



Pymble Ladies' College

TERM III, 2006

TRIAL HSC EXAMINATION

Senior Science

TIME ALLOWED: 3 hours

PLUS 5 minutes reading time

<p>General Instructions</p> <ul style="list-style-type: none"> ▪ Reading time – 5 minutes ▪ Working time – 3 hours ▪ Board-approved calculators may be used ▪ Write using blue or black pen ▪ Draw diagrams using pencil 	<p>Total Marks – 100</p> <p>Section I Total Marks (75) This section has two parts, Part A and Part B</p> <p>Part A – 15 marks</p> <ul style="list-style-type: none"> ▪ Attempt questions 1-15 ▪ Allow about 30 minutes for this part <p>Part B – 60 marks</p> <ul style="list-style-type: none"> ▪ Attempt questions 16 – 27 ▪ Allow about 1 hour and 45 minutes for this part <p>Section II Total Marks (25)</p> <ul style="list-style-type: none"> ▪ Attempt ONE question – Question 28 ▪ Allow about 45 minutes for this section
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SECTION I**Part A****Total marks 15****Attempt questions 1-15****Allow 30 minutes for this section****Use the multiple Answer Sheet for multiple choice answers.**

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

Sample

2 + 4 = (A) 2 (B) 6 (C) 8 (D) 9

A B C D

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A B C D

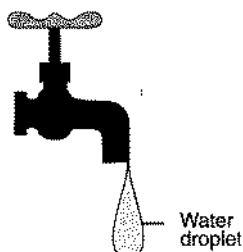
If you change your mind and have crossed out what you consider to be the correct answer, then indicate this by writing the word correct and drawing an arrow as follows:

A B C D

correct ↙

1. Calamine lotion is a medication used to soothe sunburn. If left to stand it forms layers. Which of the following best describes calamine lotion?
 - a) Solution
 - b) Emulsion
 - c) Foam
 - d) Gel

2. The figure below shows a droplet of water.



Which of the forces listed have produced this shape?

- a) Weight
- b) Surface tension
- c) Weight and surface tension
- d) Surfactant release

3. A beam of light is shone onto a beaker containing a clear liquid. Most of the light passes straight through, but the liquid scatters some of the light in many directions. Which of the following is the most likely substance present in the beaker?
- a) A sugar solution
 - b) A suspension of muddy water
 - c) A colloid such as diluted milk
 - d) A colloid such as mayonnaise.
4. A commercial liquid soap claims to have the 'perfect' formula for soap with a pH of 5.0.
- a) This pH is far too low for use with our skin.
 - b) This pH is far too high for use with our skin.
 - c) This pH is a little too low for use with our skin.
 - d) This pH is a little too high for use with our skin.
5. Vitamins are either fat soluble or water soluble. They are absorbed in different ways. Which of the following statements describes how fat soluble vitamins enter the bloodstream?
- a) Fat soluble vitamins are emulsified and enter the lymphatic system.
 - b) Fat soluble vitamins diffuse across the wall of the small intestine into the bloodstream.
 - c) Fat soluble vitamins dissolve in emulsified fatty acid droplets and enter the lymphatic system.
 - d) Fat soluble vitamins dissolve in emulsified fatty acid droplets and enter the bloodstream.
6. UHMWPE is a polymer used in artificial hip joints. Which is the main feature that makes it suitable for this application?
- a) UHMWPE is not a good conductor of heat.
 - b) UHMWPE is very low density.
 - c) UHMWPE is smooth and frictionless.
 - d) UHMWPE is strong and inflexible.
7. Build up of plaque in blood vessels can lead to heart attacks or strokes. Which of the following techniques is used to treat a build up of plaque?
- a) Angioplasty
 - b) Artificial heart valves
 - c) Artificial pacemakers
 - d) Intra-aortic balloon pumps

8. Medical imaging can be used to view the internal parts of the body. Which row of the table shows medical technology correctly matched with the type of energy it uses?

a)	Endoscope	Sound waves
b)	Magnetic Resonance Imaging	Radio waves
c)	Thermal imaging	Light waves
d)	X-rays	Gamma waves

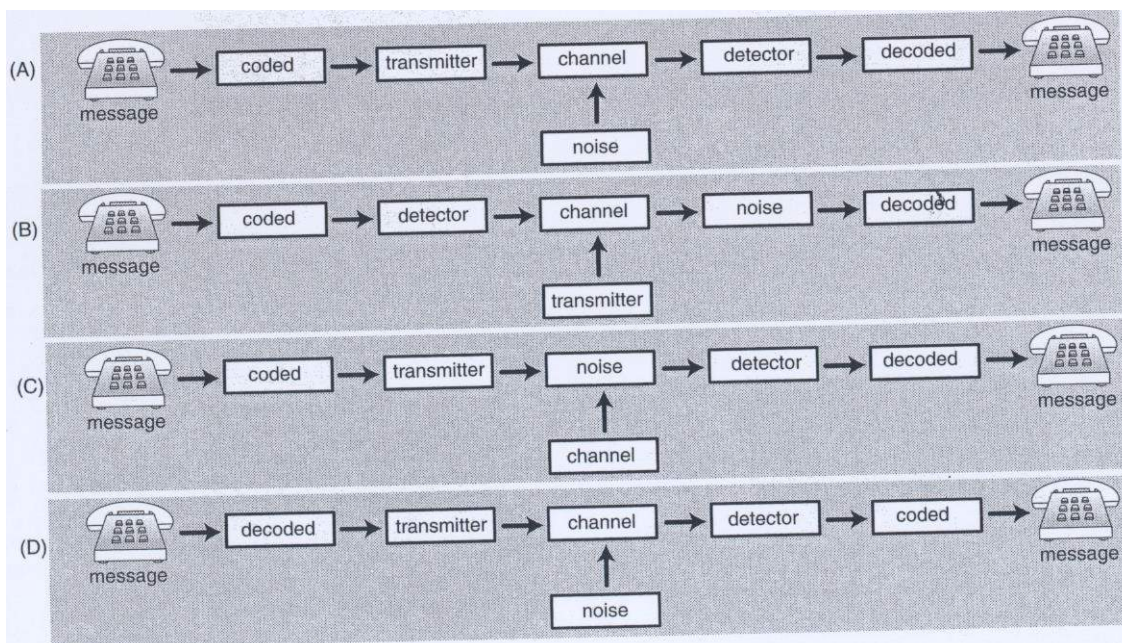
9. Which of the following correctly describes what causes damage to finger and toe joints so that they no longer move freely?

- a) The synovial fluid dries out so the joints become high friction joints.
- b) Tendons break, causing the joints to become misaligned.
- c) Cartilage reacts with synovial fluid and hardens.
- d) The body's immune system attacks and destroys the joints.

10. Artificial lungs and ventilators are used to supply oxygen to people whose lungs are not functioning correctly. Which of the following statements about ventilators is correct?

- a) The iron lung works by pushing down on a person's chest.
- b) Most modern ventilators work by pushing down on a person's chest.
- c) The iron lung pumps air into a person's lungs.
- d) Most modern ventilators pump air into a person's lung.

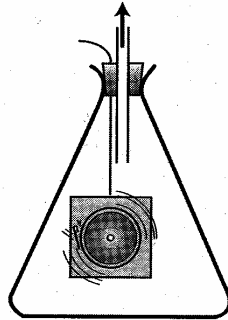
11. Any communication system uses a series of steps to communicate a message. Which is the correct sequence of steps in this process?



12. The electromagnetic spectrum uses waves to carry many forms of energy allowing communication to occur. Which of the following uses a code energy that is **NOT** part of the electromagnetic spectrum?

- a) Bar code scanner
- b) CD player
- c) Computer
- d) Fax machine

13. A student carried out an experiment using the equipment shown.



The sound of the bell ringing gradually faded away as air was removed from the flask by the vacuum pump. What could the student conclude from this experiment?

- a) That sound travels faster in solids than in gases.
 - b) That sound can only travel through glass at high pressure.
 - c) That sound requires a medium to travel through
 - d) That sound travels more slowly at low pressures.
14. Why is there reduced interference for the electromagnetic waves used in television satellite transmissions?

- a) They are the lowest energy waves in the radio spectrum.
- b) They are transmitted by the ionosphere
- c) They are transmitted to the satellite antenna at one frequency and relayed from it at another frequency.
- d) They occupy a broad bandwidth.

15. Why has digital communication replaced other forms of electronic communication over long distances?

- a) Many messages can be sent at the same time by multiplexing.
- b) Digital signals are less affected by electrical noise.
- c) Computers manipulate data using digital signals.
- d) All of the above.

Section I (continued)

PART B

Total marks (60)

Attempt Questions 16 – 27

Allow about 1 hour and 45 minutes for this part

Answer the questions in the spaces provided.

Question 16 (6 marks)

Different bathroom cleaning agents were tested by two students, Sally and Joan. Sally suggested the Clean-fresh brand (an emulsion) was a better cleaning agent than the Cleans All brand (a suspension) because an emulsion is easier to use than a suspension. Joan did not agree.

- a) Define the term *emulsion*. **1**

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- b) Outline TWO ways in which an emulsion differs from a suspension. **2**

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- c) Describe how you would test which of the two cleaning agents is easier to use. **3**

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Question 17 (4 marks)

During your study of the Lifestyle Chemistry topic, you carried out a first-hand investigation to relate the significance of the solubility of a medication to its action on/in the body.

- a) List 2 major factors that affect the rate of solubility of drugs. 2

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- b) A scientist designs a drug to relieve an illness. It is known that the drug can damage the wall of the human stomach if it dissolves in the stomach. Justify a coating that might be applied to the drug so that no harm is caused to the stomach when the drug is taken. 2

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Question 18 (6 marks)

Compare the use of transdermal patches and subdermal implants in releasing medication into the body by completing the table below. 6

	Where it is placed in the body?	How medication is released into body?	Example
Transdermal patches			
Subdermal implants			

Question 19 (4 marks)

- a) Define the term *microflora*. **1**

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- b) Describe the role of the normal microflora on a part of the skin. **2**

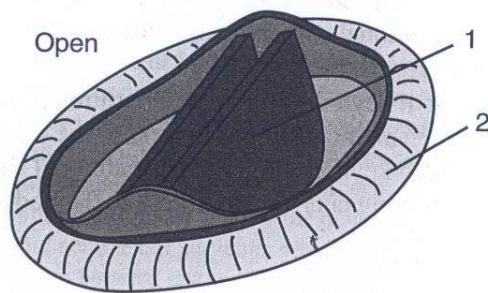
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- c) Outline a condition that may cause an imbalance of normal microflora on the skin. **1**

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Question 20 (6 marks)

An artificial heart valve is shown in the diagram below.



- a) Identify the material used for the parts labelled 1 and 2. **2**

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b) Explain why each material would be used.

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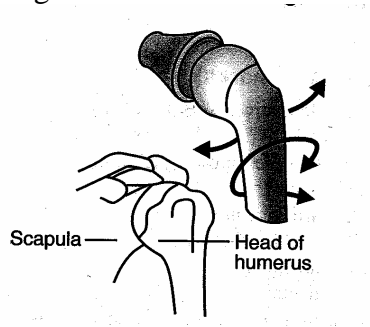
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Question 21 (6 marks)

A part of the skeleton is shown in the diagram below.



a) Identify the name given to this type of structure.

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b) Describe the movements that are possible.

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c) Describe materials that could replace this structure if injury was to occur.

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Question 22 (8 marks)

X-rays are used as a diagnostic tool in medicine. It is an example of a non-invasive technique.

- a) Define what is meant by a non-invasive medical technique. **1**

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- b) Describe how x-rays can be used for diagnosis. **3**

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- c) Discuss the advantages and disadvantages of non-invasive techniques. **4**

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Question 23 (3 marks)

Identify the **THREE** properties that energy from the electromagnetic spectrum has that make it useful for communication technologies. **3**

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Question 24 (3 marks)

In your studies of Information systems you have studied communication systems and how they transfer energy while sending a message. Choose ONE communication system and draw a flow diagram to show the energy transformations involved in sending a message. **3**

Question 25 (5 marks)

- a) Name TWO properties of AM radio waves that allow them to be used in communication systems. **2**

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- b) What are TWO advantages of using AM radio waves in communication systems? **2**

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- c) What is ONE disadvantage of using AM radio waves in communication systems? **1**

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Question 26 (3 marks)

Explain why the wave messages from television stations must occupy a broad bandwidth compared with messages from radio stations. **3**

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Question 27 (6 marks)

Analyse the impact on society of TWO communication systems that have been developed during the last 200 years. **6**

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SECTION II**Total marks (25)****Attempt one option****Allow about 45 minutes for this part****Answer the questions in this section *ON THE WRITING PAPER PROVIDED.*****Question 28 - PHARMACEUTICALS (25 marks)**

- a) i) Describe the structure and function of a neuron. **2**
- ii) Distinguish between sensory neurons, motor neurons and interneurons. **3**
- iii) Explain the general functions of the nervous systems. **3**
- b) A child falls over and hurts his knee. After the tears have settled down it is noted that the grazed area is starting to swell, feel hot and become red.
- i) Describe the steps involved in the inflammation response. **3**
- ii) Define pain. **1**
- iii) Aspirin belongs to the group of drugs called analgesics.
1. Name the main ingredient in aspirin. **1**
2. Briefly explain how aspirin blocks pain in the body. **2**
- c) Describe the contributions of Pasteur and Koch to our understanding of disease. **4**
- d) i) Bacteria are classified according to shape. Identify the following two diagrams of bacteria. **1**

**A****B**

- ii) Explain why penicillin only works on bacteria while they are reproducing. **2**
- iii) Identify one antibiotic other than penicillin, its mode of action and the bacteria it affects. **3**

END OF EXAMINATION

Student Number:

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Senior Science

2006

Trial Examination

Multiple Choice Answer Sheet

Fill in the correct response.

- Start here →
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
 11. A B C D
 12. A B C D
 13. A B C D
 14. A B C D
 15. A B C D