Trinity College

BOOKLET 1

SCIENCE DEPARTMENT

YEAR 11
HUMAN BIOLOGICAL SCIENCE EXAMINATION
SEMESTER 1, 2011

Student Name: _____ **Form:** _____

Teacher Name: _____

TIME ALLOWED FOR THIS PAPER

Reading time before commencing work: 10 minutes
Working time for paper: 2.5 hours

MATERIALS REQUIRED / RECOMMENDED FOR THIS PAPER

TO BE PROVIDED BY THE SUPERVISOR

Booklet 1 – Multiple Choice Question Booklet
Booklet 2 – Multiple Choice Answer Sheet and Extended Answer Lined Paper
Booklet 3 – Short Answer Questions and Extended Answer Questions

TO BE PROVIDED BY THE CANDIDATE

Standard items: Pens, pencils, eraser or correction fluid, ruler
Special items: A 2B, B or HB pencil for the separate Multiple Choice Answer Sheet and calculators satisfying the conditions set by the Curriculum Council for this subject
*(Graphics type calculators are **NOT** permitted).*

IMPORTANT NOTE TO CANDIDATES

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

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STRUCTURE OF THIS PAPER

Section		Number of questions available	Number of questions to be attempted	Percentage of Total Score
A	Multiple Choice	40	40	/40
B	Short Answer questions	20	20	/40
C	Extended Answer questions:	4	2	/20
			Total %	**/100**

INSTRUCTIONS TO CANDIDATES

1. Answer the questions according to the following instructions.

   Section A Answer ALL multiple choice questions by CROSSING OUT the letter of your choice on the Answer Sheet provided. Use 2B pencil here.

   Section B Answer the questions in the spaces provided. Answers to be in BLUE or BLACK biro. GRAPHS and DRAWINGS to be in pencil.

   Section C Answer BOTH questions in this section.

   Write your answers on the lined paper provided.

2. You should note that the space made available for an answer is NOT necessarily an indication of the length of the answer.

3. You must not take any of the examination booklets away from the examination room.

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SECTION A MULTIPLE CHOICE (40 marks)

Mark your answers on the Multiple Choice Answer Sheet in ***Booklet 2****.*

1. Blood plasma is mainly composed of:

   (a) haemoglobin
   (b) antibodies
   (c) blood cells
   (d) water

2. The openings between the atria and the ventricles are guarded by atrio-ventricular valves. The valve between the right atrium and the right ventricle is known as the:

   (a) mitral valve
   (b) semi-lunar valve
   (c) bicuspid valve
   (d) tricuspid valve

3. The following four statements are about the events occurring during different phases of the cardiac cycle.

   (I) Atrial systole is the phase of active contraction of the atria.
   (II) Ventricular diastole is the period during which filling of the ventricles occurs.
   (III) Blood enters the right atrium from the pulmonary veins during atrial diastole.
   (IV) Blood enters the aorta and the pulmonary arteries during ventricular systole.

   Which of the above statements is CORRECT?

   (a) (I) and (II) only
   (b) (I), (II) and (IV) only
   (c) (II), (III) and (IV) only
   (d) all are correct

4. A membrane which allows the passage of certain molecules only is said to be:

   (a) fully permeable
   (b) permeable
   (c) impermeable
   (d) differentially permeable

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5. Which blood group is a "universal recipient"?

   (a) A
   (b) B
   (c) O
   (d) AB

6. Which one of the following is NOT involved in the clotting mechanism of blood?

   (a) fibrinogen
   (b) blood platelets
   (c) leucocytes
   (d) erythrocytes

7. The period in which a heart chamber fills is called:

   (a) systole
   (b) palpitation
   (c) diastole
   (d) dilation

8. Oxygenated blood enters the heart in the:

   (a) right atrium
   (b) right ventricle
   (c) left ventricle
   (d) left atrium

9. The greatest work effort of the cardiac muscle is exerted by the:

   (a) right atrium
   (b) right ventricle
   (c) left atrium
   (d) left ventricle

10. Systolic and diastolic blood pressure in a healthy young adult should be approximately:

    (a) 100mm and 120mm of Hg respectively
    (b) 80mm and 100mm of Hg respectively
    (c) 80mm and 120mm of Hg respectively
    (d) 120mm and 80mm of Hg respectively

11. An enzyme is a/an:

    (a) chemical messenger
    (b) carbohydrate
    (c) organic catalyst
    (d) inorganic substance

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12. Which of the following lists states the major levels of taxonomic classification in order of decreasing diversity within each level?

(a) species, genus, order, class, family
(b) class, order, family, genus, species
(c) order, class, species, family, genus
(d) class, order, genus, family, species

13. A student made a wet mount of a letter that she observed under the microscope on low power as 'd'. What letter did she make the slide of?

(a) 'b'
(b) 'p'
(c) 'd'
(d) 'q'

14. Cells use as their main source of energy which of the following?

(a) sugar
(b) glucose
(c) amino acids
(d) fats

15. ATP is essential to every living cell because it:

(a) stores energy released during the breakdown of ADP
(b) speeds up the digestion of food
(c) stores energy in a form that is readily available
(d) reacts with energy from glucose to form ADP

16. Students observed a cell under high power of a microscope using a 10X ocular lens and a 40X objective lens. The cell appeared to have the width of 24mm. If the objective lens was changed to 10X, what would be the width of the cell?

(a) 96mm
(b) 24mm
(c) 6mm
(d) 12mm

17. Which of the following organelles would you expect to be more numerous in a muscle cell than in a bone cell?

(a) ribosomes
(b) mitochondria
(c) centrioles
(d) lysosomes

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18. During the process of mitosis there are a number of clearly visible stages. During which stage does replication of DNA occur?

    (a) interphase
    (b) prophase
    (c) metaphase
    (d) anaphase

19. Which of the following is the site for aerobic respiration?

    (a) nucleus
    (b) cytoplasm
    (c) mitochondria
    (d) ribosomes

20. Any group of cells of similar structure that perform a specific task are referred to as:

    (a) a system
    (b) a tissue
    (c) an organ
    (d) a nerve

21. The series of interconnecting canals that transport fluid through a cell are called:

    (a) endoplasmic reticulum
    (b) centrioles
    (c) golgi bodies
    (d) mitochondria

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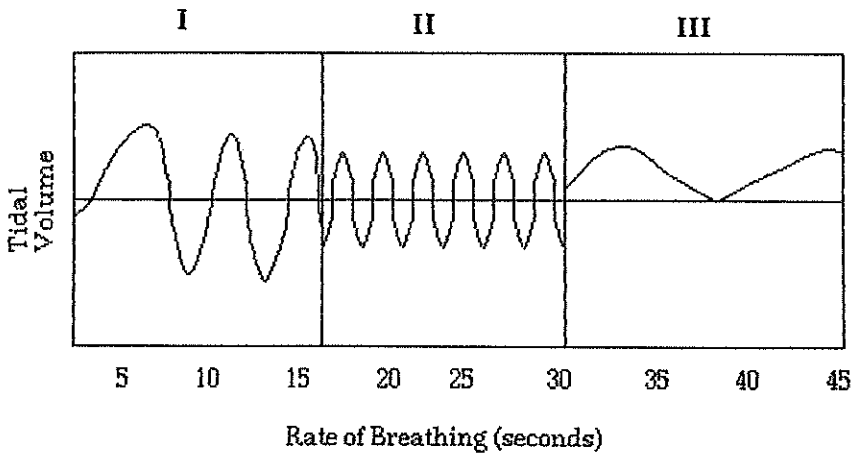
22. Consider the graph below of a man's breathing rate:



The average breathing rate for this man in an awake, sitting position was 12 breaths/minute.

Which section/s of the graph indicate/s a process of replacing the greatest oxygen deficiency?

(a) I
(b) II
(c) III
(d) I and III

23. A guide to whether an individual is overweight is calculated using the body mass index. This is calculated in the following way.

$$\text{BMI} = \frac{\text{weight (kg)}}{\text{height x height (m)}}$$

To interpret the results a standardised chart has been constructed.

Condition	BMI
Underweight	19.9 or less
Acceptable weight	20 - 25
Overweight	25.1 - 30
Obese	30.1 - 40
Extreme obesity	40.1 or more

If a 1.57m woman weighed 63kg, into which category would she fall?

(a) underweight
(b) overweight
(c) acceptable weight
(d) obese

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24. Which of the following best describes osmosis?

(a) the movement of molecules from an area of higher concentration to one of lower concentration
(b) the ability of a membrane to regulate the molecules passing through it
(c) the movement of water through a differentially semi-permeable membrane
(d) the process of transporting molecules against a concentration gradient

25. Which of the following are necessary for protein synthesis?

(a) amino acids, DNA, ADP and phosphate
(b) amino acids, ATP, phosphate and energy
(c) amino acids, DNA, enzyme and energy
(d) amino acids, ADP, enzyme and phosphate

26. Which of the following contains a body part that is not involved in digestion?

(a) stomach, liver and gall bladder
(b) gall bladder, liver and colon
(c) stomach, duodenum and liver
(d) stomach, trachea and liver

27. In mammals, most enzymes cease to function when they pass from one part of the alimentary tract to another. Which one of the following statements is the most likely explanation for the generalisation?

(a) different substrates require a variety of enzymes
(b) enzymes are affected by temperature changes
(c) some enzymes will only operate in a relatively narrow pH range
(d) absorption of the products of digestion has occurred and enzyme reaction is no longer necessary

28. Which is NOT a function of saliva?

(a) lubricates the mouth
(b) contains antibodies that kill bacteria
(c) dissolves food so the taste receptors can be stimulated
(d) mechanical digestion

29. The main function of the large intestine is:

(a) absorption of bile
(b) absorption of fatty acids and glycerol
(c) absorption of water
(d) absorption of blood

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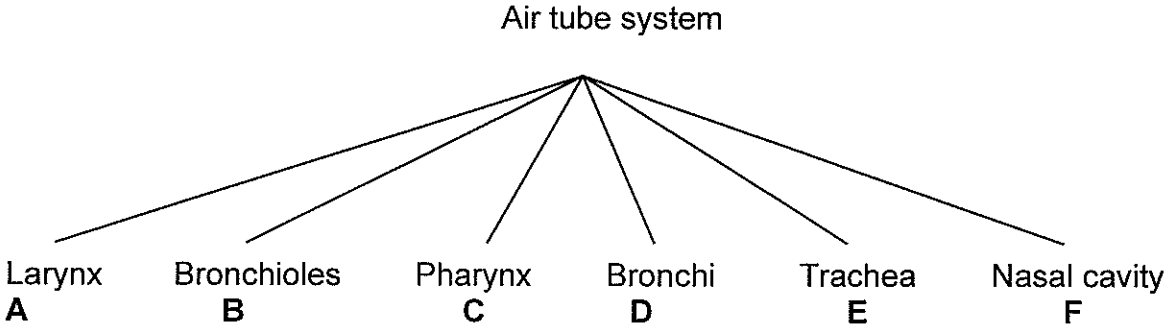
30. Digested lipids would be in the form of:

(a) amino acids and glucose
(b) glucose and glycerol
(c) fatty acids and sucrose
(d) fatty acids and glycerol

31. Many children in Australia suffer from asthma. Wheezing in asthma would be directly produced by:

(a) constriction of the bronchi and bronchioles
(b) grass pollens in the air
(c) mucus obstructing the nasal passages
(d) atmospheric pollution

32. When air is inhaled it flows through the air tube system to reach the air sacs. Which labelled part of the system contains the vocal cords?



(a) A
(b) B
(c) C
(d) D

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33. The following table shows the composition of inhaled and exhaled air.

	Inhaled Air	Exhaled Air
Oxygen	20.7%	14.8%
Carbon dioxide	0.04%	4.3%
Nitrogen	79.0%	79.5%
Water vapour	Same as atmosphere	Higher than atmosphere
Temperature	Same as atmosphere	Higher than atmosphere

Which of the following statements are TRUE?

(I) Exhaled air has a lower concentration of oxygen but a higher concentration of carbon dioxide and water vapour.
(II) The carbon dioxide content in exhaled air is increased 100 times due to excretion as waste through the alveoli.
(III) The water vapour in exhaled air is derived from the evaporation along the respiratory tract.
(IV) The temperature of the exhaled air is higher because the air is warmed by the surrounding air near the nostrils.

(a) (I) and (III) only
(b) (I), (II), (III), (IV)
(c) (II) and (IV) only
(d) (I), (II) and (III)

34. Cardiovascular disease is presently the most serious health problem in Australian society. The commonest cause of this disease is hypertension (high blood pressure). Which of the following suggestions is recommended to prevent hypertension?

(a) moderately smoking, drinking and eating anything
(b) regular exercise and a careful dietary program
(c) limiting energy and salt intake, regular daily exercise, relaxation sessions and no smoking
(d) none of the above

35. Supplemental (expiratory reserve volume) air is that which:

(a) we can inhale by making an extra effort
(b) we can forcibly exhale after normal exhalation
(c) remains in the lungs after all other air has been forced out
(d) is given to deep sea divers as an emergency supply

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36. Which of the following is true of gaseous exchange through the wall of the alveolus?

(a) nett diffusion of oxygen is from alveoli to the blood capillaries
(b) nett diffusion of carbon dioxide is from alveoli to the blood capillaries
(c) diffusion of oxygen occurs at the same rate in both directions
(d) diffusion of carbon dioxide occurs at the same rate in both directions

37. During the process of expiration the:

(a) diaphragm lowers
(b) ribs move upward and outward
(c) size of the thoracic cavity increases
(d) pressure inside the thoracic cavity increases

38. When air is inhaled it flows through an air tube system to reach the air sacs. The system consists of the following:

(i) larynx
(ii) bronchioles
(iii) pharynx
(iv) bronchi
(v) trachea
(vi) nasal cavity

What order of structures does the air flow through?

A	B	C	D
nasal cavity	nasal cavity	nasal cavity	nasal cavity
trachea	bronchi	pharynx	bronchi
bronchi	larynx	larynx	bronchioles
pharynx	trachea	trachea	trachea
bronchioles	pharynx	bronchi	pharynx
larynx	bronchioles	bronchioles	larynx

(a) A
(b) B
(c) C
(d) D

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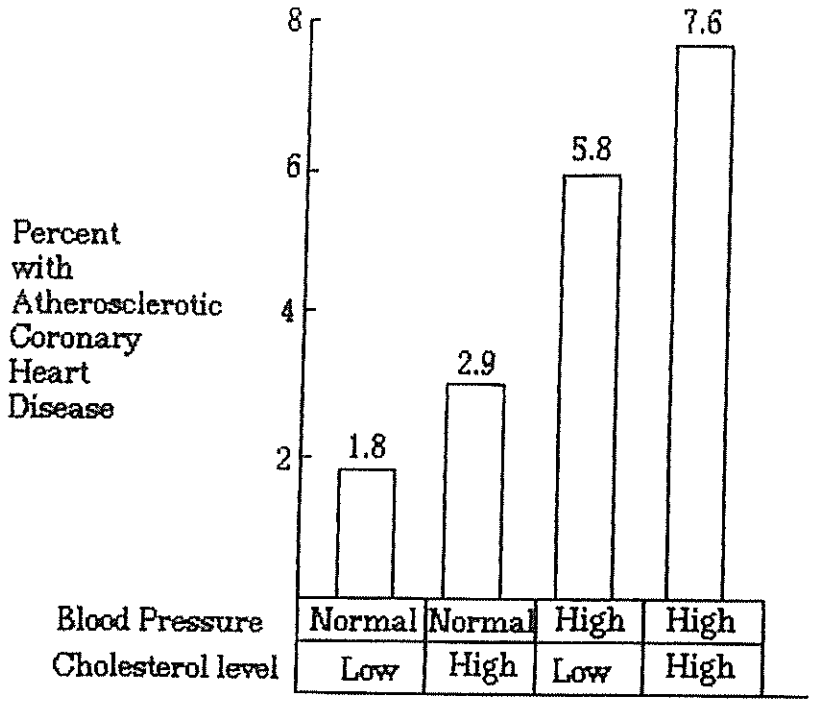
Question 39 refers to the following graph:



39. The graph above shows:

(a) the most important factor contributing to atherosclerosis is the amount of cholesterol in the blood
(b) high blood pressure and low cholesterol contribute more to atherosclerosis than high cholesterol
(c) atherosclerosis is more likely with high blood pressure and high cholesterol
(d) high blood pressure is the only factor which is implicated in atherosclerosis

40. Carbon dioxide travels:

(a) as gas bubbles in the plasma
(b) partly in the red blood cells and partly dissolved in the plasma as bicarbonate ions [HCO3 -]
(c) in the white blood cells
(d) entirely in the red blood cells

END OF SECTION A

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