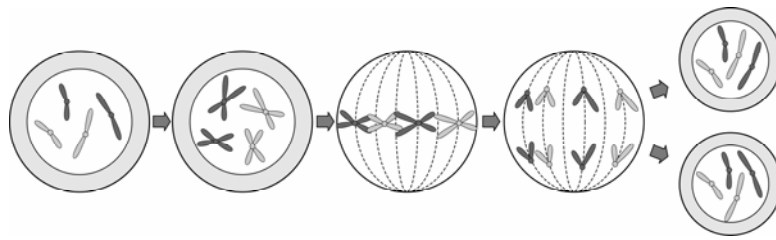
- b) Determine the value of a resistor with the colour code **white, green red**.

 Ω

- c) What resistance range would be expected from two 3500Ω resistors in series if they each had a gold band?

(0.5 + 0.5 + 1 = 2 marks)

5. The diagrams below show the stages occurring during a cell division.



a) Is the cell division shown mitosis or meiosis?.....

b) Explain your answer for part a

c) Suggest one type of cell that might undergo the type of cell division shown above.

.....

(0.5 + 2 + 0.5 = 3 marks)

6. Read the following article that appeared in "The Age" on 28 / 4 / 98, to help you answer the questions.

STONE THE CROWS, THE BLACK MAGPIE?

GEOFF STRONG
ENVIRONMENT REPORTER

Collingwood supporters take note! While basking in your team's 20-point drubbing of Essendon at the weekend, you are probably unaware a sacred symbol is under threat.

The magpie that gives Collingwood its colors and its nickname is gradually interbreeding with a northern magpie.

The club's symbol is *Gymnorhina tibicen hypoleuca*, or the white-backed magpie, common to southern Victoria, Tasmania and most of South Australia.

North of Melbourne, to the top end of Australia is the territory of *Gymnorhina tibicen tibicen*, the black-backed bird.

In the zones where the two meet, hybrids ranging from almost fully black to almost fully white-backed are developing. Science does not yet understand why, but this is what is starting to happen in Melbourne, a region that was once exclusively white-back territory. Here the magpie's back is becoming blacker.

Dr Jane Hughes, head of the school of environmental studies at Brisbane's Griffith University, is studying the phenomenon.

"I think the black-back genes are definitely moving south. We don't really know why, but it could be due to human habitation, land clearing and changes to land use," she said. "Looking at their DNA, both white and black-backed magpies are identical, but it seems that the white-back is a recessive gene, a bit like blue eyes and blond hair in humans."

Collingwood's chief executive, Mr John May, said the club might have to fund a special breeding program to keep the birds pure.

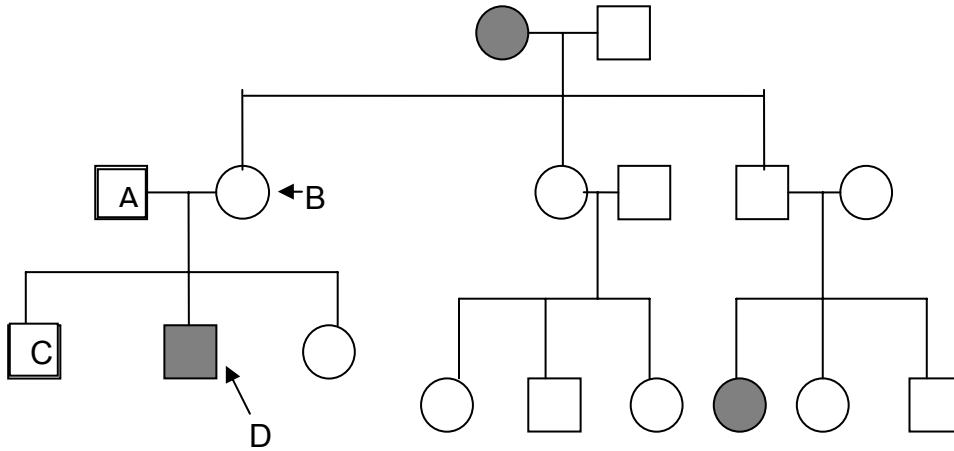
- a) Using magpies as an example, explain what it means for an allele to be recessive.

- b) Using punnet squares show the possible outcomes of a cross between a white – back magpie and a homozygous black – back magpie. Describe the phenotype of every possible offspring.

- c) Explain the likelihood of Collingwood's symbol eventually becoming extinct through interbreeding. Include punnet squares in your answer.

(1 + 2 + 2 = 5 marks)

7. The pedigree chart below represents the inheritance of a particular genetic disorder, Cruchkeld's disease, which exists in a remote area of central Europe. This disease is characterised by a strong aversion to light and a strange elongation of the upper canine teeth.* Those with the disorder are shaded.



* note: there is no such disease – it was made up for the purposes of this question!

- a) What was the gender of the first person to exhibit this disorder?
- b) Is this disorder likely to be caused by a dominant or recessive gene? Explain your reasoning.

- c) Using appropriate symbols, suggest possible genotypes and whether they are heterozygous or homozygous for the individuals listed below:

Individual	Possible genotype(s)	Heterozygous, Homozygous or can't tell
A		
B		
C		
D		

(0.5 + 1.5 + 2 = 4 marks)

8. Polypropene is a very useful polymer with a range of uses including being moulded into mixing bowls, picnic ware, ice cream containers and moulded chairs. This polymer can be recycled into a number of different products including the production of "polarfleece" type garments which keep the wearer warm in cold windy conditions.

List two properties that make polypropene suitable and explain each of these properties in terms of the bonding within and between polypropene molecules

Property	Explanation for property

(2 x 2 = 4 marks)

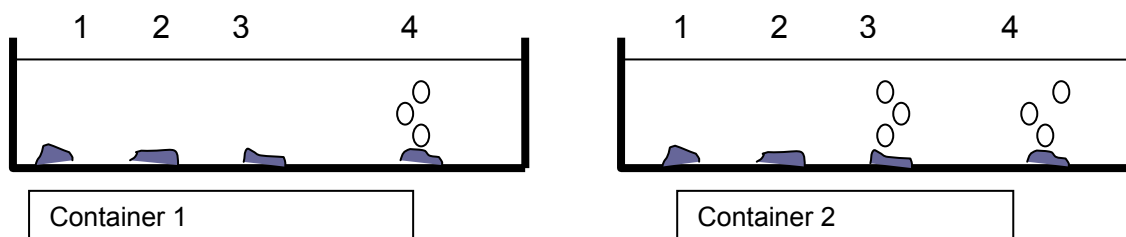
9. Copper is a very useful element for wiring up electrical systems.

- a) List two properties that make copper suitable and explain each of these properties in terms of the structure of copper

Property	Explanation for property

(2 + 2 = 4 marks)

10. Harry missed the prac class identifying the reactivity of metals, however he was able to observe the set up in the fume hood. Below is a diagrammatic representation of what he saw:



Harry knows that the following metals were being tested: calcium, aluminium, copper and magnesium. He also notes that metal 2 has a different coloured lustre to the other metals.

a) Suggest the possible liquid or solution found in:

Container 1	
Container 2	

b) Suggest the identity of each metal labelled 1 to 4 and give an explanation for your decision.

Metal number	Name of metal	Reason(s) for your decision
1	
2	
3	
4	

(1+2 + 2 = 5 marks)

Answers

Section 1.

- 1 D 2 A 3 D 4 B 5 C 6 D 7 C 8 B
 9 A 10 A 11 A 12 A 13 B 14 C 15 A 16 B
 17 C 18 C 19 B 20 C 21 B 22 C 23 A 24 A
 25 or
 A
 B

Section 2.

1	2	3	4	5
T	T	F	T	F

Section 3. part A

1. magnetic force (magnetism) 2. double helix 3. phenotype 4. monomer

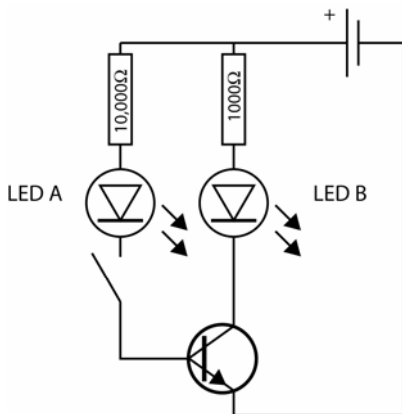
Section 3. part B (0.5 marks def + 0.5 marks eg)

- alternating current eg when a magnet moves in and out of a solenoid an alternating current is produced
- the building blocks of proteins coded for by 3 bases eg CCG codes for an amino acid
- a metal combined with another element usually another metal. eg bronze is copper and zinc

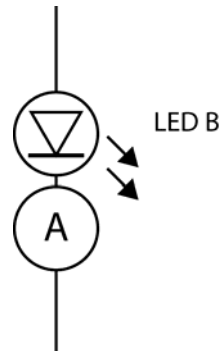
Section 4.

1.

a)



b) Ammeter must be in series to measure current.



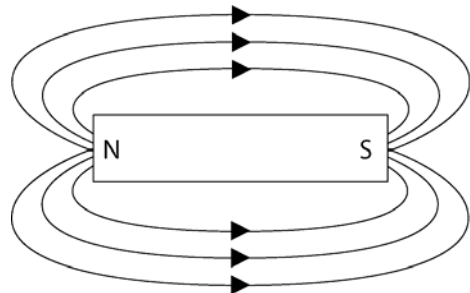
(3 + 2 = 5 marks)

- $R_{tot} = R_{para} + 800\Omega$ $1/R_{para} = 1/200 + 1/500 = 7/1000 \therefore R_{para} = 1000/7 = 143\Omega$
 $R_{tot} = 143 + 800 = 943\Omega$
 - $I = V \div R = 9 \div 943 = 0.00954A$
 - $V = IR = 0.00954 \times 800 = 7.63V$
 - 2/7ths

(2+1+1+1 = 5 marks)

- See picture.
 - The right hand grip rule indicates the flow of current in relation to the direction of a magnetic field. The direction of the thumb in a clenched fist indicates direction of current. The direction of the fingers indicates direction of magnetic field

(1 + 2 = 3 marks)



(0.5 + 0.5 + 1 = 2 marks)

- Orange green red
 - 9500Ω
 - 6650Ω - 7350Ω
- a) mitosis

- b) The 2 daughter cells produced have the same (diploid) number of chromosomes as the parent cell.
 c) Just about any cell except for gametes is acceptable ie muscle, skin etc (0.5 + 2 + 0.5 = 3 marks)

6. a) the white-back allele is recessive because the white back trait is masked by the dominant black-back allele.

b) 100% probability of heterozygous black-back magpie

c) as long as the white back allele exists in both parents, there is the likelihood of white-back magpies existing

(1 + 2 + 2 = 5 marks)

	b	b
B	Bb	Bb
B	Bb	Bb

	B	b
B	BB	Bb
b	Bb	bb

1. a) female

b) Recessive as the phenotype is only present if the person is h

Individual	Possible genotype(s)	Heterozygous, Homozygous or can't tell
A	aA	hetero
B	aA	hetero
C	aA or AA	can't tell
D	aa	homo

(2+1+1=4marks)

Property	Explanation for property
thermoplastic	As the polymer can be recycled ie melted and spun into fibres, it must have weak forces of attraction between chains. No cross linking
Thermal insulator	covalently bonded polymer chains therefore no free moving charged particles to transmit energy

Other answers possible ie water resistant ∴ nonpolar organic molecules etc (2 x 2 = 4 marks)

Property	Explanation for property
Electrical conductivity	delocalised sea of electrons able to move therefore producing a current
Ductile (or malleable)	delocalised sea of electrons able to move therefore they still surround the positive ions so electrostatic forces of attraction maintained

(2 + 2 = 4 marks)

Container 1	water
Container 2	acid (acetic, hydrochloric etc)

Metal number	Name of metal	Reason(s) for your decision
1	aluminium	non reactive in acid or water, same colour lustre as 3 and 4
2	copper	non reactive in acid or water, different colour lustre to other metals.
3	magnesium	non reactive in water but reacts in acid
4	calcium	reacts in both water and acid

(1+2 + 2 = 5 marks)