Pymble Ladies' College

TRIAL HSC EXAMINATION 2013

SENIOR SCIENCE

General Instructions

- Reading time - 5 minutes
- Working time - 3 hours
- Write using blue or black pen.
- Draw diagrams using pencil.
- Board -approved calculators may be used.
- Write your student number on EVERY page and on your writing booklet.
- The multiple choice answer sheet may be removed from the back of this paper.

Total marks – 100

Section I

75 marks

This section has two parts, Part A and Part B.

Part A – 20 marks

- Attempt questions 1 - 20
- Allow about 35 minutes for this part

Part B - 55 marks

- Attempt questions 21 - 32
- Allow about 1 hour and 40 minutes for this part

Section II

25 marks

- Question 33 is compulsory
- Allow about 45 minutes for this section

STUDENT NUMBER:_____

Section I

PART A
Total marks (20)
Allow about 35 minutes for this part
Use the multiple choice Answer Sheet for *ALL* multiple choice answers.

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

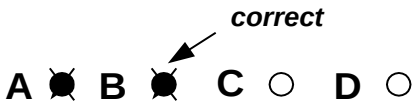
Sample 2 + 4 = **(A)** 2 **(B)** 6 **(C)** 8 **(D)** 9

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:



Questions 1-20 are multiple choice questions.

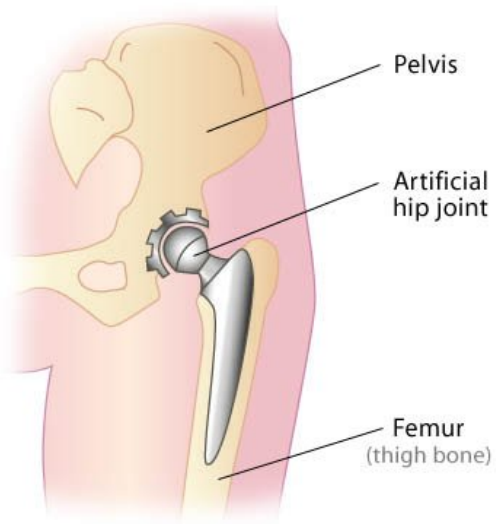
1. The table indicates the percentage of gases in inhaled and exhaled air.

Constituent gases	Inhaled Air	Exhaled Air
Oxygen	20.9%	16%
Carbon Dioxide	0.03%	4.0%
Water vapour	Variable	Variable, more than inhaled air
Nitrogen	78.1%	78.1%
Other gases	0.94%	0.94%

Which of the following statements is a correct conclusion based on the data in the table.

A. Human lungs only absorb about 10% of the oxygen inhaled.
B. Carbon dioxide levels are greater in inhaled air than exhaled air.
C. CPR is not effective as there is too much carbon dioxide in exhaled air.
D. CPR is effective as oxygen is present in exhaled air.

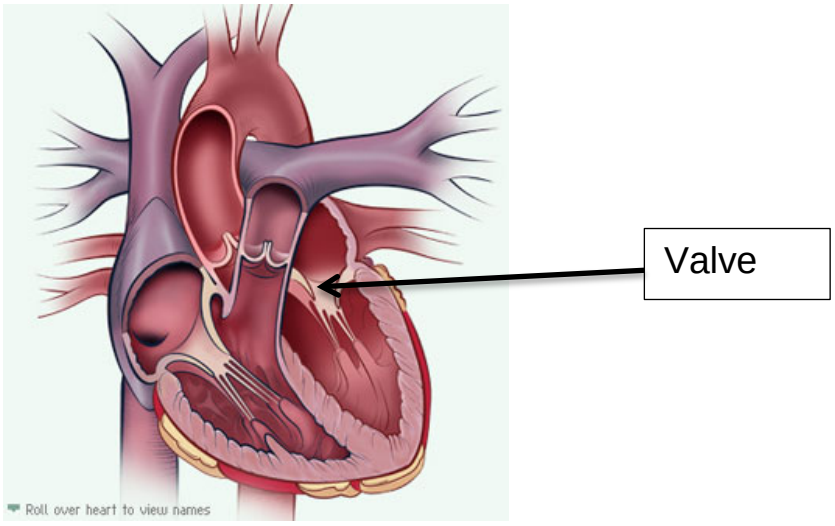
2. Observe the following image that represents an artificial hip joint.



What material would be best suited as an artificial alternative to cartilage surrounding this joint.

A. Gortex
B. Silicone
C. Titanium alloy
D. UHMWPE

3. The diagram below shows a diagram of the heart with one valve labelled.



Identify the function of this valve.

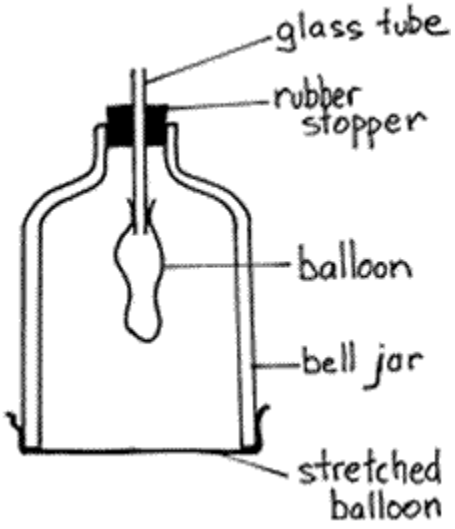
A. To prevent the backflow of oxygenated blood into the left atrium.
B. To prevent the backflow of oxygenated blood into the left ventricle.
C. To prevent the backflow of deoxygenated blood into the left atrium.
D. To prevent the backflow of deoxygenated blood into the left ventricle.

4. A student placed a chicken bone into a beaker, covered it with dilute hydrochloric acid and left it for 24 hours.

   What result should this student expect from this experiment?

   A. The bone will remain unchanged.
   B. The bone will be more flexible as calcium has been removed from the bone by the acid.
   C. The bone will be more flexible as organic compounds have been removed from the bone by the acid.
   D. The bone will be brittle as calcium has been removed from the bone by the acid.

5. This model lung can be used to demonstrate the process of inhaling and exhaling in human lungs. The stretched balloon represents the diaphragm and the balloon attached to the glass tube represents the lungs.



   Which of the following statements correctly describes the process of inhalation observed in this model?

   A. Air is forced into the balloon creating a high pressure area in the jar so the stretched balloon is forced downwards.
   B. The stretched balloon is pulled down which pulls air into the balloon creating a low pressure area in the jar.
   C. The stretched balloon is pulled down creating a low pressure area in the jar so air is forced into the balloon causing it to inflate.
   D. Pulling the stretched balloon down creates a high pressure area in the jar and this makes the balloon expand.

6. Silicone can be used to replace small joints in the bones of fingers and toes. An important property of silicone is that it is biocompatible.
   What is meant by the term 'biocompatible'?

   A. Silicone will not react with chemicals or living tissue in the body.
   B. Silicone will produce an immune response when inserted into the body.
   C. Silicone can be broken down by living tissue.
   D. Silicone can be broken down by the immune system.

7. Why is alcohol commonly used as a solvent in hairspray?

   A. It evaporates more slowly than water keeping hair in place.
   B. It evaporates quickly leaving less solvent on the hair.
   C. It sets very quickly keeping the hair in place.
   D. It nourishes the hair producing shinier hair.

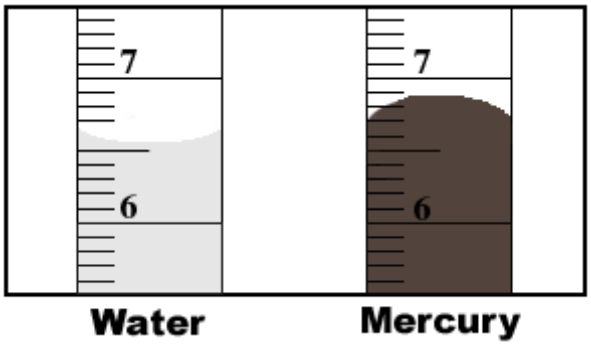
8. When making a pavlova, egg whites are whipped to create a colloid mixture. What type of colloid is the whipped egg white?

   A. Liquid-in-liquid
   B. Oil-in-water
   C. Water-in-oil
   D. Gas-in-liquid

9. Which alternative outlines three correct functions of human skin?

A	Separates the organs of the body from each other	Helps control body temperature	Provides a barrier to the entry of disease causing organisms
B	Separates the body from the external environment	Helps control body temperature	Provides a barrier to the entry of disease causing organisms
C	Separates the body from the external environment	Lowers the body temperature	Destroys microflora so disease causing organisms cannot enter
D	Separates the organs of the body from each other	Raises the body temperature	Destroys microflora so disease causing organisms cannot enter

10. The diagram below shows two measuring cylinders. One contains mercury and the other water.



Which option provides a correct explanation of the shape of the meniscus in each test tube?

A. The surface tension in water is greater than the surface tension in mercury.
B. The cohesion forces between the water molecules are greater than the cohesion forces in mercury.
C. The cohesion forces between the mercury molecules are greater than the adhesion forces between the mercury molecules and the walls of the measuring cylinder.
D. The adhesion forces between the water molecules and the walls of the measuring cylinder are less than the cohesion forces between the water molecules.

11. A substance is biodegradable if it can be decomposed by living organisms such as bacteria and fungi in a short period of time. Why is it important for detergents to be biodegradable?

A. A detergent is more effective at cleaning plates if it is biodegradable.
B. Biodegradable detergents are able to kill bacteria and fungi before they damage the environment.
C. Biodegradable detergents supply necessary nutrients for aquatic life so play an important role in the food chain.
D. Non-biodegradable detergents can build up in waterways and cause algal blooms destroying aquatic life.

12. Which of the following correctly matches a component of shampoos with the reason for its use.

	Common Component	**Reason for Use of Component**
A	Fragrance	Removes dirt, body oils and bacteria
B	Preservative	Prevents bacterial and fungal growths
C	Moisturiser	Covers up the smell of oils
D	Surfactant	Prevents the skin on the scalp from drying out

13. A vegetable contains four vitamins, A, B, C and E.

Which vitamins are water soluble?

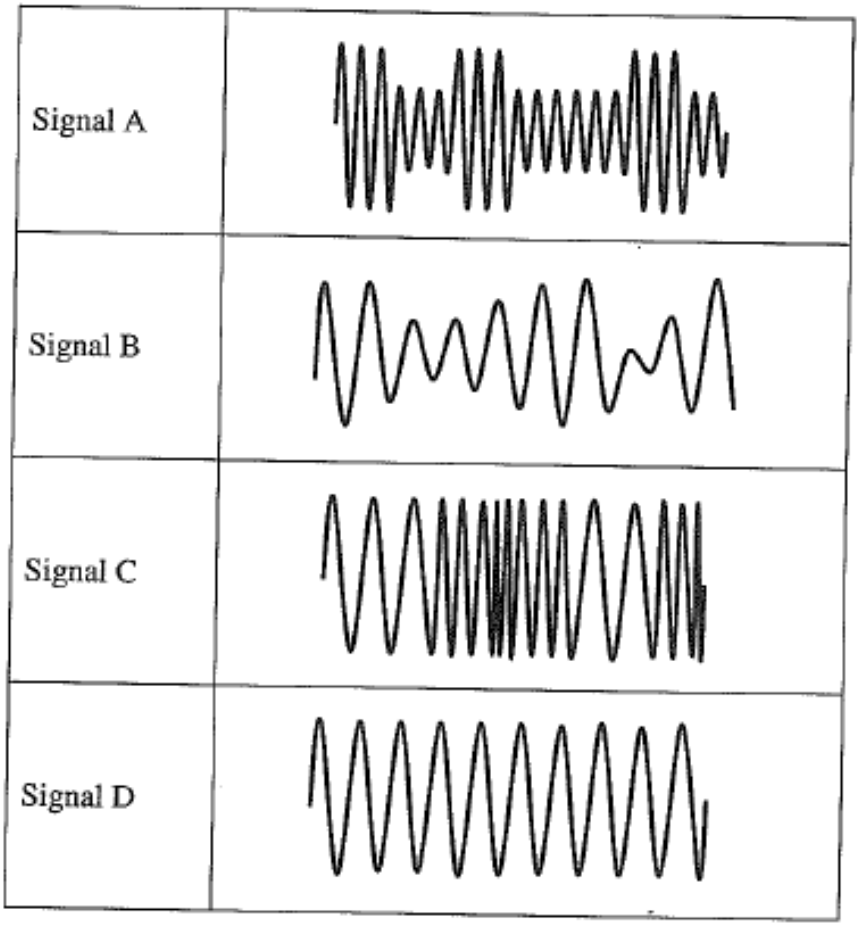
A. Vitamins B and C
B. Vitamins A and C
C. Vitamins B and E
D. Vitamins A and E

14. Observe the following image.

What type of information system is represented in the image?

A. Verbal, long distance
B. Verbal, short distance
C. Non-verbal, long distance
D. Non-verbal, short distance

15. Which of the waves shown below represents a frequency modulated wave?



16. The National Broadband Network is replacing copper cables with optical fibres.
    What is the best argument in support of optical fibres?

    A. Optical fibres carry more data at a faster rate than copper cables.
    B. Optical fibres cost much less to install and are more secure than copper cables.
    C. Optical fibres can carry digital information and copper cables cannot.
    D. Optical fibres use light waves so can transmit data faster than copper cables which use microwaves.

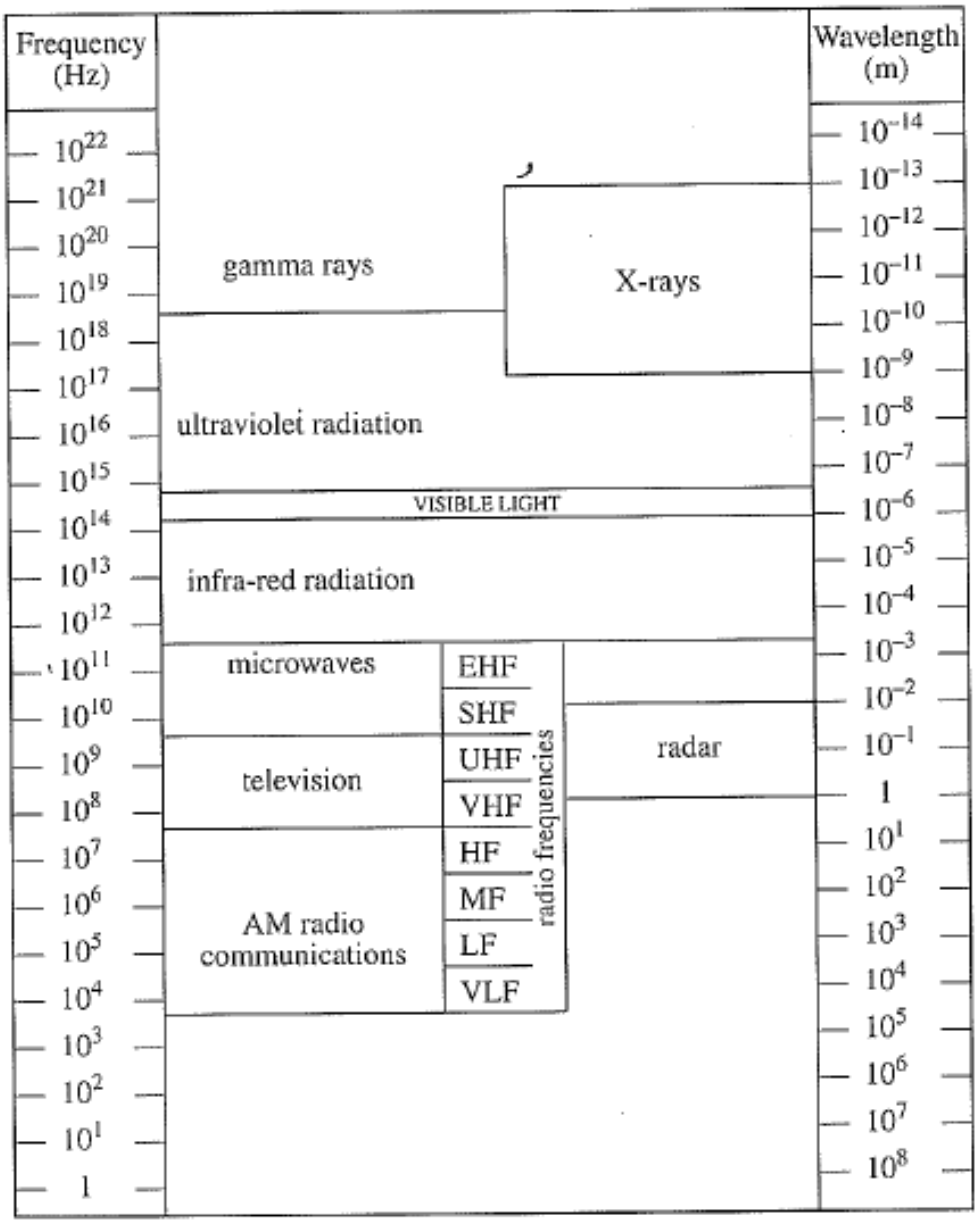
17. A first-hand investigation was performed to decide which radio wave – AM or FM – produces a better quality signal.
    How did the student make sure the results collected were reliable?

    A. She made sure the quality of reception was measured accurately.
    B. She made sure the experiment was repeated several times and that the data collected was consistent.
    C. She made sure that only the independent variable was changed and all other variables were controlled.
    D. She made sure that the radio was set to the same AM and FM station throughout the experiment.

18. What is one advantage of using radio waves instead of microwaves in communication systems?

    A. Radio waves can carry more data than microwaves as they have a higher frequency.
    B. Radio waves can travel through a vacuum and microwaves cannot.
    C. Radio waves require fewer transmission towers than microwaves.
    D. Microwaves can be absorbed by rain, oxygen and carbon dioxide in the atmosphere, reducing signal intensity but radio waves are not affected by rain.

19. The diagram below shows information about the electromagnetic spectrum.



Which of the following statements is correct?

A. To communicate, we can use waves with frequencies less than 10^{15}Hz.

B. Television uses wavelengths between 10^{10} and 10^{8} m.

C. Infra-red waves have a longer wavelength than microwaves.

D. AM radio communications include UHF and VHF frequencies.

20. The table below shows the binary code for four different numbers.

To find the binary code for the number 10 you would combine the code for 8 and 2.

So that would make the binary code 00001010 for the number 10.

1	2	4	8
00000001	00000010	00000100	00001000

Use the table above to calculate the binary code for the number 13.

A. 00001001
B. 00001100
C. 00001111
D. 00001101

Section I (continued)

PART B

Total marks (55)

Attempt Questions

Allow about 1 hour and 40 minutes for this part

Answer the questions in the spaces provided.

Question 21 (5 marks)

a) Describe how the heart maintains steady rhythmic contractions. **3**

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b) Pacemakers are inserted if there are interruptions to the normal rhythm of the heart.

Outline TWO recent advances in pacemaker technology. **2**

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Question 22 (8 marks)

The diagram below shows a healthy and a non-healthy artery.

a) What condition does the unhealthy artery have? **1**

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b) Explain the effect of this condition on blood flow. **3**

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c) Describe TWO techniques that could be used to correct blood flow in this artery. **4**

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Question 23 (6 marks)

a) Outline the advantages of minimally invasive surgery over invasive surgery. **3**

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b) Discuss the importance of ONE non-invasive technique used in medical diagnosis. **3**

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Question 24 (5 marks)

a) What is the average pH of the skin? **1**

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b) Explain the importance of the role of microflora on the skin. **4**

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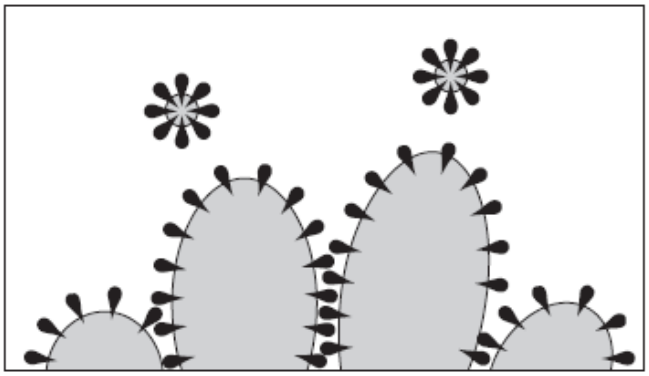
Question 25 (4 marks)

Cleaning products have to be surfactants and emulsifiers.

Explain how shampoo works to remove oil from your hair with reference to the diagram provided below.



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Question 26 (3 marks)

Water-in-oil emulsions and oil-in-water emulsions have different properties. Write a method that could be used to compare the properties of these different emulsions.

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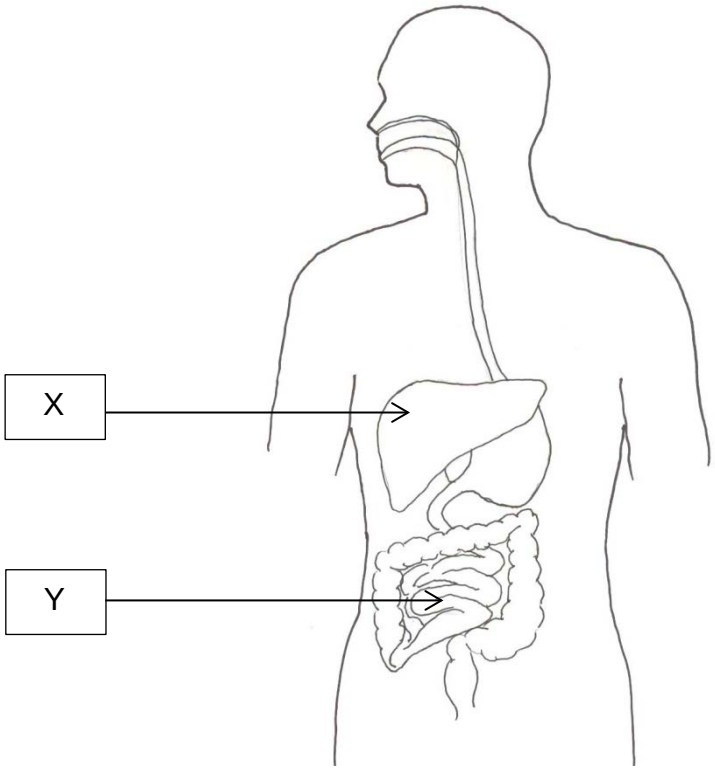
Question 27 (4 marks)

a) Identify the parts of the digestive system in the diagram below labelled X and Y. **2**



X .....

Y .....

b) Outline the role of the stomach in digestion. **2**

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Question 28 (2 marks)

A student investigated the rate of solubility of a range of medications. The results are shown below.

	Average time to dissolve (mins)		
Medication type	pH 3	pH 7	pH 9
Tablet	10	25	30
Capsule	10	Not soluble	Not soluble
Enteric coated capsule	Not soluble	Not soluble	5

a) What was the dependent variable in this experiment? **1**

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b) List TWO controlled variables that the student would need to have to ensure this was a valid experiment. **1**

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Question 29 (2 marks)

Identify the energy transformations that occur to enable two people to talk on mobile phones.

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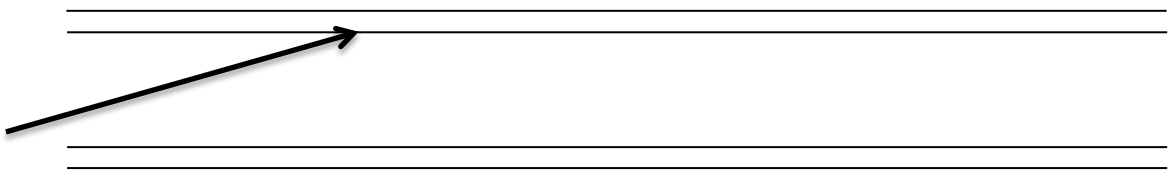
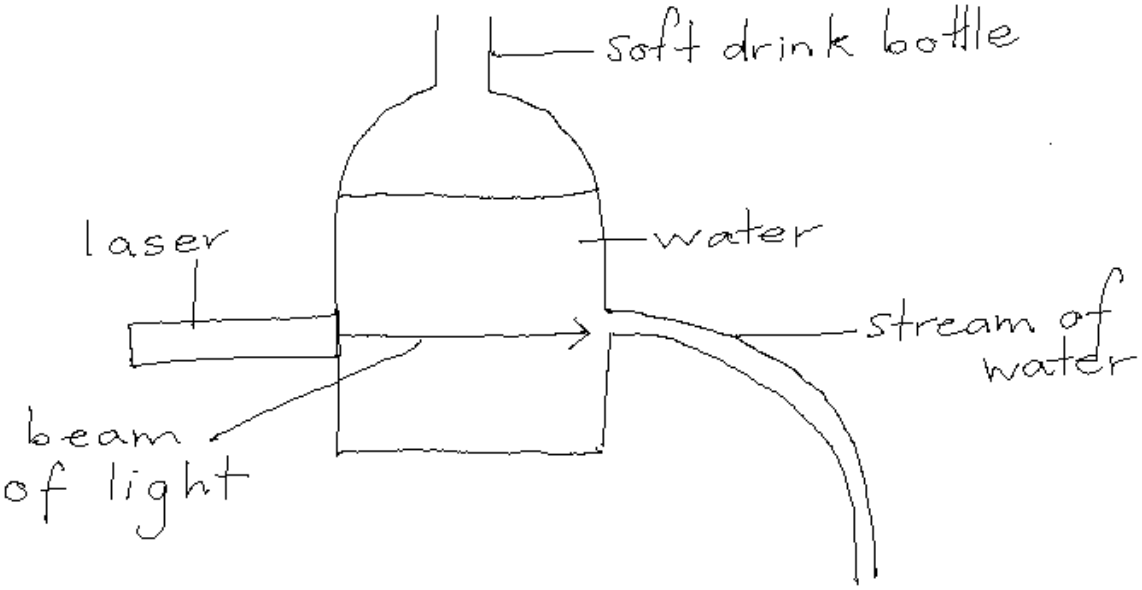
Question 30 (3 marks)

a) Complete the diagram below to show the pathway of light through an optical fibre. **1**



The equipment below was used to demonstrate the transmission of light in optical fibres.



b) Explain why this demonstration was valid. **2**

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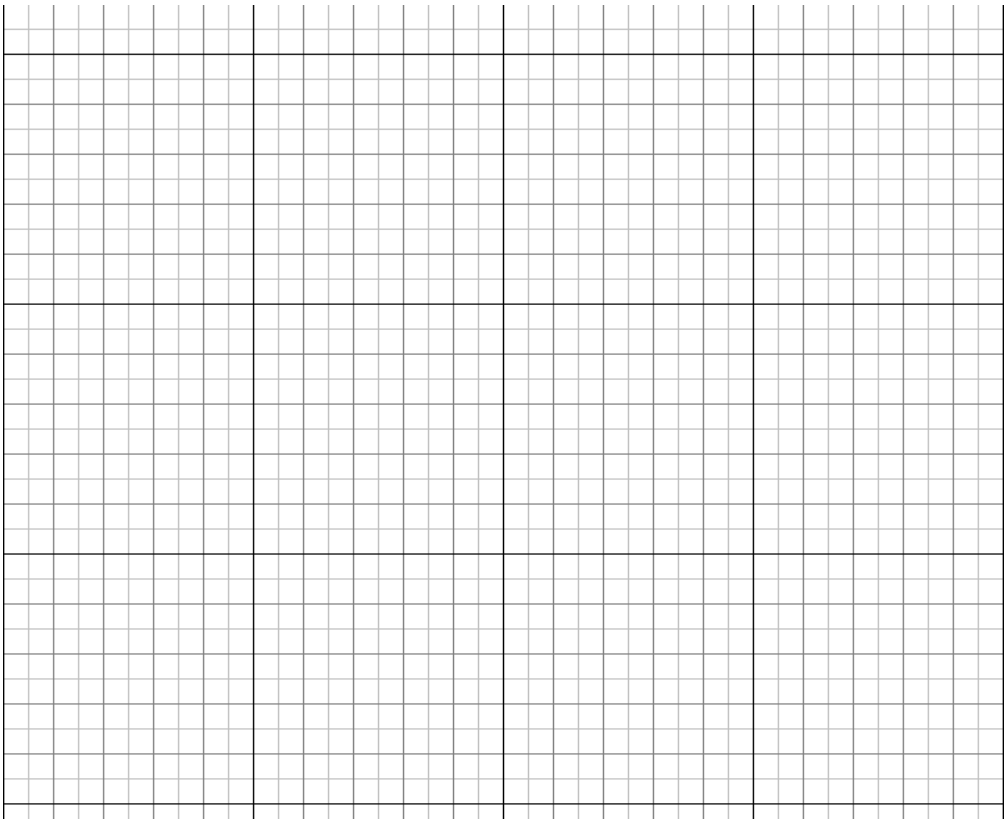
Question 31 (5 marks)

The data below shows the time taken for satellites to orbit the Earth and their height above the Earth.

Height above the Earth (km)	Time taken to orbit the Earth (hours)
10 000	6
20 000	12
30 000	19
40 000	27

a) Plot the data above on the graph paper provided. **3**



b) Use the data above to explain why geostationary satellites must be approximately 36 000km above the Earth? **2**

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Question 32 (8 marks)

"Advances in technology have greatly increased our quality of life as a society and as an individual."

Evaluate this statement using specific examples in your answer.

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STUDENT NUMBER:_____

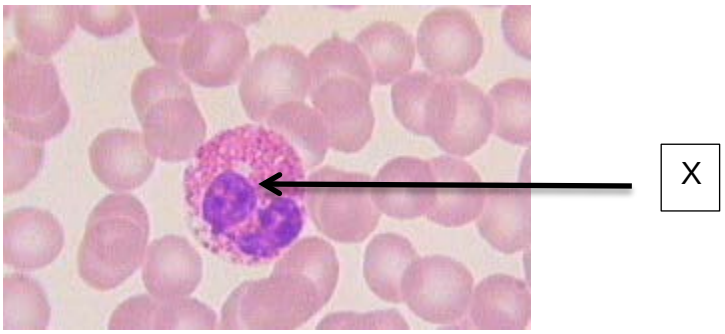
SECTION II

Total marks (25)
Attempt one option
Allow about 45 minutes for this part

Answer the questions in this section in *THE WRITING BOOKLET PROVIDED.*

Question 33 (25 marks)

a) (i) Identify the blood cell labelled X in the diagram below. **1**



(ii) Outline the role of this cell in the body. **1**

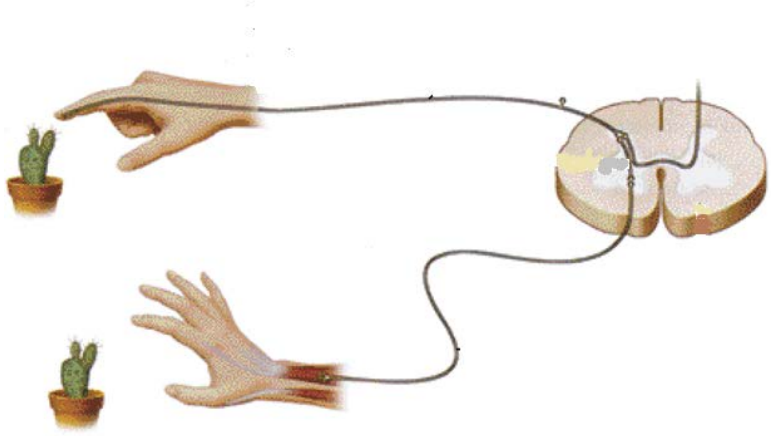
b) Compare the structure and function of arteries and veins. **4**

c) What are the advantages of using the circulatory system to transport pharmaceuticals around the body? **4**

Question 33 is continued on the next page

d) (i) Describe the role of the sense organs using an example. **2**

(ii) A reflex arc is shown in the diagram below. Draw a flow chart to show the pathway of a nerve impulse from the stimulus through to the response in a reflex arc. **3**



e) (i) Explain the physiological responses of redness, swelling, and fever that occur as part of inflammation. **6**

(ii) Identify the key ingredient in aspirin. **1**

(iii) Describe how aspirin relieves pain. **3**

END OF EXAMINATION

STUDENT NUMBER:_____

SENIOR SCIENCE

YEAR 12 TRIAL HSC EXAMINATION 2013

ANSWER SHEET

General Instructions

- Write your Student Number at the top of this page.
- Answer ALL multiple choice questions on this Answer Sheet.
- Use a pencil to fill in the circle indicating your answer.

PART A

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 ⬭
16.	A ⬭	B ⬭	C ⬭	D ⬭
17.	A ⬭	B ⬭	C ⬭	D ⬭
18.	A ⬭	B ⬭	C ⬭	D ⬭
19.	A ⬭	B ⬭	C ⬭	D ⬭
20.	A ⬭	B ⬭	C ⬭	D ⬭

Yr 12 Senior Science 2013 Task 4 - Trial Examination Marking Scheme

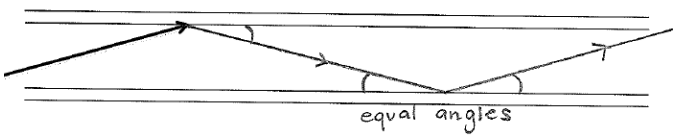
Part A – Multiple Choice

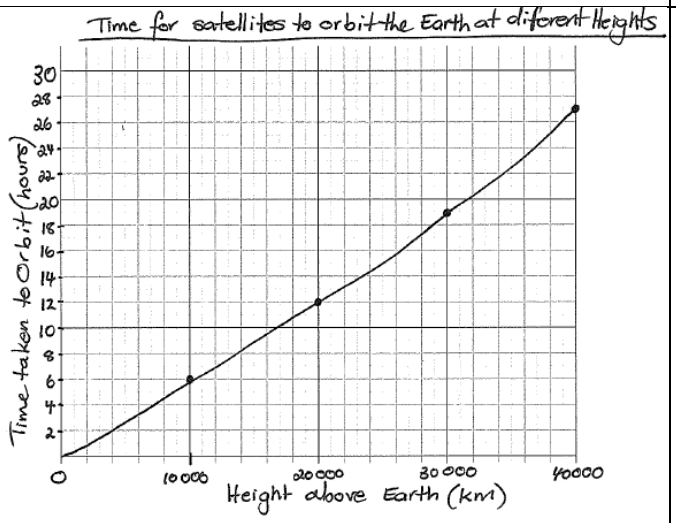
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
D	D	A	B	C	A	B	D	B	C	D	B	A	D	C	A	B	C	A	D

Part B

Q	Marking Guidelines		Sample Answer	Markers Comments
21a	Describes the action of the sinoatrial node, the electrical signal to the atria and the electrical signal via the AV junction to the ventricles.	3	The rate at which your heart beats is controlled by a patch of muscle tissue in the right atrium, called the pacemaker or sinoatrial node or sinus node. The cells in the sinoatrial node start an electrical chain reaction which causes the atria to contract. This sends blood though to the ventricles on both sides of the heart. The electrical impulse from the atria passes through an AV (atrioventricular) junction to the ventricles causing the ventricles to contract.	This question was not answered well. Some students confused the maintenance of heart rhythm with the function of valves.
	Describes 2 of the above	2		
	Describes 1 of the above	1		
b	Outlines 2 advances in technology	2	Lithium batteries which are small so they can be implanted and last longer. External monitoring devices that can program the pacemaker without the need for surgery. The use of biomaterials such as titanium so the pacemaker lasts longer in the body. Any 2 advances of pacemakers	Answered well
	Outlines 1 advance in technology	1		
22a	Identifies atherosclerosis	1	atherosclerosis	Answered very well but take care with spelling
b	Relates the build-up of plaque to the decrease in blood flow.	3	An artery wall can be damaged by smoking, diabetes and cholesterol (LDL) is absorbed by wall. White blood cells engulf the LDL and plaque is formed in the artery wall. As the plaque gets larger, the diameter of the wall of the artery decreases. This reduces the flow of blood through the artery.	Many students outlined that blood flow would be reduced but did not **explain why** so could not receive 3 marks.
	Describes a decrease in blood flow or describes a build-up of plaque	2		
	Identifies a decrease in blood flow or the build-up of plaque.	1		
c	Describes two methods to correct blood flow	4	Balloon Angioplasty with Stent – a catheter with a balloon at one end surrounded by a stent is placed in the blocked artery. The balloon is inflated, expanding the artery. The catheter is removed leaving the stent in place. Heart bypass surgery – A section of vein is removed from the leg and placed around the blocked section of artery so the blood is re-routed around the blockage.	Answered very well.
	Describes one method and outlines a second method to correct blood flow	3		
	Describes one method or outlines two methods to correct blood flow	2		
	Outlines one method to correct blood flow	1		

		Medication – patients are given blood thinners such as warfarin to make it easier for the blood to flow through narrowed arteries	
23a	Outlines 3 advantages of minimally invasive surgery – 3 Outlines 2 advantages of minimally invasive surgery – 2 Outlines 1 advantage of minimally invasive surgery – 1	Less chance of infection as the area of skin cut is reduced. Less recovery time so less time off work. Less time in hospital and cost to the patient. Any other sensible advantage.	Answered well
b	Identifies a non-invasive technique, discusses how it is used and importance in diagnosis – 3 Identifies a non-invasive technique and outlines how it is used in diagnosis – 2 Identifies a non-invasive technique – 1	X-rays – use X-rays (electromagnetic radiation) and are used to see internal hard parts of the body without invading the body. They are an important method of diagnosing broken bones and identifying tumours or disease. They provide instant images. MRI – use high strength rotating magnets to provide a detailed picture of soft and hard parts of the body without invading the body. They are important in diagnosing damage to any part of the body and identifying tumour and fractures that may be missed on an X-ray. They provide instant, multiple images. Ultrasound – use very high frequency sound waves which reflect off internal parts of the body and are converted to an image which can be seen immediately. This allows diagnosis of soft tissue damage and moving structures can be seen. So it is possible to diagnose blood flow problems and problems with organs within a foetus. Any one of above or other non-invasive technique.	Answered quite well but students need to be more specific in how and what each method is used to diagnose.
24a	Identifies pH of skin – 1	Average skin pH is 5.5	Only 5.5 was accepted, not a range of skin pH
b	Relates two roles of microflora to their importance in acting as a barrier to disease causing organisms. – 4 Relates one role of microflora to their importance in acting as a barrier to disease causing organisms and describes another role. – 3 Describes two roles of microflora – 2 Describes one role of microflora – 1	They digest dead epidermal cells, oil and sweat and excrete slightly acidic chemicals to help maintain the pH of the skin as slightly acidic which helps to make the skin inhospitable to pathogens. They provide competition for nutrients and space so prevent pathogens from entering the body or reproducing on the skin.	Some students did not mention the role of microflora in <u>maintaining</u> pH of the skin
25	Describes the structure of the surfactant in shampoo, reduction in surface tension and formation of micelle and relates to/labels diagram – 4	Shampoo contains a surfactant which is a molecule with a hydrophilic head and hydrophobic tail. The surfactant reduces the surface tension of the water so it can mix with the grease on hair. When the surfactant is applied	Most students lost a mark for not relating their answer to the diagram. This could have been done by labelling the diagram or drawing arrows from sentences in their

	Describes 3 of the above – 3 Describes 2 of the above – 2 Describes 1 of the above – 1	to the grease the hydrophobic tail enters the grease. The hydrophilic heads are attracted to the water molecules and grease is removed from the hair in small micelles. The micelles are suspended in the water and can be removed by rinsing the hair.	description to the diagram.
26	Writes a method in point form to compare 2 properties of each emulsion – 3 Writes a method in point form to compare 1 properties of each emulsion – 2 Writes a method not in point form to compare 1 property of each emulsion – 1	1. Add the same amount of each emulsion to water and observe whether the emulsion is soluble or insoluble.(oil in water soluble, water in oil insoluble) 2. Add a few drops of food colouring to each emulsion and observe whether they spread. (food colouring will spread in oil in water). 3. Add electrodes connected to an electric circuit to each emulsion to test whether they conduct electricity (oil in water will conduct, water in oil – poor conductors) 4. Apply the same amount of each emulsion to the skin and observe whether a cooling effect is felt. (oil in water – cool, water in oil – warm) 5. Repeat steps 1 - 4 Any 2 of the above steps	Students lost marks as their methods were vague and did not specify equipment or the names of specific dyes.
27a	Identifies X and Y – 2 Identifies either X or Y – 1	X – liver Y – small intestine	Many students incorrectly labelled the liver as the stomach
b	Outlines the production of gastric juice and the breakdown of proteins – 2 Outlines one of the above – 1	The stomach produces gastric juice which contains hydrochloric acid and enzymes (pepsin). Food is chemically broken down, particularly proteins.	This was answered poorly. Students need to be more specific about what is contained in the gastric juice.
28a	Identifies the dependent variable – 1	Time to dissolve	Answered well
b	Lists two controlling variables – 1	Volume of liquid to dissolve medication Mass of medication Temperature of liquid Stirring/No stirring Any 2 sensible responses	Answered well
29	Identifies all energy transformations – 2 Identifies some energy transformations – 1	Sound energy → electrical energy→ electromagnetic/microwave energy → electrical energy→ sound energy	Answered well
30a	Draws the correct pathway of light showing total internal reflection. – 1		Marks were not taken off if the angles of refection were not exactly the same but may be in the future
b	Explains that it enabled us to view total internal reflection as the light did not – 2	This demonstration was valid as it demonstrated transmission of light by total internal reflection. The light	Students lost marks as they described total internal reflection but did not relate it

	leave the water stream. Outlines that total internal reflection was observed.	 1	from the laser did not leave the stream of water showing total internal reflection which occurs in optical fibres.	to the experiment.
31a	Graph drawn with axes labelled, title, correct plotting Graph drawn with 2 of the above Graph drawn with 1 of the above	3 2 1		Graph was done OK Failure to identify the independent (controlled) variable as Height above Earth could have resulted in marks being taken off – but not this time. Some were presented as column graphs, resulting in a 1 mark deduction for not being able to identify a clear trend (and poor choice of graph type). The use of pen was too common, and makes it hard to correct mistakes made when under HSC pressure. Scale was good, interpreting the results (on a line graph) was good, axes were commonly labelled and correct units were often present. A reminder to create valid, detailed titles and to take the axes label from the graph should be given.
b	Relates height above Earth to rate of rotation, therefore maintaining a constant position above the Earth Relates the height above the Earth to the rate of rotation.	2 1	A geostationary satellite must be in the same position above the Earth constantly so must have an orbit time equal to the rotation time of the Earth – 24 hours. This occurs at a height of approximately 36 000km.	Strong across the cohort. Marks taken for unclear responses that did not link height above the Earth with geosynchronous positioning (or similar)
32	Evaluates the statement providing detailed evidence of impacts on the individual and society using at least four examples of technology Evaluates the statement providing detailed evidence of impacts on the individual and society using at least two examples of technology Evaluates the statement providing some evidence of impacts on the individual and society using at least two examples of technology Evaluates the statement providing one piece of evidence of an impact on the individual and society using at least one example of technology.	7-8 6-7 4-5 0-3	This statement is true as advances in technology have enabled advances in medicine and communication and have had a very positive impact on our quality of life as individuals and as a society. For example the range of information systems now available. E.g. mobile phones, internet, satellites and television allow constant communication and contact with other people locally and globally and mean that large amounts of data can be shared over long distances. Both verbal and non-verbal information can be shared. This benefits society as it means that there is better chance of communication in emergency situations and businesses and individuals as they can have more flexible working arrangements. Individuals can feel less isolated and have access to entertainment and	Mostly answered well. The two main errors were – - Not mentioning enough examples of technology - Not being specific in how quality of life is improved. - No judgement statement, just repeated the question.

<table>
<tr><td></td><td></td><td></td><td>resources for safety and work.
The creation of biomaterials and biomedical devices such as cochlear implants to enable deaf people to hear, pacemakers to maintain heart rhythms and joint and organ replacements. These give individuals better quality of life as they are able to return to the workforce, increases their life span and are less of a burden on family, friends and others. Society benefits as they can contribute socially and economically – not a burden on social security.</td><td></td></tr>
<tr><td>33ai)</td><td>Identifies a white blood cell</td><td>1</td><td>White Blood Cell</td><td>Answered well</td></tr>
<tr><td>aii)</td><td>Outlines the role of a white blood cell in fighting disease</td><td>1</td><td>Destroys disease causing organisms and damaged cells in the body and plays an important role in the inflammatory response.</td><td>Most good, some too brief – needed to mention the role, not simply the area it was employed, or a vague description</td></tr>
<tr><td>b</td><td>Identifies two similarities and two differences (or one similarity and three differences) between the structure and function or arteries and veins.</td><td>4</td><td rowspan="4"><table><tr><td></td><td>Arteries</td><td>Veins</td></tr><tr><td>Similarities</td><td colspan="2">They both transport blood around the body.
They are both long thin tube structures.</td></tr><tr><td rowspan="3">Differences</td><td>No valves</td><td>Valves</td></tr><tr><td>Thick elastic muscular layer in walls</td><td>Thin muscular walls</td></tr><tr><td>Transport blood away from the heart under high pressure</td><td>Transport blood to the heart under low pressure</td></tr></table></td><td rowspan="4">Many 4/4 responses – some students lost marks for clearly confusing the structure or function of each (valves on arteries, transport to limbs using veins)</td></tr>
<tr><td>Identifies one similarity and two differences (or one similarity and two differences) between the structure and function or arteries and veins.</td><td>3</td></tr>
<tr><td>Identifies one similarity and one difference (or two differences) between the structure and function or arteries and veins.</td><td>2</td></tr>
<tr><td>Identifies one similarity or one difference between the structure and function or arteries and veins.</td><td>1</td></tr>
<tr><td>c</td><td>Describes three advantages of using the circulatory system with reference to the structure of the circulatory system</td><td>4</td><td rowspan="4">The circulatory system is a continuous, closed network of blood vessels so provides a quick means of transporting pharmaceuticals.
The capillaries are in contact with all body cells and are very thin to allow exchange of pharmaceuticals between blood and target cells.
Pharmaceuticals can be delivered into the bloodstream via injection into veins or muscles, the digestive system and skin patches.</td><td rowspan="4">Few 4/4 responses – many did not make 3 clear, separate advantages, or failed to mention the structure and its importance</td></tr>
<tr><td>Describes three advantages of using the circulatory system</td><td>3</td></tr>
<tr><td>Describes two advantages of using the circulatory system</td><td>2</td></tr>
<tr><td>Describes one advantage of using the circulatory system</td><td>1</td></tr>
<tr><td>di)</td><td>Describes the role of sense organs and gives an example</td><td>2</td><td rowspan="2">Sense organs receive stimuli using receptor cells. The stimuli are converted into an electrical message to be sent to the CNS. E.g. receptor cells in the retina of the eye convert light energy into electrical energy.</td><td rowspan="2">Very few students gave clear examples of sense organs.</td></tr>
<tr><td>Describes the role of sense organs or gives an example of a sense organ</td><td>1</td></tr>
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<tr>
<td>dii)</td>
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<table>
<tr><td>Draws flow chart in correct format including all steps in the nerve pathway</td><td>3</td></tr>
<tr><td>Draws a flow chart with an error in formatting or an error in the nerve pathway</td><td>2</td></tr>
<tr><td>Draws a flow chart with an errors in formatting or errors in the nerve pathway</td><td>1</td></tr>
</table>
</td>
<td>Stimulus – sharp object
⇓
Receptor in skin
⇓
Sensory neuron
⇓
Interneuron in spinal cord
⇓
Motor neuron
⇓
Muscle in arm
⇓
Response – pull away finger</td>
<td>Failure to name sensory neurons, interneurons and motor neurons too common.
Combining steps was also unnecessary and could have cost marks if it made an unclear flow chart.
Occasionally, stimulus or response left off the flow chart.</td>
</tr>
<tr>
<td>ei)</td>
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<table>
<tr><td>Relates the symptoms of redness, swelling and fever to their physiological causes</td><td>6</td></tr>
<tr><td>Relates two of the symptoms to their physiological causes</td><td>4-5</td></tr>
<tr><td>Relates one of the symptoms to their physiological causes</td><td>2-3</td></tr>
<tr><td>Outlines how one of the symptoms is caused</td><td>1</td></tr>
</table>
</td>
<td>When tissue is damaged or there is an infection by a pathogen, prostaglandins and histamines are produced to stimulate the inflammatory response.
This causes the blood vessels to dilate in the area which results in redness in the area.
The chemicals also cause the blood vessels to increase in permeability so more fluid carrying red blood cells can reach the site of tissue damage. This results in swelling in the area.
The chemicals also send signals to the brain to increase the temperature of the body so phagocytosis can occur more quickly which results in a fever.</td>
<td>Rare 6/6 responses.
Common failure to link symptoms with their physiological cause.
Occasionally, causes were mismatched or incorrectly doubled up.
Fever, its cause and its benefit not well answered by the cohort.</td>
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<td>eii)</td>
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<tr><td>Identifies acetyl salicylic acid</td><td>1</td></tr>
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<td>Acetyl salicylic acid</td>
<td>~75% correct.</td>
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<tr>
<td>eiii)</td>
<td>
<table>
<tr><td>Describes the action of prostaglandins and how aspirin inhibits this response at the synapse of nerve cells</td><td>3</td></tr>
<tr><td>Describes how aspirin acts at the nerve synapse</td><td>2</td></tr>
<tr><td>Outlines how aspirin inhibits pain</td><td>1</td></tr>
</table>
</td>
<td>When tissue is damaged, prostaglandin is released by these cells. Prostaglandin stimulates a nerve endings/receptors in the area and a message is sent to the brain to sense pain. Aspirin inhibits the enzyme which makes prostaglandin and blocks its uptake at the synapse between nerve endings. This means less signals are sent to the brain so less pain sensation is felt.</td>
<td>Some 3/3 responses, many 2/3 responses.
Marks lost for failure to mention prostaglandins (or PE2) in response.
Some included pictures (which were good to enhance your answer) but did not make up for a poor written response.</td>
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