



# Year 9 Science

## Semester Two Examination - 2008

**TIME ALLOWED**  
**15 MINUTES READING**  
**1 HOUR AND 15 MINUTES WRITING**

**Instructions to candidates:**

- 1) Do not write or mark the examination booklet in any way during reading time.
- 2) Please check that, aside from this test booklet, you also have a multiple choice answer sheet and data sheet.
- 3) There are 12 pages in this booklet including this one. Please check to ensure that this is so.
- 4) Note that the time allocated for the examination 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.
- 6) **Graphic calculators with the memory cleared may be used. 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, form and teacher details on this booklet (below) **and** on the multiple choice answer sheet before you begin answering any questions.

Name.....

Form.....

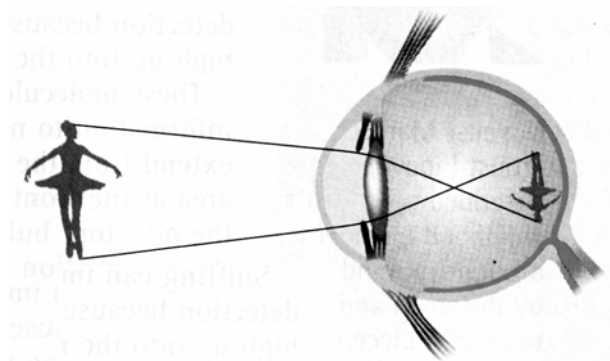
Science Teacher.....

### 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.

1. Perspex has a higher refractive index than air. Light entering air from Perspex will:
  - a) slow down slightly and be bent towards the normal.
  - b) slow down slightly and be bent away from the normal.
  - c) speed up slightly and be bent towards the normal.
  - d) speed up slightly and be bent away from the normal.
  
2. A light ray strikes a glass surface at a small angle and passes through the glass. The ray emerging from the glass into the air will be:
  - a) parallel to the ray entering the glass.
  - b) in the same straight line as the ray entering the glass.
  - c) bent towards the normal as it exits the glass.
  - d) at right angles to the ray entering the glass.
  
3. The image produced by a plane mirror may be best described as:
  - a) virtual and upright.
  - b) real and upright.
  - c) virtual and inverted.
  - d) real and laterally inverted.
  
4. The image produced on a screen by a slide projector is:
  - a) virtual, upright and enlarged.
  - b) virtual, inverted and diminished.
  - c) real, upright and enlarged.
  - d) real, inverted and enlarged.
  
5. The headlights of a car have:
  - a) concave lens to focus the light to a point.
  - b) concave mirror to reflect the light in parallel lines.
  - c) convex lens to disperse the light in all directions.
  - d) convex mirror to reflect the light in all directions.
  
6. Which of the following colours of light is most strongly refracted?
  - a) red
  - b) yellow
  - c) green
  - d) violet

The diagram below shows short-sightedness; a vision defect where the formation of an image occurs in front of the retina.



7. To restore proper vision, a person with such a condition would be prescribed:
- converging corrective lenses.
  - diverging corrective lenses.
  - bifocal lenses.
  - polaroid lenses.
8. What colour is transmitted when cyan light is shone on a green filter?
- cyan
  - blue
  - green
  - red
9. Which of the following involves a chemical change?
- A piece of chocolate becomes soft when warmed.
  - Dry ice (solid  $\text{CO}_2$ ) is warmed to form gaseous  $\text{CO}_2$ .
  - Fireflies glow in the dark.
  - Water boils to become steam.
10. Given that the symbol for chromium is Cr, and the formula for the sulfate ion is  $\text{SO}_4^{2-}$ , the formula for chromium(III) sulfate is:
- $\text{CrSO}_4$ .
  - $\text{Cr}_3(\text{SO}_4)_2$ .
  - $\text{Cr}_2(\text{SO}_4)_3$ .
  - $\text{Cr}_2\text{SO}_4$ .
11. The number of electrons involved in a double covalent bond between two oxygen atoms is:
- 2.
  - 4.
  - 6.
  - 12.
12. During an endothermic reaction:
- energy is released to the surroundings.
  - the reaction vessel becomes warm.
  - the products of the reaction have lower energy than the reactants.
  - heat must be supplied for the reaction to occur.

13. Molecular substances generally will melt before burning or charring. This is due to:
- the covalent bonds between the molecules are weak.
  - the covalent bonds within the molecules are weak and are easily broken.
  - the intermolecular forces being weaker than the intramolecular forces.
  - the charges on the molecules are small and do not exert much attraction.
14. Covalent bonding involves:
- swapping of electrons.
  - sharing of electrons.
  - donation and acceptance of electrons.
  - splitting of electrons.
15. Metals can be easily drawn out into wires. This property is known as ductile. Metals are ductile because:
- the loosely attracted molecules move when the metal is bent.
  - the tightly attracted molecules move when the metal is bent.
  - the free electrons move with the lattice of positive ions when the metal is stretched.
  - the positive and negative ions move when the metal is stretched.
16. Ionic compounds dissolved in water conduct electricity but solid ionic compounds do not. The reason for this is:
- electrons are free to move in the solution but not in the solid.
  - protons are released and are free to move in the solution but not in the solid.
  - ions are free to move.
  - atoms are free to move.
17. Myelin is a:
- muscle that surrounds the axon.
  - muscle that surrounds the dendrites.
  - fatty substance that surrounds the axon.
  - fatty substance that surrounds the dendrites.
18. When the level of carbon dioxide in your blood falls, the usual response of your body is to:
- decrease breathing rate.
  - increase breathing rate.
  - produce the hormone oestrogen.
  - produce the hormone insulin.
19. Which of the following statements is incorrect? Neurotransmitters:
- are chemical substances that carry impulses across gaps called synapses.
  - exist in many forms including acetylcholine, noradrenaline and dopamine.
  - are electrical impulses that are passed to the neurones.
  - are broken down by enzymes once they have passed on an impulse to the next neurone.
20. Which of the following is not a reflex action?
- blinking
  - sneezing
  - eating
  - coughing
21. In humans, the endocrine system:
- is responsible for reflex actions in response to stimuli.
  - depends entirely on communication between the adrenal gland and the hypothalamus.
  - is made up of functioning hormone producing glands such as the thyroid, adrenals and pancreas.
  - is responsible for detecting external stimuli.

22. The brain is a very important part of the body's vital functions. Which of the following statements is correct?
- a) The right side of the body is controlled by the right side of the brain.
  - b) The left side of the body is controlled by the right side of the brain.
  - c) The left side of the body is controlled by the left side of the brain.
  - d) Both sides of the body are controlled by both sides of the brain.
23. Certain functions of the body happen without conscious thought, such as breathing. The part of the brain that controls these functions is the:
- a) cerebellum.
  - b) brain stem.
  - c) cerebrum
  - d) spinal cord.
24. The speed at which nerve impulses travel in humans is closest to:
- a) 100 mm/s.
  - b) 100 m/s.
  - c) 100 km/s.
  - d)  $3 \times 10^8$  m/s.
25. Some effects of exercise on the human body are:
- a) lowered blood sugar level, increased temperature, and sweating.
  - b) lowered blood sugar level, decreased respiration rate, and sweating.
  - c) raised blood sugar level, increased temperature, and sweating.
  - d) raised blood sugar level, increased respiration rate, and sweating.

**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. Only real images can be projected onto a screen for viewing.
2. Red light has a greater wavelength than violet light.
3. Magnesium oxide can be found as molecules.
4. Messages are passed between neurones by neurotransmitters.
5. The hormone adrenaline is primarily responsible for sleep.


**Section 3: Definitions**

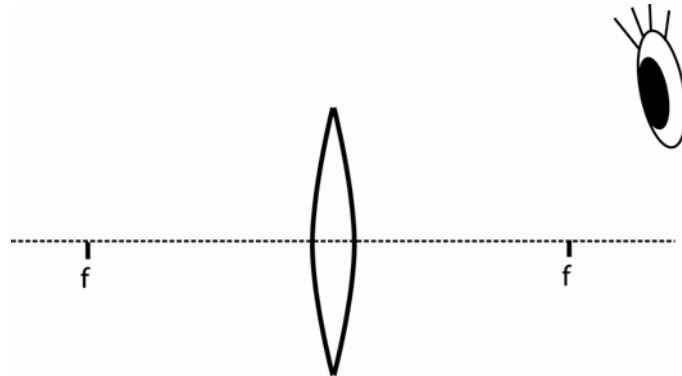
Give a term to fit each of the following definitions. This section is worth 5 marks.

1. The type of mirror that can be used to give an upright, magnified image.
2. An ionic solid, such as calcium carbonate, that does not break up in water.
3. The attraction between cations and their delocalised electrons.
4. The minimum intensity that causes a response for that stimulus
5. The steady state of the internal environment of an organism.


**Section 4: Extended Questions**

Give detailed answers to each question in the spaces provided. Answers that do not show all required mathematical working will not obtain full marks. This section is worth 40 marks.

1. A magnifying glass uses a single lens to produce an upright, magnified image.
  - a) A student is using a magnifying lens and wishes to obtain a magnified image. On the diagram below, mark the position (with an X) of the object in order to obtain the **largest possible upright image**.



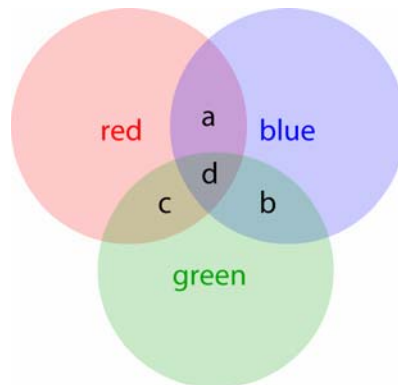
- b) The images formed by the magnifying glass in its normal operation are
 

real	virtual
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- c) The lens used would be described as
 

converging	diverging
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(2 + 1 + 1 = 4 marks)

2. Three coloured lights are shone overlapping onto a white wall, as shown in the diagram.



List the colours seen in the overlapping positions:

a)	b)
c)	d)

(4 x 1 = 4 marks)

3. Explain, with the assistance of a diagram, why a red shirt looks red and how it appears when viewed under cyan light.

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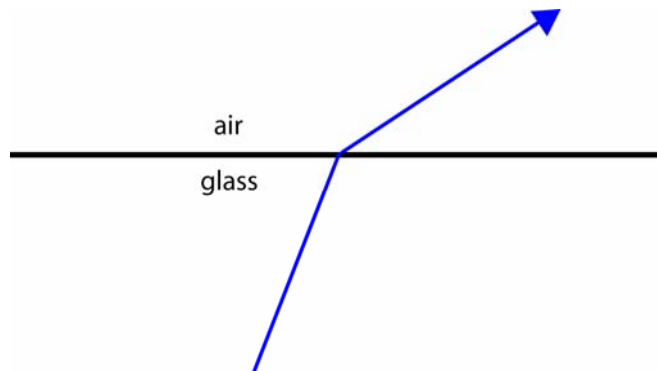
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(3 marks)

4. This diagram shows the refraction of light travelling from glass to air.



On the same diagram:

- a) mark and label the normal.
- b) mark and label the angle of incidence.
- c) draw another ray, from the same point of origin, that is totally internally reflected.
- d) Through which of these two materials does light travel fastest?

(4 x 0.5 = 2 marks)

5. Write the chemical formulae for each of the following compounds:

Compound	Formula
ammonium sulfide	
oxygen gas	
nitrogen dioxide	
	$\text{Fe}_2\text{O}_3$
	CO
	$\text{Na}_2\text{CO}_3$

(6 marks)

6. All bonding is electrostatic in nature. Identify the particles involved and the source of the electrostatic attraction that is responsible for the different types of bonding.

IONIC	COVALENT	METALLIC

(1 + 1 + 1 = 3 marks)

7.  $\text{NO}_2$  is a brown gas which under certain conditions can be converted to the colourless  $\text{N}_2\text{O}_4$  gas. Write the balanced equation to show  $\text{NO}_2$  is converted to  $\text{N}_2\text{O}_4$  if these are the only 2 substances present.

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(1 mark)

8. Identify the type of bonding present in the following substances.

Substance	Ionic	Covalent	Metallic
Sulphur hexafluoride			
Ammonium sulphide			
Calcium carbide			
Lead/Tin alloy			

(2 marks)

9. Explain the difference between  $\text{NaCl}_{(s)}$  and  $\text{NaCl}_{(aq)}$ .

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(2 marks)

10. In the following table, for each part of the brain, describe the function of each part of the brain.

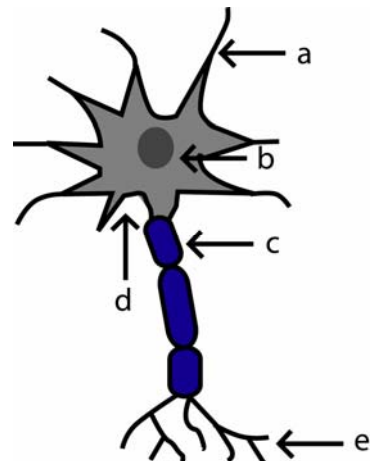
Part of Brain	Function
cerebellum	
cerebrum	
Brain stem	

(3 marks)

11. The following diagram shows a neurone, with five parts labelled.

a) Match the five parts to the positions.

axon branches	
cell body	
nucleus	
myelin sheath	
dendrites	



b) In which direction(s) (as shown on this page) do electrical impulses travel along the neurone?

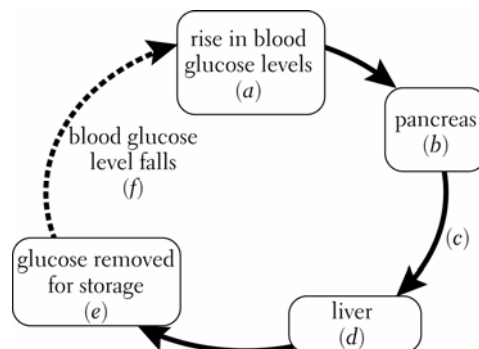
up

down

both directions

(6 x 0.5 = 3 marks)

12. The diagram below shows the control of blood glucose levels.



Complete the labelling of the diagram by naming **a** to **e** in terms of the stimulus–response model. Label **c** and **f** has been completed as an example.

a)	d)
b)	e)
c) <b>hormonal relay</b>	f) <b>feedback</b>

(2 marks)

13. The hormone insulin causes glucose to be removed from the blood and stored in the liver as glycogen. In diabetes, either the pancreas does not manufacture enough insulin (*type 1 diabetes*) or the body does not respond to the insulin produced (*type 2 diabetes*).

The following table shows the blood glucose levels of two people after they each consumed 50g of glucose from a can of Coke™ for breakfast.

Time after drinking glucose solution (min)	Stephen's blood glucose level (mg/100mL)	Johnny's blood glucose level (mg/100mL)
0	86	85
15	110	125
30	140	170
45	115	190
60	90	210
75	80	210
90	84	200
105	85	180
120	85	145

- a) Explain whether Stephen or Johnny may have diabetes.

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- b) Suggest why the non-diabetic person's blood glucose level fell.

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- c) People with *type 1 diabetes* inject insulin to make up for their body's inability to produce it. Injected insulin takes about an hour to start working. Explain when and why the diabetic person should inject insulin.

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(1 + 2 + 2 = 5 marks)

**Answers**

**Section 1**

- 1 d 2 a 3 a 4 d 5 b 6 d 7 b 8 c  
 9 c 10 c 11 b 12 d 13 c 14 b 15 c 16 c  
 17 c 18 a 19 c 20 c 21 c 22 b 23 b 24 b  
 25 a

**Section 2**

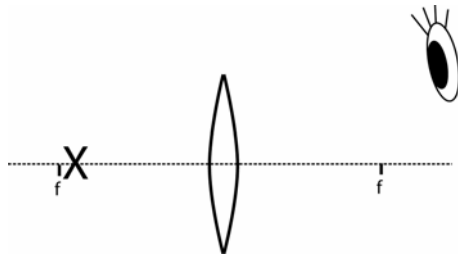
1	2	3	4	5
T	T	F	T	F

**Section 3**

concave , insoluble, metallic bonding (electrostatic) , stimulus threshold , homeostasis

**Section 4.**

1.



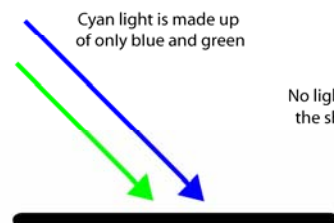
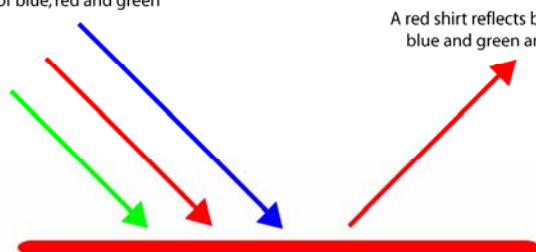
a) Object must be just inside the focal point (and on the other side of the lens from the eye!).

- b) virtual image  
 c) converging lens

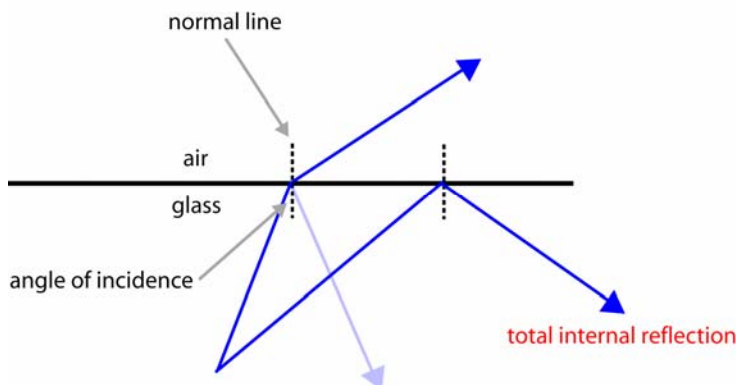
2. a) magenta b) cyan c) yellow d) white

3. (1 mark for diagram(s) and 2 marks for explanation)

White light is made up of blue, red and green



4.



d) Air transmits light faster.

5.

Compound	Formula
ammonium sulfide	(NH <sub>4</sub> ) <sub>2</sub> S
oxygen gas	O <sub>2</sub>
nitrogen dioxide	NO <sub>2</sub>
Iron III oxide	Fe <sub>2</sub> O <sub>3</sub>
Carbon monoxide	CO
Sodium carbonate	Na <sub>2</sub> CO <sub>3</sub>

(6)

6.

**IONIC**

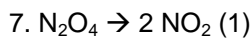
Ionic bonding is the attraction between oppositely charged ions that have been created by the transferring of electrons between atoms (1)

**COVALENT**

Attraction between the bonding electrons and the nucleus' of the atoms in the covalent bond (1)

**METALLIC**

Attraction between the delocalised electrons and the cations created by the metals 'losing' their valence electrons. (1)



8.

Substance	Ionic	Covalent	Metallic
Sulphur hexafluoride		#	
Ammonium sulphide	#	#	
Calcium carbide	#		
Lead/Tin alloy			#

(4 x ½ for each substance correct)

9. NaCl<sub>(s)</sub> is solid sodium chloride. (1) NaCl<sub>(aq)</sub> is an aqueous solution of sodium chloride. (Sodium chloride dissolved in water) (1)

10.

Part of Brain	
cerebellum	Responsible for coordination and balance. Eg. walking, catching a ball
cerebrum	Responsible for our conscious thoughts and actions
Brain stem	Controls the body's vital functions such as breathing, blood pressure and heart rate.

(3)

11.

a)

axon branches	e
cell body	d
nucleus	b
myelin sheath	c
dendrites	a

b) impulse travels **down** (from nucleus through axon)

12. a) stimulus b) receptor c) **hormonal relay** d) effector e) response f) **feedback**  
(½ for each one correct = 2)

13. a) **Johnny** is more likely to have diabetes as he has a higher blood sugar level after ingesting the same amount of glucose.

b) Stephen's blood glucose fell as insulin had been produced (1) removing the glucose for storage in the liver (1).

c) A diabetic person should inject insulin about an hour before eating (1), so that the insulin is present when they start to metabolise glucose (1).