Government of **Western Australia**
Curriculum Council

WACE
Western Australian Certificate of Education

Western Australian Certificate of Education
Examination, 2010

Question/Answer Booklet

HUMAN BIOLOGICAL SCIENCE

Stage 2

Please place your student identification label in this box

Student Number: In figures | | | | | | | | |

In words _____

_____

Time allowed for this paper
Reading time before commencing work: ten minutes
Working time for paper: three hours

Materials required/recommended for this paper
To be provided by the supervisor
This Question/Answer Booklet
Multiple-choice Answer Sheet

To be provided by the candidate
Standard items: pens, pencils, eraser, correction fluid/tape, ruler, highlighters

Special items: non-programmable calculators satisfying the conditions set by the Curriculum Council for this course

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.

2011/5084
Web version of 2010/31161

Ref: 10-060

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of exam
Section One: Multiple-choice	30	30	40	30	30
Section Two: Short answer	9	9	90	100	50
Section Three: Extended answer	4	2	50	40	20
				Total	100

Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2010.* Sitting this examination implies that you agree to abide by these rules.

2. Answer the questions according to the following instructions.

   Section One: Answer all questions on the separate Multiple-choice Answer Sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, do not erase or use correction fluid, and shade your new answer. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

   Sections Two and Three: Write your answers in this Question/Answer Booklet.

3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.

4. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
   - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
   - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

See next page

Section One: Multiple-choice **30% (30 Marks)**

This section has **30** questions. Answer **all** questions on the separate Multiple-choice Answer Sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, do not erase or use correction fluid, and shade your new answer. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 40 minutes.

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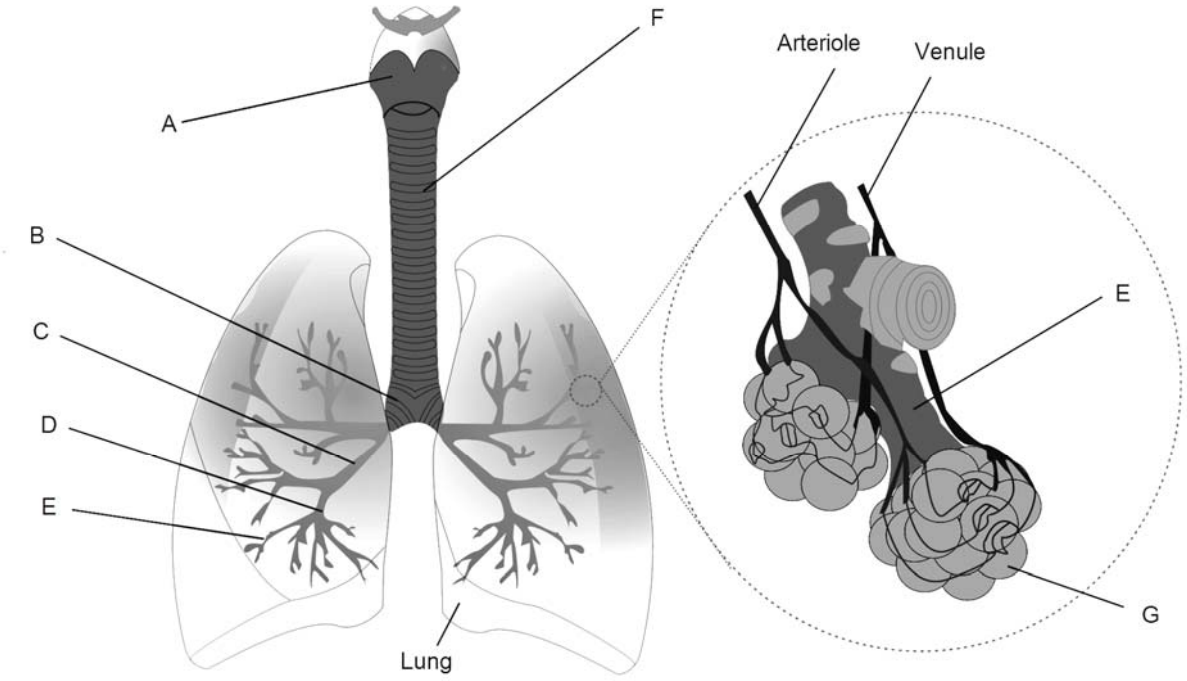
1. Gonorrhoea and Chlamydia are both sexually transmitted infections caused by

   (a) bacteria.
   (b) viruses.
   (c) fungi.
   (d) parasites.

Question 2 refers to the diagram of the respiratory system shown below.



2. Which of the following lists correctly identifies the structures shown in the diagram?

   (a) A = larynx, F = trachea, E = bronchioles, G = alveoli
   (b) A = pharynx, F = trachea, B = primary bronchi, E = bronchioles
   (c) B = primary bronchi, C = secondary bronchi, D = bronchioles, E = alveoli
   (d) F = bronchi, B = secondary bronchi, E = bronchioles, G = blood vessels

See next page

3. Absorption of fatty acids from the small intestine occurs by the process of

(a) active transport into the blood capillaries.
(b) diffusion into the blood capillaries.
(c) active transport into the lacteal.
(d) diffusion into the lacteal.

4. Which of the following is a complementary pair of bases found in the DNA?

(a) cytosine and adenine
(b) adenine and thymine
(c) guanine and adenine
(d) thymine and cytosine

Question 5 refers to the diagram shown below.

5. Which of the following correctly identifies the three different formed elements of blood as shown in the diagram above?

	1	2	3
(a)	Erythrocytes	Platelets	Leukocytes
(b)	Leukocytes	Platelets	Erythrocytes
(c)	Platelets	Plasma	Erythrocytes
(d)	Leukocytes	Erythrocytes	Plasma

6. During the process of expiration the

(a) external intercostal muscles contract and the diaphragm moves upward.
(b) external intercostal muscles relax and the diaphragm moves downward.
(c) diaphragm contracts and decreases air pressure in the lungs.
(d) diaphragm relaxes and decreases the volume of the lungs.

See next page

7. Which of the following is true for experimental errors that occur when conducting an investigation?

   (a) If scientists are very careful, then experimental errors will not occur.
   (b) The removal of experimental errors means that the results of an investigation can be said to have proven the hypothesis.
   (c) Multiple trials will reduce the impact of experimental errors on the final results.
   (d) Having a maximum number of controlled variables will mean that no experimental errors will occur.

8. Which of the following structures transports both food and air?

   (a) oesophagus
   (b) bronchus
   (c) larynx
   (d) pharynx

9. Which of the following **does not** act to prevent the entry of disease-causing organisms into the body?

   (a) acid environment in the urethra
   (b) mucus lining the respiratory tract
   (c) nasal hairs
   (d) lymph nodes

10. Which of the following is the best example of the cephalocaudal pattern of motor development in infants? Infants can

    (a) lift their head off the ground before they lift their chest off the ground.
    (b) move and control arm muscles before they can control the muscles of the fingers.
    (c) hold a large ball in their hands before they can hold and manipulate a pencil.
    (d) walk and run before they can jump up and down.

11. Medical tests show that a woman is ovulating normally but she has had several miscarriages. This is due to a lack of one particular hormone during pregnancy. This hormone would most likely be

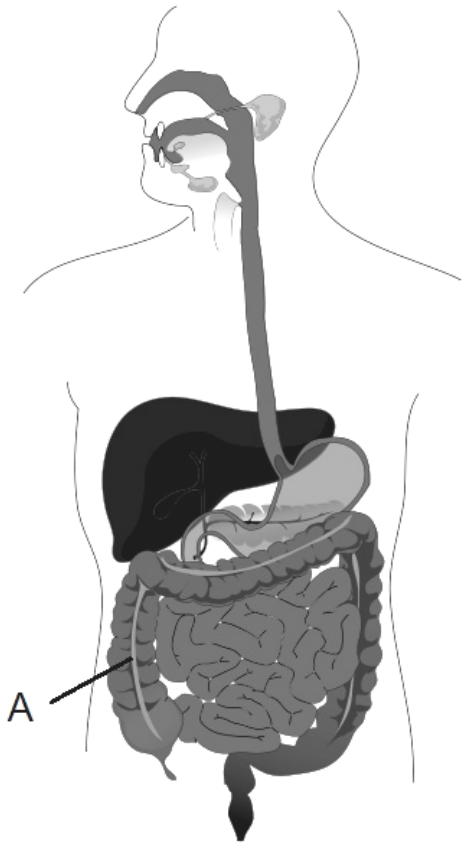
    (a) follicle stimulating hormone.
    (b) prolactin.
    (c) progesterone.
    (d) luteinising hormone.

See next page

12. For optimum gas exchange, the concentration gradient of gases in the lungs must have

    (a) low O_2 in the blood capillaries arriving at the alveoli and high CO_2 in the air in the lungs.
    (b) low CO_2 in the blood capillaries arriving at the alveoli and high O_2 in the air in the lungs.
    (c) low CO_2 in the blood capillaries arriving at the alveoli and high CO_2 in the air in the lungs.
    (d) low O_2 in the blood capillaries arriving at the alveoli and high O_2 in the air in the lungs.

Question 13 refers to the diagram of the digestive system shown below.



13. The role of structure A is to

    (a) absorb the breakdown products of fats.
    (b) digest insoluble fibre.
    (c) absorb water from undigested material.
    (d) digest minerals from undigested fibre.

14. The genotype of an individual

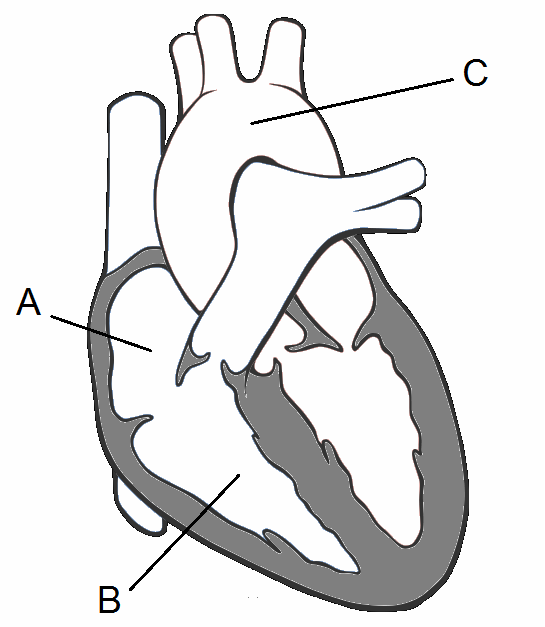
    (a) is always the same as the phenotype.
    (b) refers to the visible trait of that individual.
    (c) refers to the composition of the genes.
    (d) is indicated by the presence of either an X or Y chromosome.

See next page

15. The kidney

(a) excretes nitrogenous waste.
(b) produces enzymes for digestion.
(c) synthesises white blood cells.
(d) stores urine.

Questions 16 and 17 refer to the diagram of the heart shown below.



16. The period of time when structure A contracts and forces blood into structure B is known as

(a) ventriculation.
(b) atrial systole.
(c) diastole.
(d) the cardiac cycle.

17. Blood travelling in the vessel labelled C is moving through the

(a) aorta to deliver blood to the body.
(b) pulmonary artery to deliver blood to the lungs.
(c) vena cava to deliver blood to the heart.
(d) pulmonary vein to deliver blood to the heart.

18. At the fourth month of pregnancy, the mother becomes very aware of the foetus because

(a) of the onset of morning sickness.
(b) she can sense the heartbeat.
(c) her temperature rises suddenly.
(d) she can feel it moving around.

See next page

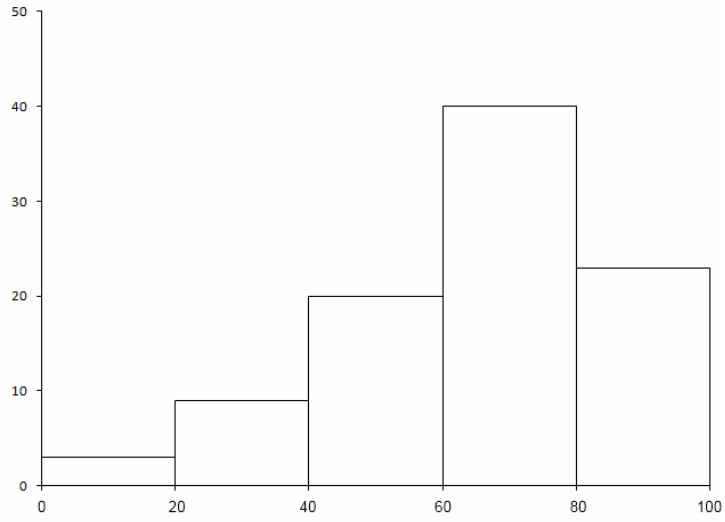
19. Consider the list of nutrients listed below:

carbohydrates, minerals, vitamins, lipids, water, proteins

Which of these substances help form an energy supply for cells of the body?

(a) carbohydrates only
(b) carbohydrates and lipids
(c) minerals and proteins
(d) minerals, vitamins and water

Question 20 refers to the graph shown below.



20. The type of graph shown in the diagram above is a

(a) bar graph
(b) column graph.
(c) pie chart.
(d) histogram.

21. The lung infection known as pneumonia is often caused by an airborne bacterium or viruses. Which of the following would be most effective in reducing the chances of an individual spreading pneumonia?

(a) regular exercise and a diet high in carbohydrates
(b) treatment of diseases with analgesic medications
(c) covering the mouth when coughing and sneezing
(d) covering open wounds with protective bandages

22. Deamination is a metabolic process that involves

(a) carbohydrates under the influence of insulin.
(b) fats in the kidney.
(c) proteins in the liver.
(d) vitamins in the adrenal medulla.

See next page

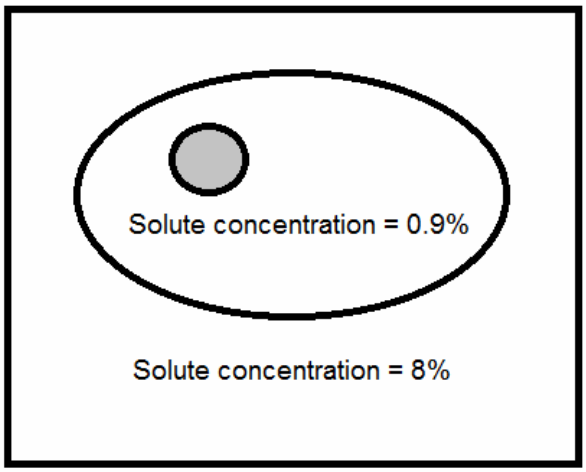
23. Sickle-cell anaemia is an example of a disease caused by a point mutation to a particular gene. This means that a

(a) change has occurred at one base pair in the DNA, altering the production of a protein.
(b) duplication of a section of chromosome has occurred and the coded information appears twice.
(c) chromosome pair has not separated during meiosis and an extra chromosome occurs in the affected individual.
(d) recessive trait will be produced, that can be inherited from one generation to the next.

24. Which of the following types of genetic diseases could be avoided by a couple using medical techniques for the sex selection of an embryo?

(a) sex-linked recessive
(b) autosomal recessive
(c) somatic mutations
(d) germline mutations

Question 25 refers to the diagram representing a cell in a salt solution as shown below.

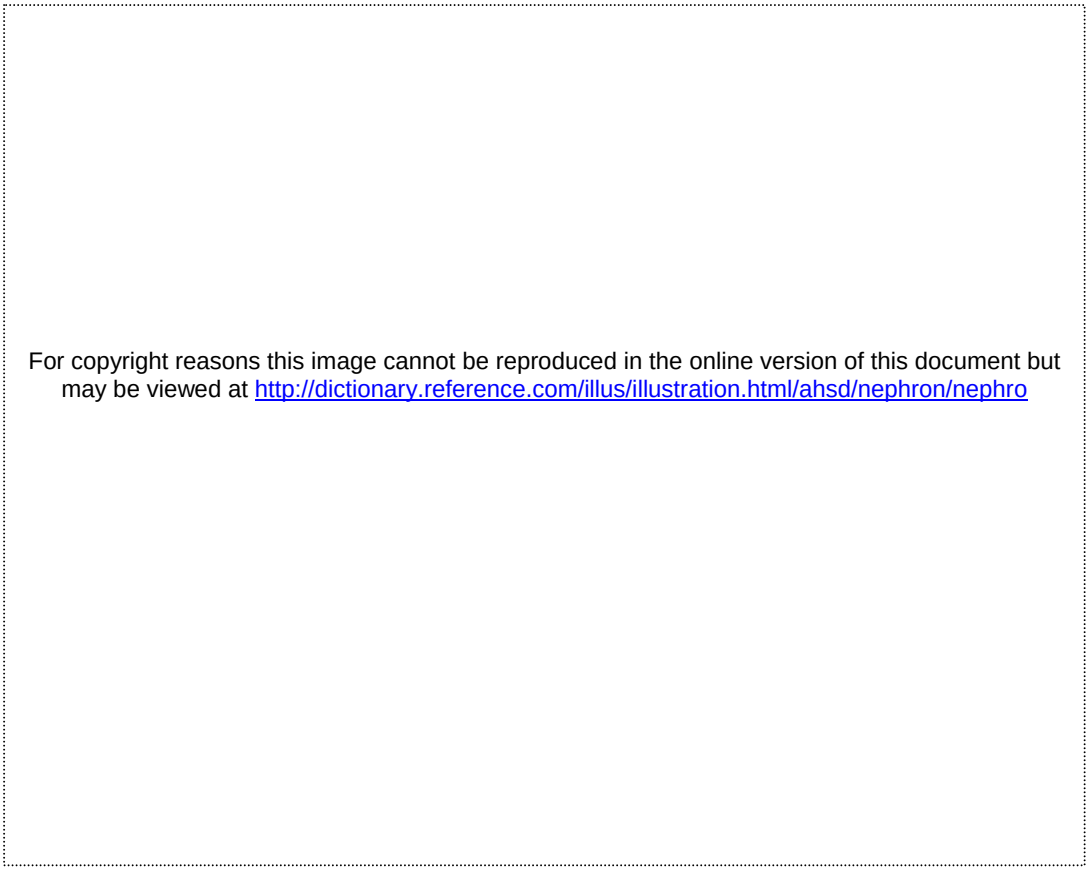


25. Which one of the following statements is correct?

(a) This cell will gain water while there is no net movement of salt.
(b) This cell will lose both salt and water to the external environment.
(c) Salt will move into the cell and water will move out of the cell.
(d) Water and salt will move into the cell's cytoplasm.

See next page

Question 26 refers to the diagram of a nephron shown below.



26. Which of the following lists correctly identifies the structures shown in the diagram?

(a) A = glomerulus, C = renal artery, E = loop of Henle, F = collecting tubule
(b) A = bowman's capsule, D = renal artery, E = loop of Henle, F = distal convoluted tubule
(c) A = glomerulus, B = bowman's capsule, C = renal vein, D = renal artery
(d) B = glomerulus, C = renal artery, E = loop of Henle, F = distal convoluting tubule

27. Liver cells are considered to be among the most active cells in the body. Therefore, it is most likely that they will contain large numbers of

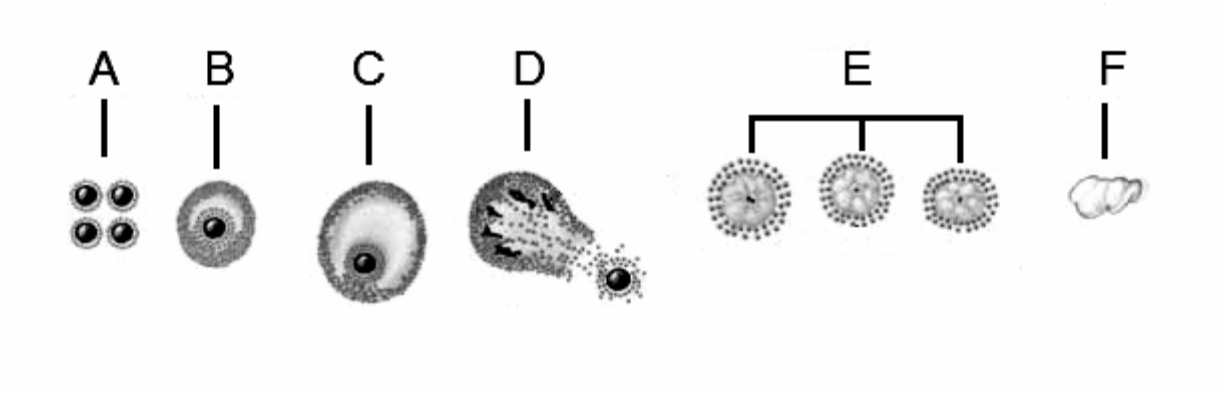
(a) nuclei.
(b) mitochondria.
(c) vesicles.
(d) golgi bodies.

28. Red-green colour blindness is an X-linked recessive disorder. A mother with this condition will pass this allele to

(a) her daughters only.
(b) her sons only.
(c) all of her children.
(d) none of her children.

See next page

Questions 29 and 30 refer to the diagram of the changes that occur in the ovarian cycle shown below.



29. Which of the following lists correctly identifies the stages shown in the diagram?

(a) B = primary follicle, C = ovulation, E = corpus luteum
(b) A = secondary follicles, C = graafian follicle, F = corpus luteum
(c) B = secondary follicle, D = ovulation , E = corpus albicans
(d) A = primary follicles, E = corpus luteum, F = corpus albicans

30. Structure C would most likely be present at what time in the normal ovarian and menstrual cycle? Days:

(a) 1 to 4
(b) 5 to 9
(c) 10 to 13
(d) 14 to 16

End of Section One

See next page

Section Two: Short answer **50% (100 Marks)**

This section has **nine (9)** questions. Answer **all** questions. Write your answers in the spaces provided.

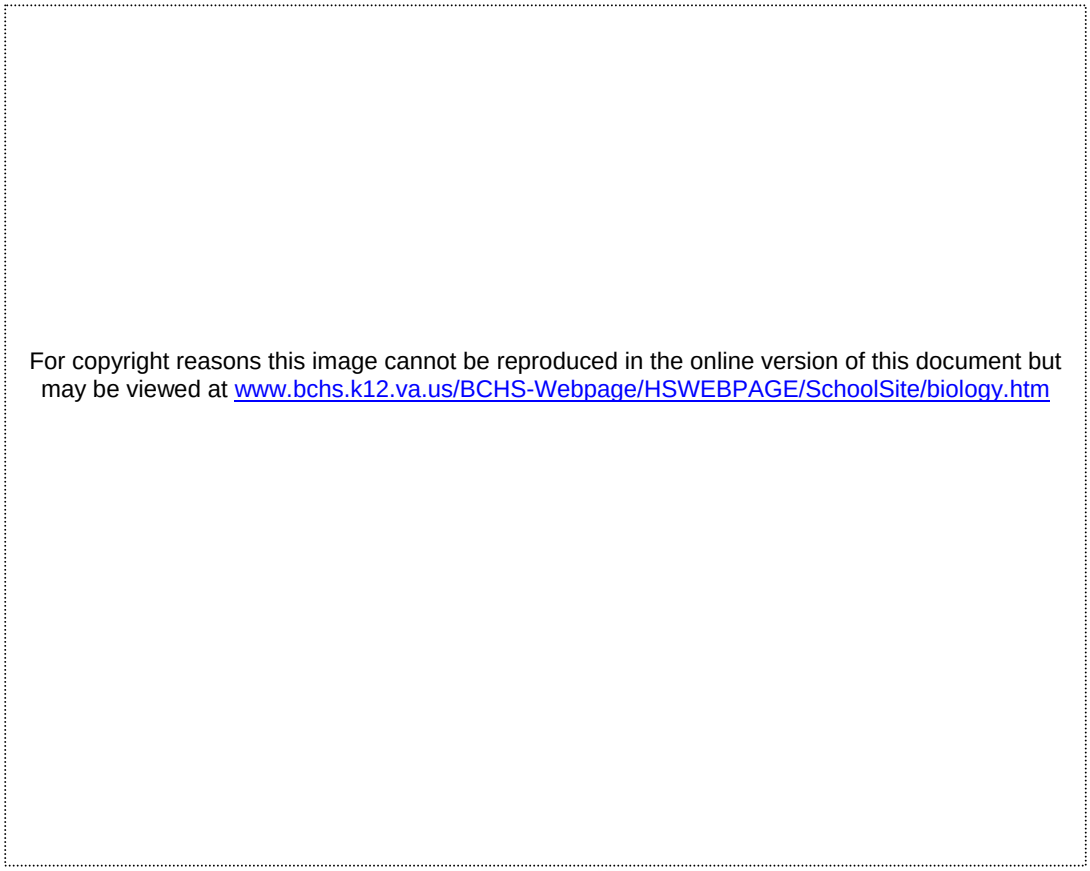
Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Suggested working time: 90 minutes.

Question 31 **(10 marks)**

The following parts of question 31 refer to the diagram of the generalised animal cell shown below.



(a) Identify the structures labelled A and B.

(2 marks)

A: _____

B: _____

(b) State the function of the structures labelled C and D. (2 marks)

C: _____

D: _____

(c) Structure E is the cell membrane. This is often referred to as being 'selectively permeable'. What does this mean? (1 mark)

_____

_____

_____

(d) What advantage does having cells so small in size provide for the human body? (2 marks)

_____

_____

_____

_____

(e) For the each of the examples listed below, identify the method of transportation that moves the specific material across the cell membrane. (3 marks)

(i) Movement of glucose from high to low concentration through a carrier protein molecule.

_____

(ii) White blood cell engulfing a pathogenic organism.

_____

(iii) Passive movement of water molecules out of the cell.

_____

See next page

Question 32 **(17 marks)**

(a) Parturition or labour occurs at the end of pregnancy. There are three stages of labour. Name the **three (3)** stages and describe what happens during each of the stages of labour in the table provided below. (6 marks)

Names of stages of labour	Events during the stage

(b) Identify **two (2)** parental choices recommended by medical professionals which are aimed at improving the immunity of infants after they are born. (2 marks)

In order to prevent unwanted pregnancies, many different contraceptive methods are available to couples. For **each** of the scenarios listed below, state the most effective contraceptive method (apart from abstinence) that could be recommended to the couples. Include in your answer **one (1)** advantage and **one (1)** disadvantage for each method that couples should be made aware of.

(c) A couple who want a natural method of contraception. (3 marks)

Method: _____

Advantage: _____

Disdvantage: _____

See next page

(d) A couple who want to protect themselves from unwanted pregnancy as well as sexually transmitted infections (STIs).

(3 marks)

Method: _____

Advantage: _____

_____

Disdvantage: _____

_____

(e) A couple wanting a surgical contraception method, as they have had two children and do not wish to have any more children in the future. (3 marks)

Method: _____

Advantage: _____

_____

Disdvantage: _____

_____

See next page

Question 33 **(10 marks)**

(a) Complete the following table, comparing aerobic and anaerobic respiration. (4 marks)

	Aerobic Respiration	**Anaerobic Respiration**
Where it occurs in the cell		
Amount of energy produced		

(b) During a one-hour tennis match, you do a lot of running around and frequently feel short of breath. The next day, you have very sore muscles in your arms and legs. Explain how your muscle soreness is most probably due to cellular respiration. (3 marks)

(c) Exercise is one healthy lifestyle choice that can reduce the risk of disease. Diet is another factor. Describe **three (3)** diet choices that can promote good health and improve long-term body functioning. (3 marks)

One: _____

Two: _____

Three: _____

See next page

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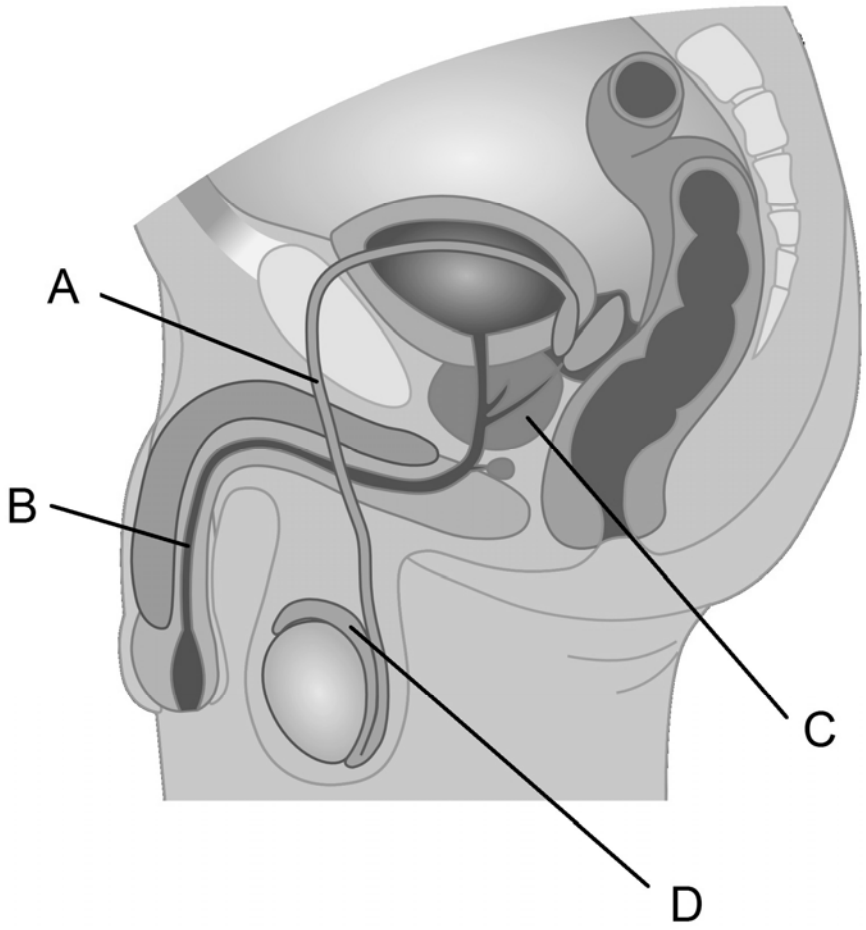
See next page

Question 34 **(10 marks)**

The following parts of question 34 refer to the diagram of the male reproductive system shown below.



(a) Identify the structures labelled A and C. (2 marks)

A: _____

C: _____

(b) State the function of the structures labelled B and D. (2 marks)

B: _____

_____

D: _____

_____

See next page

(c) Spermatogenesis is the process that forms male gametes, known as spermatozoa.

(i) How many chromosomes are found in spermatozoa? (1 mark)

(ii) Why is it important that spermatozoa have this chromosome number? (2 marks)

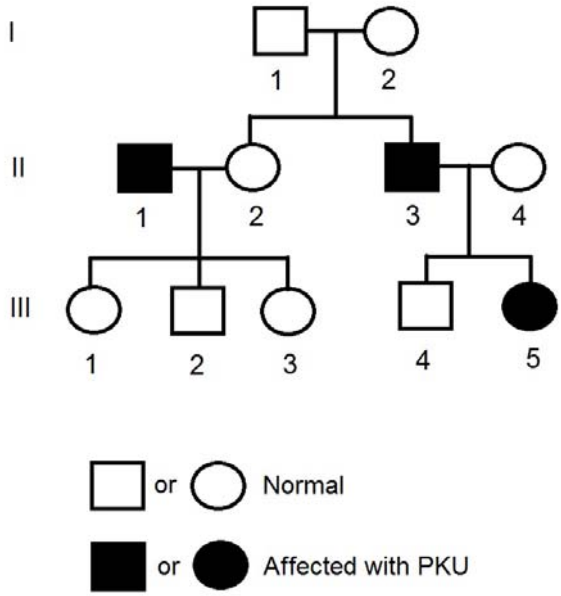
(d) Oogenesis is the process that forms female gametes, known as ovum. Complete the table below, which outlines the differences between the processes of spermatogenesis and oogenesis. (3 marks)

	Spermatogenesis	**Oogenesis**
Age of individual when the process starts occurring	Onset of puberty	
Number of gametes produced for each mother cell that undergoes the complete process		1
Size of the products	All the same size	

See next page

Question 35 **(10 marks)**

The pedigree diagram below shows the incidence of PKU in one family. PKU is an inherited disorder that prevents the normal breakdown of a protein, phenylalanine, found in some foods. Use the pedigree diagram to answer the following questions.



(a) (i) PKU is an autosomal condition. State whether is it dominant or recessive. (1 mark)

(ii) Use the information in the pedigree diagram to provide a reason for your answer in part (a) (i). (2 marks)

(b) If individuals II3 and II4 were to have a third child, what is the probability that this child would be affected with PKU? Show all your working out. (3 marks)

Another type of inheritance found in humans is co-dominance. An example of this is the ABO blood group system. The following table provides information on the inheritance of the ABO blood system.

A	Allele represented as I^A	Co-dominant with I^B allele
B	Allele represented as I^B	Co-dominant with I^A allele
O	Allele represented as *i*	Recessive to both I^A and I^B allele

(c) Using the ABO blood grouping as an example, what is meant by co-dominance?

(2 marks)

(d) Use a punnet square to explain how it is possible for two parents, one with blood type A and one with blood type B, to produce four children with four different blood types.

(2 marks)

See next page

Question 36 **(15 marks)**

The data presented below were obtained during a medical investigation seeking to improve the health and wellbeing of patients in aged-care facilities. The data represent averages determined from 200 patients in five different aged-care facilities.

The investigators monitored and analysed the nutritional content of the patients' diets over a period of six months and recorded simple indicators of health and wellbeing, such as blood pressure.

Examine the data and answer the questions that follow.

Fat Content (g/kg)	Diastolic Blood Pressure (mmHg)		Protein content (g/kg)	Diastolic Blood Pressure (mmHg)
2.0	90.9		5.3	90.9
2.5	92.7		7.0	91.7
3.5	95.3		11.9	90.3
4.8	103.4		14.7	95.4
6.2	109.4		18.9	100.4

(a) Consider the data obtained for fat content and state the hypothesis that the scientists were investigating. (1 mark)

_____

_____

(b) In terms of the hypothesis you stated in part (a),

(i) name the independent variable. (1 mark)

_____

(ii) name the dependent variable. (1 mark)

_____

(iii) state **two (2)** variables in this procedure that should be controlled. (2 marks)

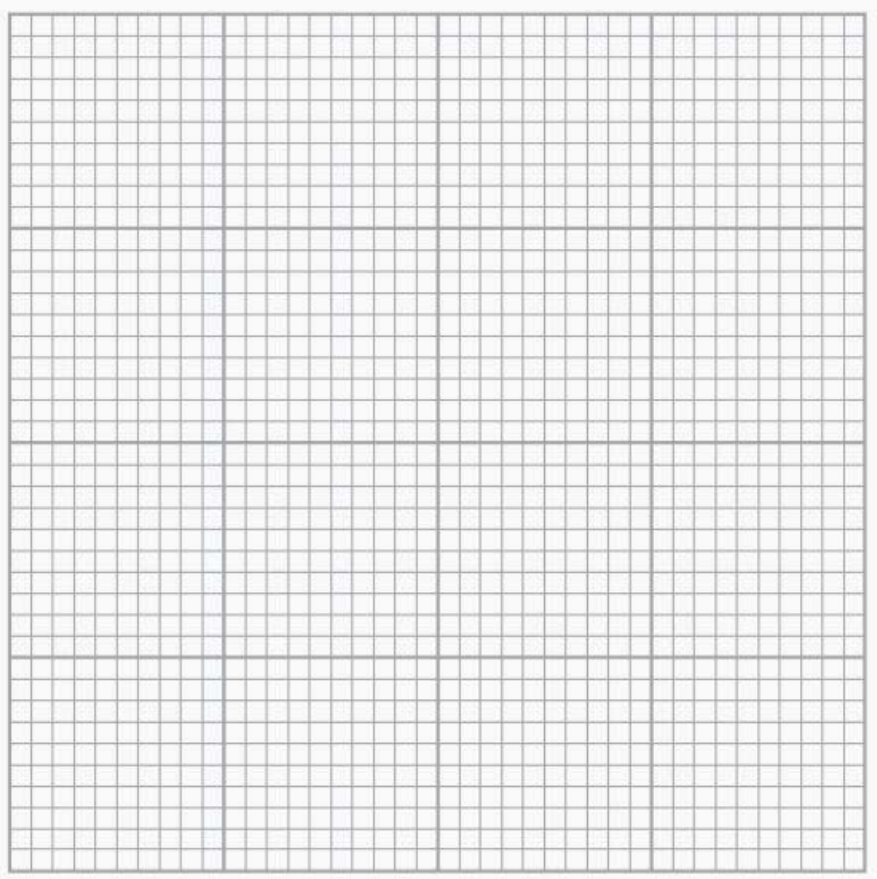
One: _____

Two: _____

See next page

(c) On the grid provided, graph the data obtained for fat content and diastolic blood pressure. (5 marks)

If you wish to have a second attempt at the graph, the grid is repeated on page 43 at the end of this Question/Answer Booklet. Indicate clearly on this page if you have used the second grid and cancel the working on the grid on this page.

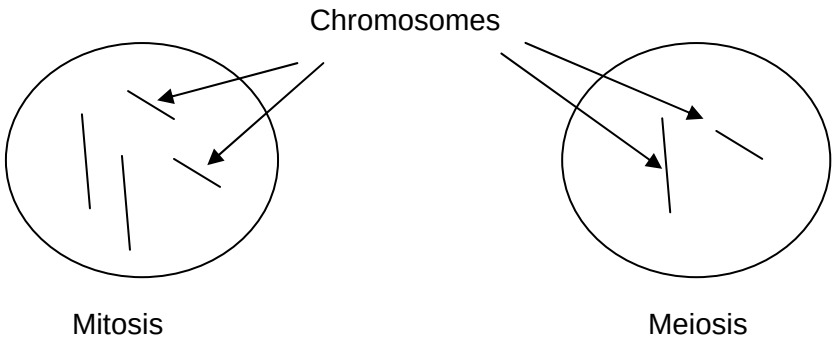


(d) Explain why it was necessary to test so many patients from a variety of aged-care facilities. (2 marks)

(e) Using the data, describe the effect of dietary protein content on diastolic blood pressure. (3 marks)

Question 37 **(8 marks)**

The diagram below represents two cells and their chromosomes. One has been produced by the process of mitosis, while the other has been produced as a result of meiosis.



(a) In the space below, draw a diagram of the cells from which these two cells originated. Indicate chromosomes only: **do not** show organelles. (2 marks)

Original Cell: Mitosis Original Cell: Meiosis

(b) During meiosis, a number of processes may occur that will increase variation. Identify and describe **two (2)** of these processes. (4 marks)

(c) Explain the importance of producing meiotic variation in new cells (2 marks)

See next page

Question 38 **(10 marks)**

With advances in biotechnology, some medical conditions can now be treated with stem cell therapy.

(a) What are stem cells? (1 mark)

(b) Identify **two (2)** characteristics of stem cells that distinguish them from other cell types. (2 marks)

One:

Two:

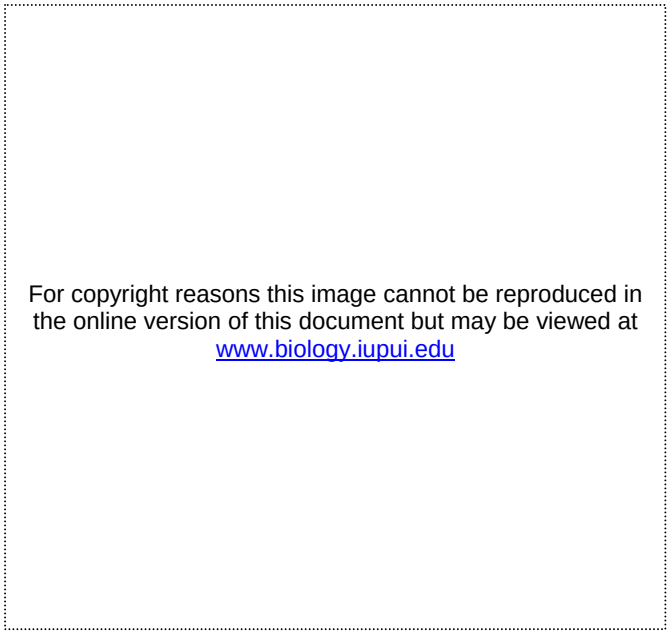
(c) (i) List **two (2)** types of stem cells. (2 marks)

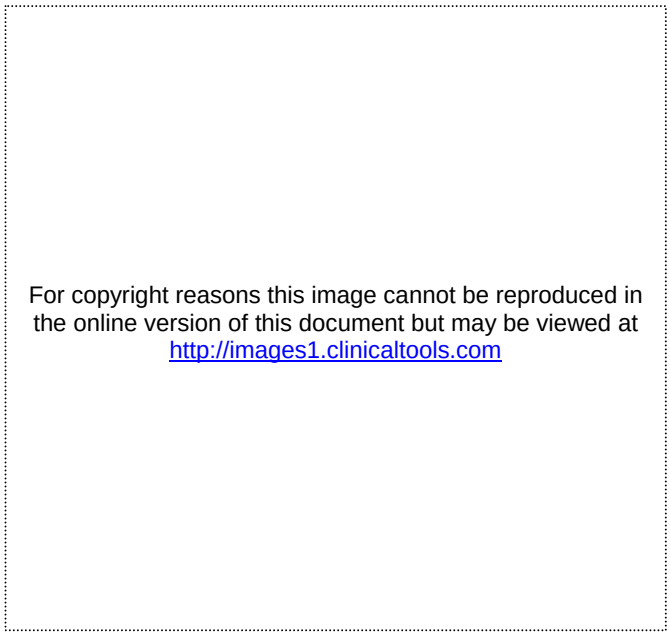
One:

Two:

(ii) Describe one potential use of stem cells in the treatment of a medical condition. (1 mark)

(d) Another advance in medical sciences is karyotyping for genetic diseases. Below is a diagram of two human karyotypes.





Karyotype 1 Karyotype 2

(i) Which karyotype is normal, Karyotype 1 or 2? (1 mark)

_____

(ii) State **two (2)** differences between Karyotype 1 and 2. (2 marks)

One: _____

_____

Two: _____

_____

(e) A woman who has the condition known as Turner's syndrome has a karyotype that shows monosomy of the sex chromosomes. What would this karyotype look like? (1 mark)

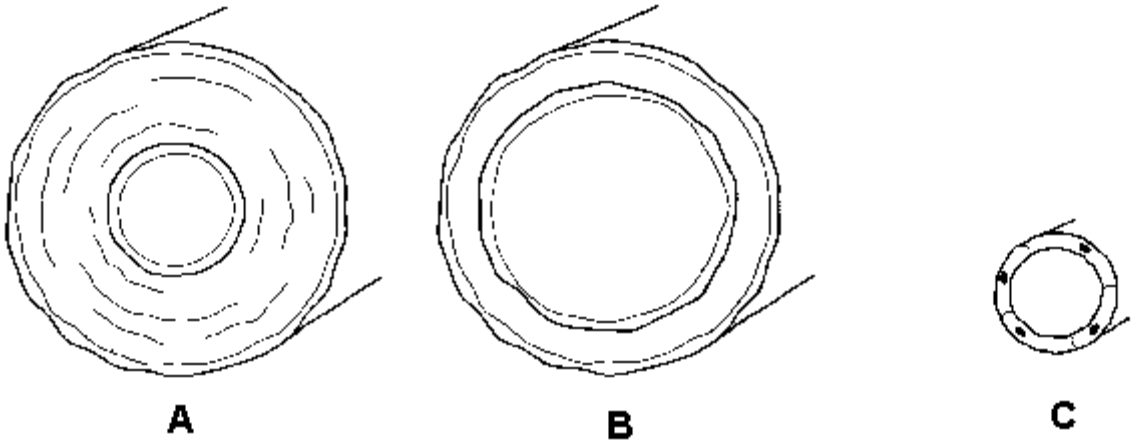
_____

_____

See next page

Question 39 **(10 marks)**

Blood vessels transport blood through systemic and pulmonary circulation. The diagram below shows three types of blood vessels.



(a) Identify the three types of blood vessels shown in the diagram. (3 marks)

A: _____

B: _____

C: _____

(b) Explain how the structure of A relates to its function. (3 marks)

_____

_____

_____

_____

_____

_____

(c) When any blood vessel is damaged, blood escapes and after a few minutes the blood flow stops as it thickens and forms a clot. Outline **four (4)** events occurring in the blood vessel and blood leading to the arrest of bleeding. (4 marks)

End of Section Two

See next page

Section Three: Extended answer **20% (40 Marks)**

This section contains **four (4)** questions. You must answer **two (2)** questions. You can choose question 40 **or** question 41 **and** question 42 **or** question 43. Write your answers in the space provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Responses could include clearly labelled diagrams with explanatory notes; lists of points with linking sentences; clearly labelled tables and graphs; and annotated flow diagrams with introductory notes.

Suggested working time: 50 minutes.

Answer **either** question 40 **or** question 41

Question 40 **(20 marks)**

(a) (i) Describe the nature and action of enzymes. (6 marks)

(ii) Outline the factors that affect the action of enzymes. (4 marks)

(b) Identify the organs involved in the digestion of proteins and lipids.
Describe how each organ will assist in the digestion of these two organic substances.
(10 marks)

or

Question 41 **(20 marks)**

(a) (i) Describe the process by which the placenta develops. (5 marks)

(ii) Provide a description of the major developments that occur during the first five weeks of embryonic development. (8 marks)

(b) If a foetus is to survive as a neonate, significant changes must occur in its circulation at birth and in the few weeks that follow birth.

Describe these changes and explain their significance in the normal functioning of a newborn infant. (7 marks)

See next page

Answer **either** question 42 **or** question 43

Question 42 **(20 marks)**

(a) Explain how sex determination of an individual occurs. (4 marks)

(b) Identify and describe **three (3)** types of teratogens that have the potential to cause birth defects. For each one, explain a measure a pregnant woman could take to reduce her chance of coming into contact with the teratogen. (6 marks)

(c) Describe the information the Human Genome Project aims to provide. Identify and describe **four (4)** different possible uses for the information. (10 marks)

or

Question 43 **(20 marks)**

(a) Explain how DNA is replicated. (6 marks)

(b) Describe the differences between nuclear DNA and mitochondrial DNA. Include in your answer an explanation of how the inheritance of mitochondrial DNA is unique. (6 marks)

(c) Genetic testing is a means of investigating the inheritance of genetic disorders.

(i) Describe how genetic testing can be done before and after conception. (5 marks)

(ii) Explain why some people consider it better to conduct genetic tests before conception rather than after. (3 marks)

End of questions

Question number: _____

Question number: _____

Question number: _____

Question number: _____

Question number: _____

Question number: _____

Question number: _____

Question number: _____

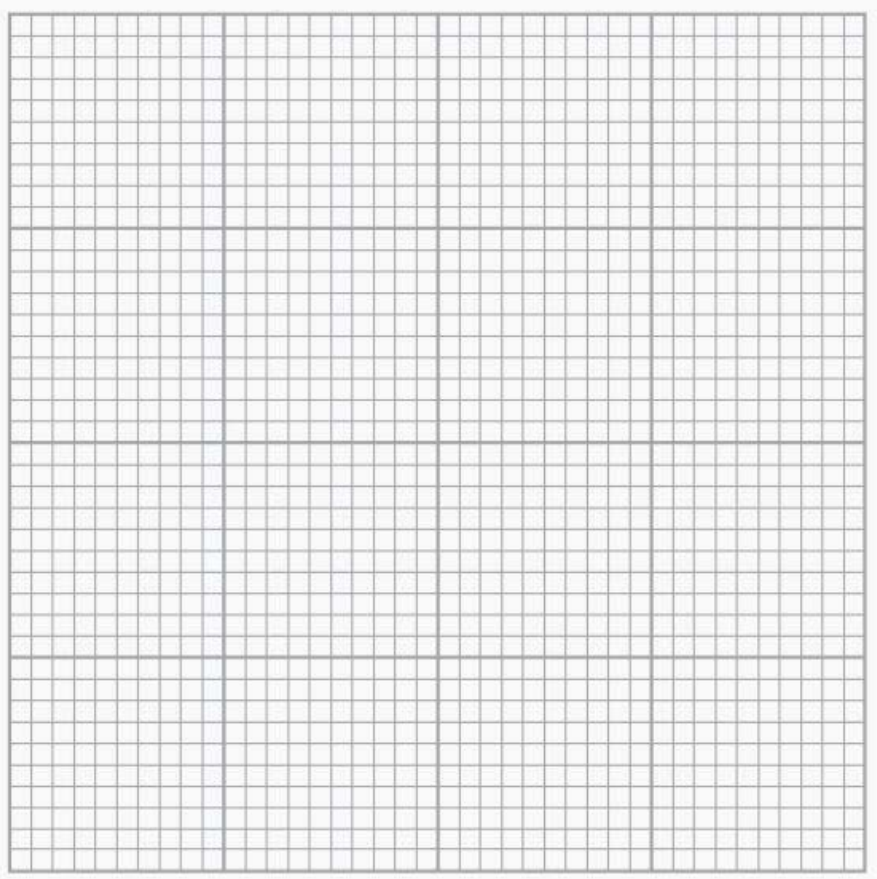
Question number: _____

Question number: _____

Additional working space

Question number: _____

Use the grid to answer question 36(c) if you have cancelled your first attempt.



ACKNOWLEDGEMENTS

Section One

Question 2 Image dapted from: Rastrojo. (2007). *Diagrama de los pulmones*. Retrieved February, 2010, from Wikimedia Commons website: http://commons.wikimedia.org/wiki/File:Diagrama_de_los_pulmones.svg

Question 5 Image adapted from: Doohan, J. (1999). *Blood cells*. Retrieved February, 2010, from Biomed 108 Human Physiology website: www.biosbcc.net/doohan/sample/htm/Blood%20cells.htm

Question 13 Diagram of human digestive system from: Villarreal, M.R. (2008). Retrieved December, 2009, from Wikimedia Commons website: http://commons.wikimedia.org/wiki/File:Digestive_system_whitout_labels.svg

Questions 16 and 17 Image adapted from: Lynch, P., J. (2006). *Heart circulation diagram*. Retrieved February, 2010, from Wikimedia Commons website: http://commons.wikimedia.org/wiki/File:Heart_circulation_diagram.svg

Question 26 Diagram adapted from: nephron. (n.d.). *The American Heritage® Science Dictionary*. Retrieved June 28, 2010, from Dictionary.com website: http://dictionary.reference.com/illus/illustration.html/ahsd/nephron/nephro

Questions 29 and 30 Ovarian cycle diagram adapted from: Myers, P., Z. (2006). *Why the wingnuts hate Plan B*. Retrieved March, 2010, from Pharyngula website: http://scienceblogs.com/pharyngula/2006/04/why_the_wingnuts_hate_plan_b.php

Section Two

Question 31 Diagram adapted from: Armstrong, E., M. (2001). *Animal Cell*. Retrieved January, 2010, from Buckingham County High School website: www.bchs.k12.va.us/BCHS-Webpage/HSWEBPAGE/SchoolSite/biology.htm

Question 34 Diagram adapted from: Ningyou. (2006). *Male reproductive system*. Retrieved March, 2010, from Wikimedia Commons website: http://commons.wikimedia.org/wiki/File:Male_reproductive_system.png

Question 38(d) Karyotype 1:
IUPUI Department of Biology. (2003). [Image]. Retrieved March, 2010, from Human Chromosomal Disorders website: www.biology.iupui.edu

Karyotype 2:
Clinical tools. (n.d.). *Karyotypes.* Retrieved March, 2010 from Clinical Tools website: http://images1.clinicaltools.com

Question 39 Diagram of blood vessels from: Horsforth school. (1998). *GCSE Sience (salters): double award, paper 3*. Retrieved February, 2010, from Horsforth school website: www.horsforth.leeds.sch.uk

Published by the Curriculum Council of Western Australia
27 Walters Drive
OSBORNE PARK WA 6017