Government of **Western Australia**
**Curriculum Council**

WACE
Western Australian Certificate of Education

# Western Australian Certificate of Education Examination, 2011

## 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.

2012/3288
Web version of 2011/30872



Ref: 11-060

## 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 | 10 | 10 | 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 2011.* 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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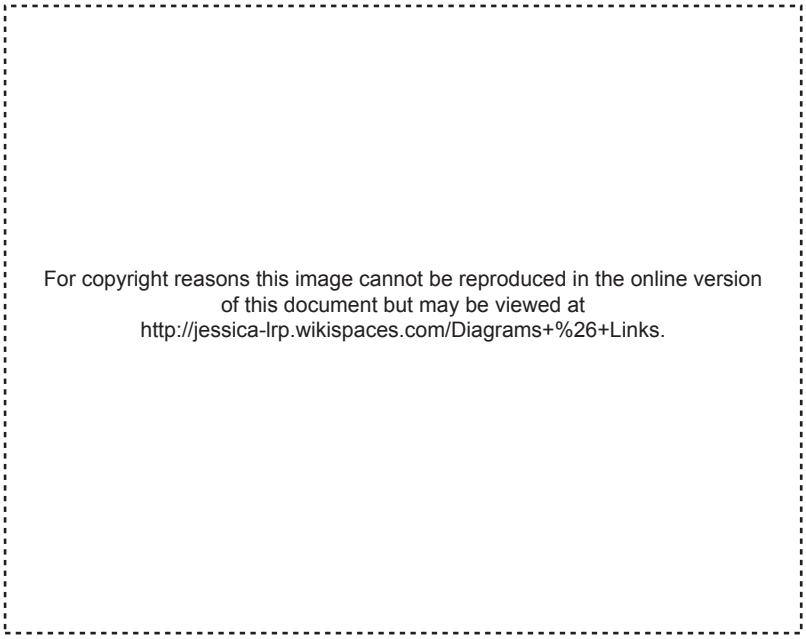
1. DNA is located in the nucleus. Where else in the cell is DNA found?

   (a) ribosomes
   (b) mitochondria
   (c) golgi body
   (d) centrioles

Question 2 refers to the diagram below.




2. Which reproductive technique is represented in the diagram?

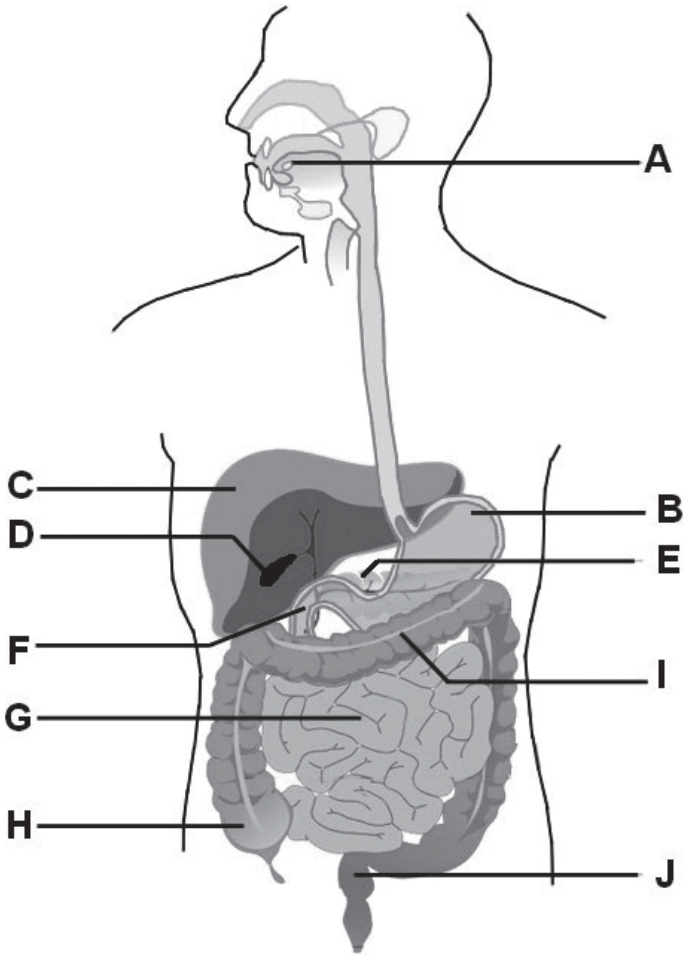
   (a) in-vitro fertilisation
   (b) artificial insemination
   (c) intracytoplasmic sperm injection
   (d) chorionic villus sampling

3. The major event that occurs during the first stage of birth is

   (a) dilation of the cervix.
   (b) delivery of the foetus.
   (c) bursting of the membranes.
   (d) expulsion of the afterbirth.

**See next page**

Questions 4–6 refer to the diagram below, which shows the human digestive system.




4. Where does the chemical digestion of fats begin?

(a) B
(b) A
(c) F
(d) G

5. Where is glucose absorbed?

(a) B
(b) G
(c) C
(d) J

6. Which of the following parts would contain a fluid that lacks digestive enzymes?

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

**See next page**

7. During the sixth month of foetal development, which of the following changes are seen in the developing foetus?

(a) arms and hands fully formed and sex distinguishable for the first time
(b) the skeleton, bone marrow and blood cells are formed
(c) respiratory movements begin and digestive organs start functioning
(d) sucking and grasping reflexes begin and eyes open

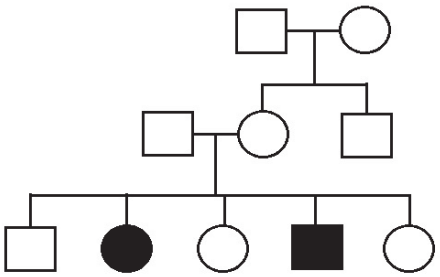
8. As a result of the Human Genome Project

(a) all human diseases can now be cured.
(b) the genes in all 46 chromosomes have been mapped.
(c) the sequence of proteins in all human chromosomes is known.
(d) faulty genes can now be corrected.

9. Which of the following **cannot** pass across the placenta?

(a) oxygen
(b) waste materials
(c) blood
(d) nutrients

Question 10 refers to the diagram below.



10. Which inheritance pattern would you expect to display this type of pedigree?

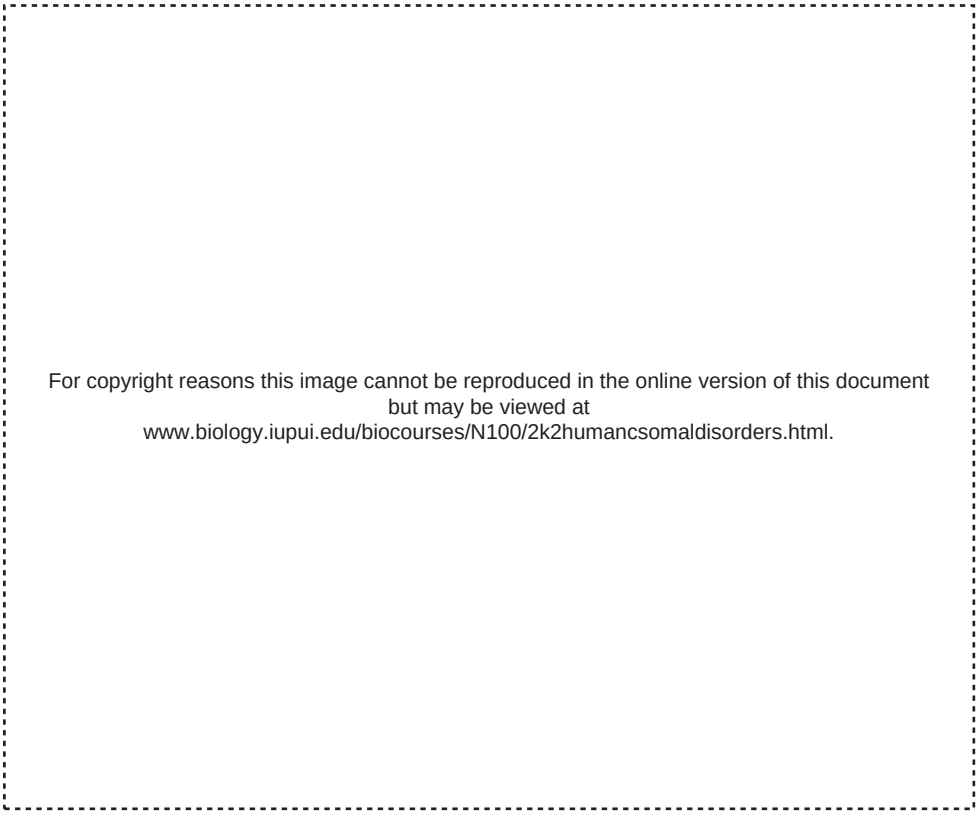
(a) sex-linked recessive
(b) autosomal recessive
(c) sex-linked dominant
(d) autosomal dominant

11. An athlete with a high count of red blood cells will perform well in tests of physical endurance because

(a) waste products will be removed from the body easily.
(b) excess levels of glucose will increase levels of respiration.
(c) the reduced plasma volume will lower carbon dioxide levels.
(d) high levels of oxygen will be available to the muscles.

**See next page**

Question 12 refers to the diagram below, which shows a karyotype.




12. The diagram shown above is a karyotype of a normal female. How would the karyotype differ if it was showing a female with monosomy of the sex chromosomes?

(a) one less X chromosome
(b) one more X chromosome
(c) two less X chromosomes
(d) one more Y chromosome

13. The production of proteins occurs in the

(a) endoplasmic reticulum.
(b) mitochondria.
(c) ribosomes.
(d) nucleus.

14. Performance-enhancing drugs, such as anabolic steroids, can produce many negative side effects. Which of the following is a potential negative side effect for **both** men and women?

(a) shrinking of the breasts
(b) shrinking of the testes
(c) deepening of the voice
(d) liver damage

15. The best description of an antibiotic is that it is used to fight infections caused by

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

16. Topical preparations, such as antiseptic creams and sanitising lotions, are considered good for improving personal hygiene. They are also used for

(a) protecting against sunburn.
(b) reducing pain and swelling.
(c) preventing the spread of infection.
(d) treating fungal infections.

Question 17 refers to the diagram below.

**Size of the Australian Standard Alcoholic Drink**

| Light beer | Full strength beer | Wine | Spirits | Port/sherry |
|---|---|---|---|---|
| **Large glass** 425 mL | **Medium glass** 285 mL | **Glass** 100mL | **Nip** 30mL | **Glass** 60mL |

17. The size of a standard drink varies because

(a) you can drink a glass of beer much more easily than a glass of spirits.
(b) as alcohol content increases, greater volumes can be consumed.
(c) the effect of alcohol in beer is different from the effect of alcohol in spirits.
(d) the concentration of alcohol varies between different beverages.

18. The function of the vas deferens is to

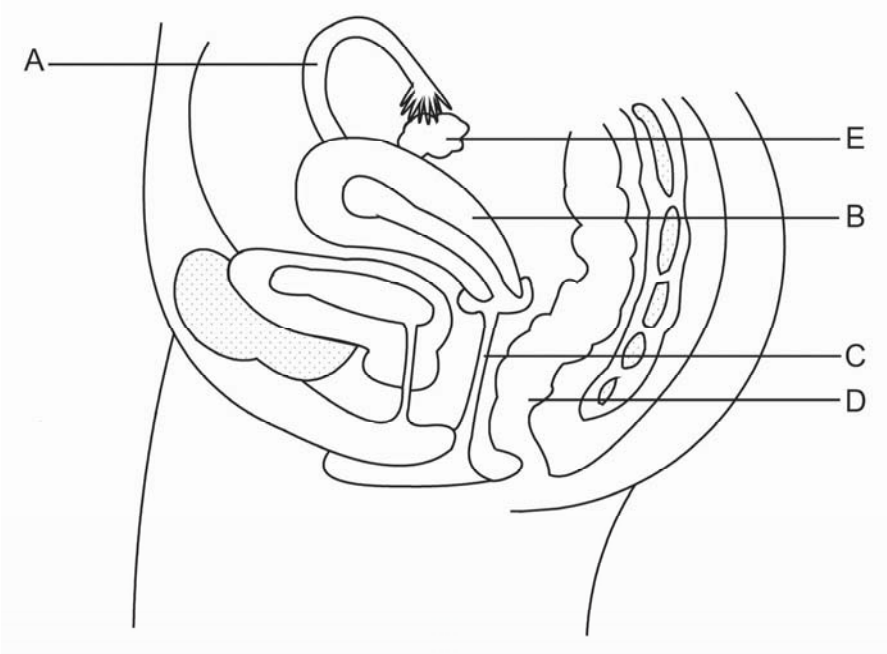
(a) carry sperm to the urethra.
(b) produce spermatozoa.
(c) produce seminal fluid.
(d) pass out urine.

**See next page**

19. Which of the following is a visible sign of inflammation?

(a) pus, which is due to release of heparin
(b) redness and swelling, which are due to release of histamine
(c) the presence of phagocytes
(d) the presence of platelets

Questions 20–21 refer to the diagram below, which shows the female reproductive system.




20. The structure that produces the ovum is

(a) A.
(b) B.
(c) C.
(d) E.

21. The structure where fertilisation takes place is

(a) A.
(b) B.
(c) D.
(d) E.

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

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

**See next page**

23. The following is a list of birth defects or negative side effects associated with different teratogens.

i. increased respiratory problems
ii. increased gastrointestinal problems
iii. malformations of the heart and limbs
iv. blindness and deafness
v. increased risk of sudden infant death syndrome

Which of these has been linked to smoking during pregnancy and smoking around newborn babies?

(a) i, iii, iv
(b) ii, iii, iv
(c) i, ii, v
(d) i, iv, v

24. Air moves out of the lungs when the

(a) diaphragm relaxes and the rib cage moves inward.
(b) air pressure inside the lungs is less than the external air pressure.
(c) diaphragm contracts and the rib cage expands.
(d) air pressure inside the lungs is the same as the external air pressure.

25. Which of the pathways listed below shows the correct route of air as it passes from the alveoli to the external environment?

(a) larynx → bronchus → trachea → nasal cavity
(b) bronchiole → bronchus → trachea → larynx
(c) larynx → trachea → bronchus → bronchiole
(d) bronchus → bronchiole → trachea → nasal cavity

26. At birth, a newborn's head is about one quarter of the total length of the body. What happens to this ratio as the body grows?

(a) decreases to about one-tenth of the total length
(b) increases to about half of the total length
(c) stays the same
(d) decreases to about one-sixth of the total length

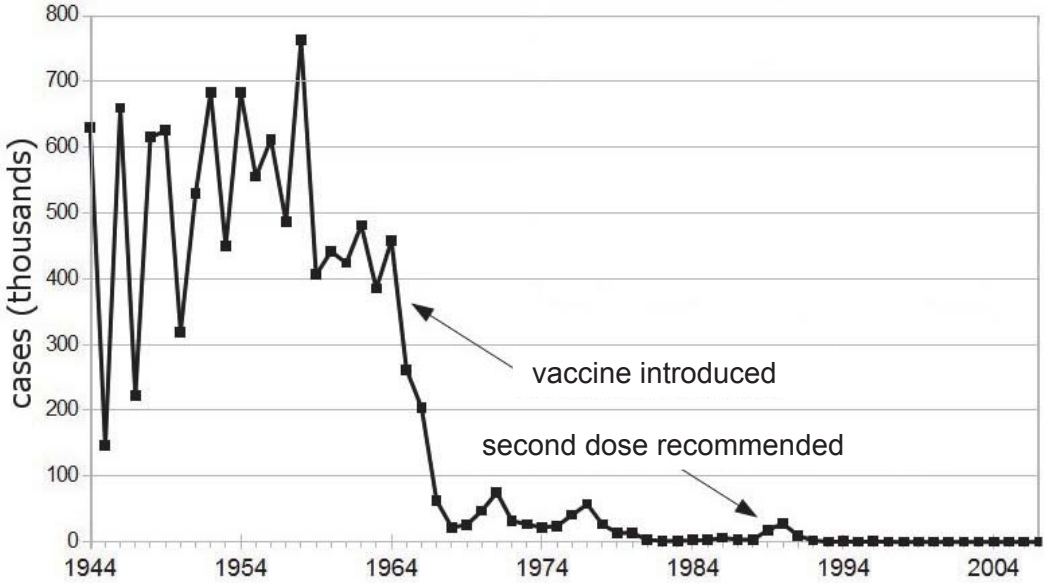
27. Which of the following does **not** result in increased variation?

(a) crossing-over during meiosis
(b) replication of chromosomes in the nucleus
(c) random union of two gametes
(d) random assortment of chromosomes during meiosis

**See next page**

Question 28 refers to the graph below.

**Measles cases in the United States, 1944–2007**




28. Data from the graph provide support for the following statement.

(a) Immunisation has had little effect on the number of cases of measles in the population.
(b) Since 1984, no cases of measles have been seen in the general population.
(c) Since the introduction of the vaccine, cases of measles in the population have decreased greatly.
(d) The incidence of measles would have decreased with or without the introduction of the vaccine.

29. The most likely means by which a white blood cell would remove foreign material is

(a) osmosis.
(b) exocytosis.
(c) active transport.
(d) phagocytosis.

30. In meiosis, the chromosome number is halved in order to

(a) ensure the DNA is copied completely.
(b) maintain all the DNA in the daughter cells.
(c) ensure that errors in crossing-over can be corrected at fertilisation.
(d) maintain the correct chromosome number in offspring.

**End of Section One**

**See next page**

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

This section has **ten (10)** 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.

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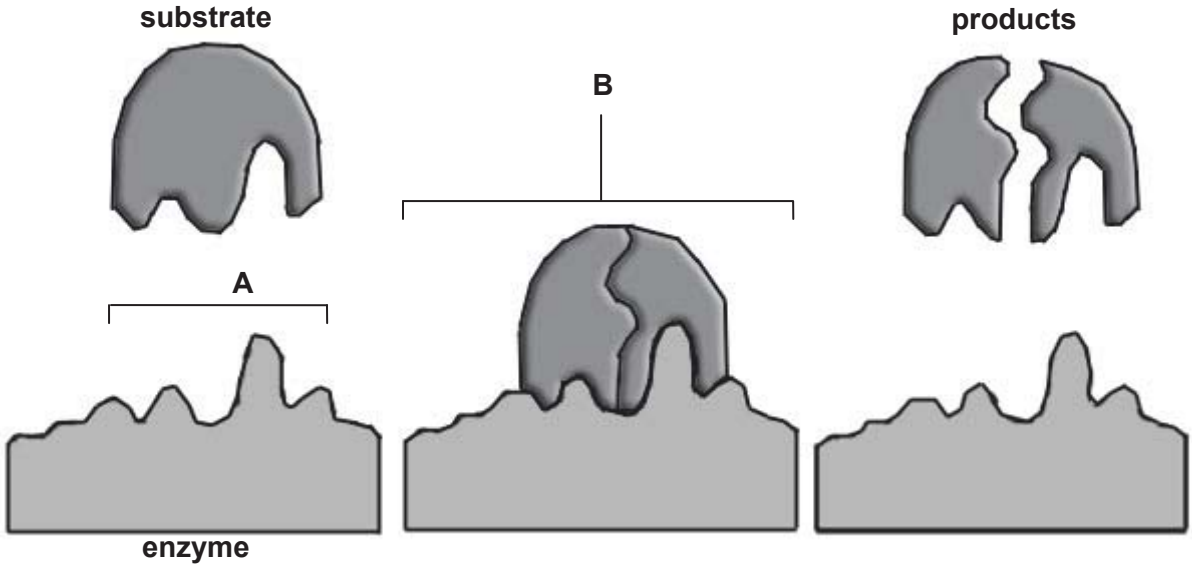
**Question 31** **(10 marks)**

The following question refers to the diagram below, which shows the events that occur during a reaction involving an enzyme.




(a) Complete the following questions using the information in the diagram above.

(i) Name the region indicated by A. (1 mark)

(ii) Name structure B. (1 mark)

(iii) Is the reaction shown in the diagram a catabolic or anabolic reaction? Explain why. (2 marks)

(b) Select the correct term that describes how different factors can affect enzyme activity.
(4 marks)

| Factor | Reaction rate<br>(Select the correct term: Increase / Decrease / Unchanged) |
|---|---|
| Concentration of an enzyme increases | |
| Internal body temperature decreases | |
| Stomach pH levels become neutral | |
| Concentration of substrate increases | |

(c) Explain how enzymes increase the speed of a chemical reaction in the body.
(2 marks)

See next page

**Question 32** **(7 marks)**

The table below shows raw data collected in Australia on the incidence of two different sexually transmitted infections (STIs).

| Year | Number of reported cases of STI Type 1 | Number of reported cases of STI Type 2 |
|---|---|---|
| 1950 | 1000 | 0 |
| 1960 | 2000 | 0 |
| 1970 | 3500 | 500 |
| 1980 | 5000 | 1000 |
| 1990 | 4000 | 2500 |
| 2000 | 3000 | 5000 |
| 2010 | 2500 | 8000 |

(a) Using the data, which STI (Type 1 or 2), would more likely represent HIV? Explain your answer. (2 marks)

(b) Suggest why using raw data is **not** the most appropriate way of measuring the incidence of these diseases. (1 mark)

(c) Give **two (2)** examples of STIs (other than HIV). (2 marks)

One: _____

Two: _____

(d) Which STI is characterised by

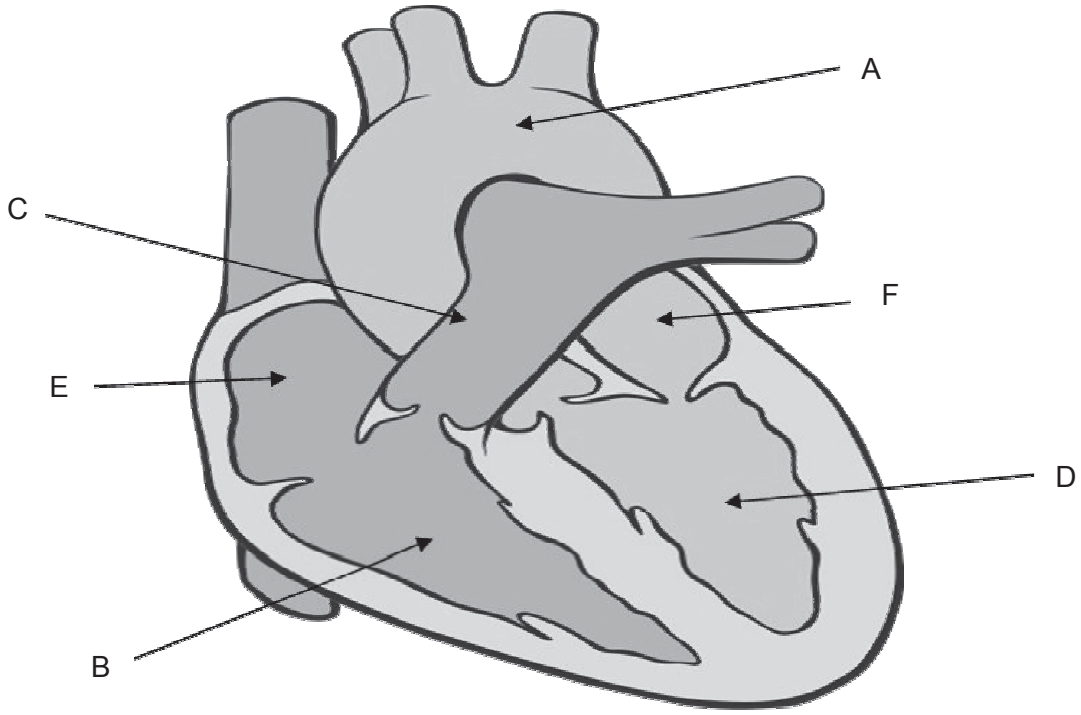
(i) a chancre (open sore) during the primary stage? (1 mark)

(ii) painful genital blisters? (1 mark)

**See next page**

**Question 33** **(10 marks)**

Part (a), (b) and (d) of this question refer to the diagram below, which represents a longitudinal section through the human heart.




(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) Describe the difference in structure between an artery and a vein. Give a reason for this difference. (2 marks)

_____

_____

_____

_____

**See next page**

(d) In some instances, babies can be born with a hole that connects the structure labelled E with the structure labelled F. Explain why this 'hole in the heart' is a serious problem. (1 mark)

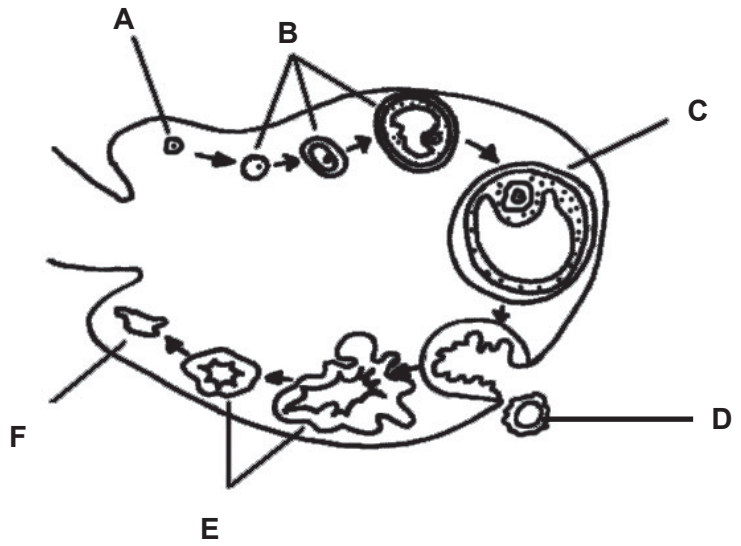
(e) The major chambers of the heart are separated by valves. What important role is performed by these valves? (1 mark)

(f) Describe what occurs during atrial systole. (2 marks)

**See next page**

**Question 34** **(10 marks)**

Part (a) of this question refers to the diagram below, which shows the events that occur inside the ovary during a normal ovarian cycle.




(a) Complete the following using the information in the diagram.

(i) Name structure A. (1 mark)

(ii) What is the name of the event shown at point D? (1 mark)

(iii) The corpus albicans is best represented by which structure? (1 mark)

(iv) Name a hormone secreted by structure E and state its function. (2 marks)

(v) At approximately what day in the cycle would you expect to find structure C? (1 mark)

(vi) At what point in the cycle would you expect menstruation to occur? (1 mark)

**See next page**

(b) The oral contraceptive pill known as the combined pill prevents pregnancy by affecting the menstrual and ovarian cycles. Explain how the pill stops female ovulation.

(2 marks)

(c) How does use of the male condom prevent pregnancy? (1 mark)

**See next page**

**Question 35** **(11 marks)**

(a) Tay-Sachs is an autosomal recessive disorder. A couple with a history of Tay-Sachs in their families undergoes genetic screening before trying to conceive a baby.

(i) It is found that the woman is a carrier for Tay-Sachs and the man is homozygous normal. Using a punnet square, predict the possible genotypes and phenotypes of their future children. (3 marks)

(ii) If you were the genetic counsellor for the couple, what advice would you give them about their chances of having a child with Tay-Sachs? (1 mark)

**See next page**

(iii) The genetic counsellor drew a pedigree to show the couple how Tay-Sachs has been inherited in their families. In the space provided, construct the pedigree diagram the counsellor would have drawn. Include three labelled generations in the pedigree: (6 marks)

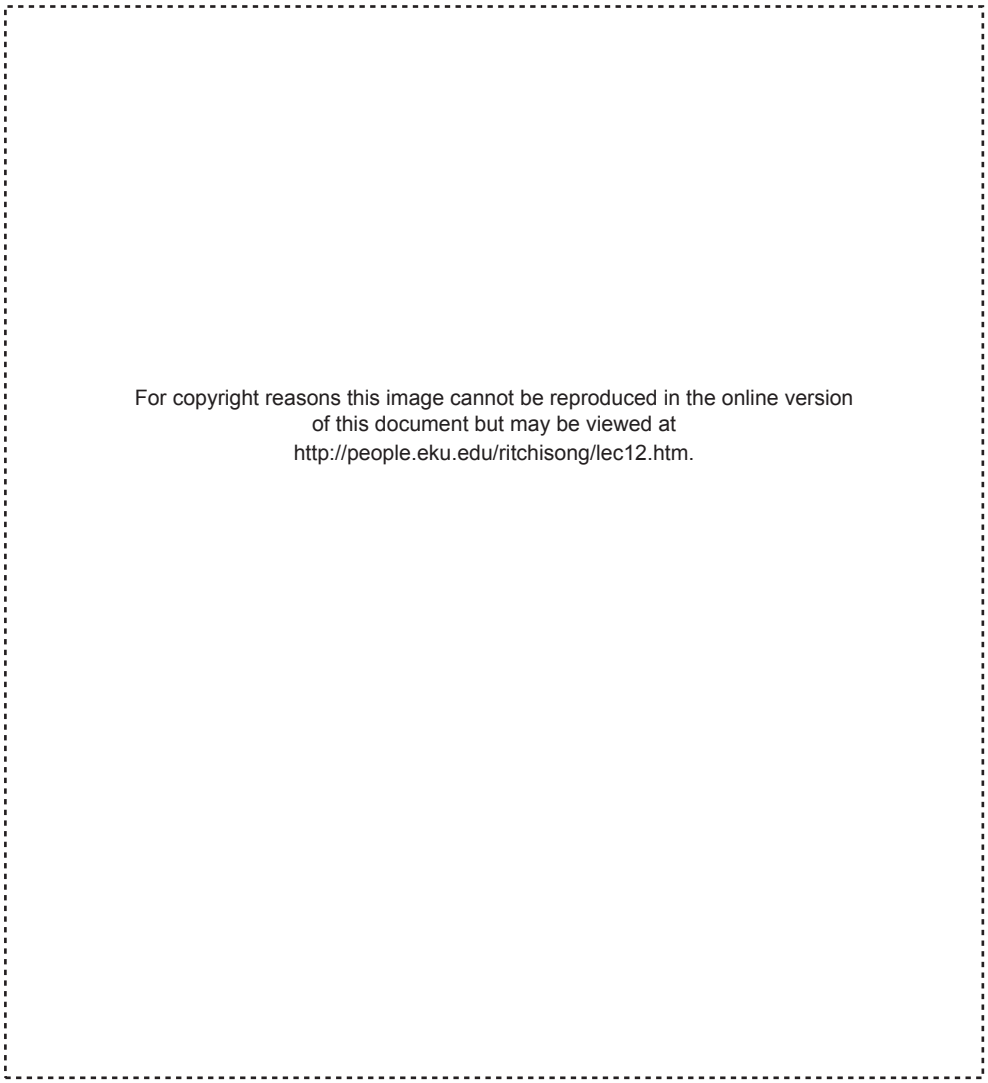
- the couple's parents
- the couple and their siblings. The woman is the younger of two girls; her sister was affected with Tay-Sachs. The man is the oldest child, with a younger sister and an even younger brother who are all normal.
- the prediction of three future children, who are all boys.

(b) Tay-Sachs is an example of a disorder that can be linked to a particular population. Name a population that has a high incidence of Tay-Sachs. (1 mark)

**See next page**

**Question 36** **(10 marks)**

Part (a), (b) and (c) of this question refer to the diagram below, which represents a nephron. This is the main urine-forming structure in the human body.




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

A: _____

B: _____

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

C: _____

D: _____

**See next page**

(c) Complete the following sentence, describing filtration at structure E. (2 marks)

The arteriole directing blood away from structure E has a _____

diameter than the arteriole directing blood toward it. This results in a/an _____

of the blood pressure to force more fluid out of the blood during filtration.

(d) In general, the urine of a healthy person should not contain high levels of glucose or large protein of any kind. Explain why this is the case. (2 marks)

_____

_____

_____

_____

(e) Name the process that produces urea and state the location at which this occurs. (2 marks)

_____

_____

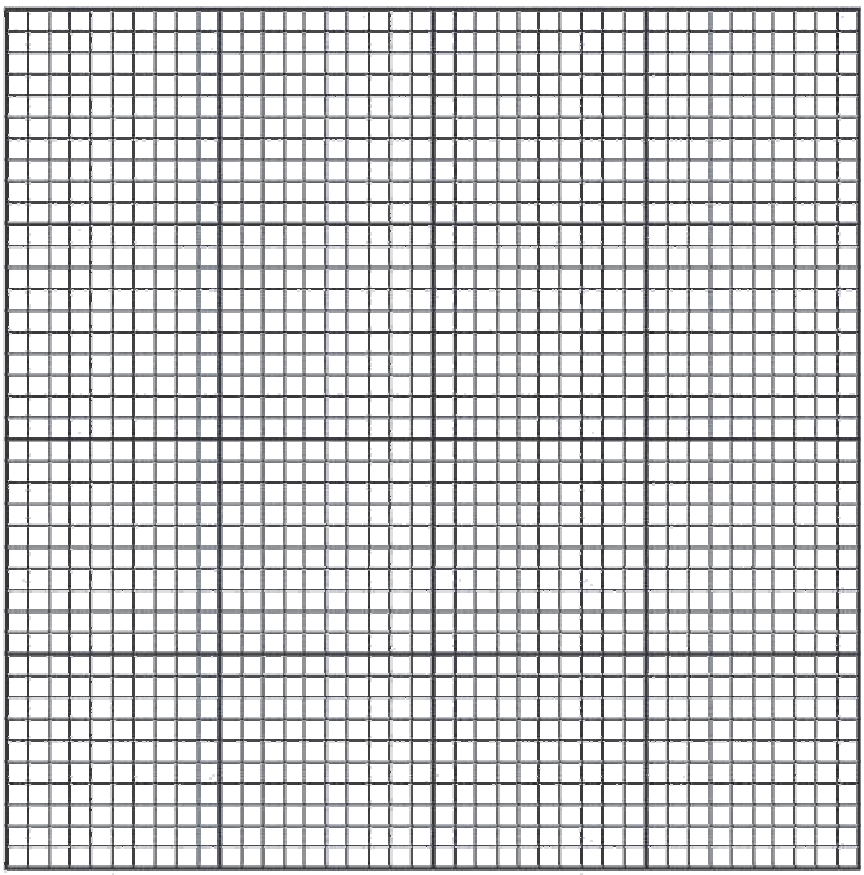
**Question 37** **(16 marks)**

A medical researcher published her findings about an exciting new drug, Xenon. She trialled the drug on 100 patients suffering from high blood cholesterol over a three month period. Group 1 took one Xenon tablet daily. Group 2 took a daily dose of a sugar-coated tablet containing **no** Xenon. Blood cholesterol was measured at the beginning and the end of the trial. Her results are shown below.

| | **Average Cholesterol Level (mg/dL)** | |
|---|---|---|
| **Time** | Group 1 | Group 2 |
| Before treatment | 240 | 240 |
| After 1 month of treatment | 230 | 242 |
| After 2 months of treatment | 205 | 237 |
| After 3 months of treatment | 190 | 238 |

(a) On the grid provided, plot the data as a graph in the most appropriate manner. (5 marks)

If you wish to have a second attempt at the graph, the grid is repeated at the end of this Question/Answer booklet. Indicate clearly on this page if you have used the second grid and cancel the workings on the grid on this page. You may use pencil.



**See next page**

(b) What hypothesis was the researcher trying to test? (2 marks)

(c) In this investigation, identify the

(i) dependent variable. (1 mark)

(ii) independent variable. (1 mark)

(d) What name do scientists use for Group 2? (1 mark)

(e) What was the purpose of using Group 2? (1 mark)

(f) List **three (3)** variables that the researcher should have controlled. (3 marks)

One:

Two:

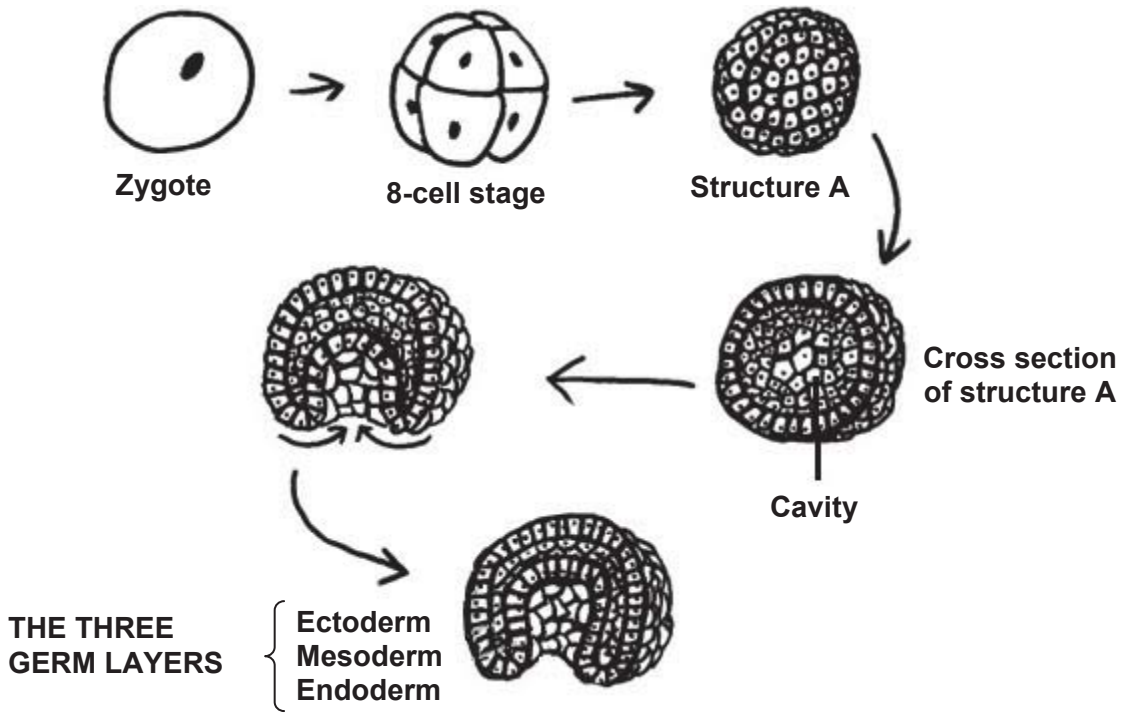
Three:

(g) Suggest **two (2)** improvements that would increase the reliability of her results. (2 marks)

**See next page**

**Question 38** **(9 marks)**

The following parts of this question refer to the diagram below, which shows the changes that a zygote undergoes after fertilisation has occurred.




(a) Identify structure A. (1 mark)

(b) The three germ layers known as the ectoderm, mesoderm and endoderm are shown on the diagram. For each of the structures listed below, state from which of the three germ layers they are formed. (3 marks)

| Structure | Primary Germ Layer |
|---|---|
| Nervous system | |
| Liver and pancreas | |
| Bones and blood | |

**See next page**

(c) Structure A is one of the sources of stem cells in the human body. Identify the other **two (2)** sources of stem cells. (2 marks)

One: _____

Two: _____

(d) Explain how embryonic stem cells are collected from structure A, cultured and kept for future use. (3 marks)

_____

_____

_____

_____

_____

_____

**See next page**

**Question 39** **(7 marks)**

Sickle-cell anaemia is a condition caused by a gene that affects the normal structure and function of haemoglobin. Individuals who possess this gene experience illness because their red blood cells become 'sickle-shaped'. This interferes with normal blood flow and the ability to carry oxygen.

The alleles for this condition can be considered as:

N: Normal
S: Sickle cells

People who are homozygous for the sickle cell anaemia allele usually die at a young age, yet this allele has been maintained at a significant level in some human populations, particularly those who inhabit the tropical regions in Africa.

(a) State the genotype and phenotype for a person who is heterozygous for this gene. (2 marks)

(b) What is the name of the change which gave rise to the gene for sickle-cell anaemia in human populations? (1 mark)

(c) Explain why the gene for sickle-cell anaemia is at a high frequency in populations that live in the tropical regions of Africa. (2 marks)

(d) Large populations have migrated to the United States of America from Africa. Studies have shown that the frequency of the sickle-cell gene in these populations is decreasing. Provide an explanation for this observation. (2 marks)

**See next page**

**Question 40** **(10 marks)**

Part (a) of the question refers to the diagrams below.



(a) Identify correctly the stages of mitosis as shown in the diagrams. (4 marks)

P: _____

Q: _____

R: _____

S: _____

(b) The table below is based on a comparison between the processes of mitosis and meiosis. (6 marks)

Complete the table.

| Feature | Mitosis | Meiosis |
|---|---|---|
| Number of divisions | | |
| Place where process occurs | | |
| Reason for division | | |

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

Suggested working time: 50 minutes.

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**Question 41** **(20 marks)**

(a) There are numerous processes that transport materials across a cell membrane. Describe the **six (6)** different processes listed below that allow substances to move across the cell membrane. (12 marks)

(i) Diffusion
(ii) Osmosis
(iii) Facilitated diffusion
(iv) Active transport
(v) Endocytosis
(vi) Exocytosis

(b) (i) Explain how the structure of the cell membrane relates to the selective transport of substances across it. (4 marks)

(ii) Describe **two (2)** factors affecting the exchange of materials between cells and their environment. Provide an example for each factor. (4 marks)

**Question 42** **(20 marks)**

(a) List **five (5)** major changes that take place in a female during pregnancy and explain the reason for each change. (10 marks)

(b) What information can be determined from ultrasound monitoring during pregnancy? (4 marks)

(c) Outline **six (6)** benefits of breastfeeding compared with bottle feeding. Consider the mother and/or the child. (6 marks)

**See next page**

**Question 43** **(20 marks)**

(a) Describe the structure of DNA. (8 marks)

(b) What is a mutation? Using examples, explain the differences between gene and chromosomal mutations. (6 marks)

(c) (i) How is Huntington's disease inherited? (2 marks)

(ii) Describe how gene therapy could be used to treat Huntington's disease in the future. (4 marks)

**Question 44** **(20 marks)**

(a) Define the term 'cellular respiration'. Describe briefly the processes of aerobic and anaerobic respiration. (10 marks)

(b) Using examples, describe **five (5)** features of the human body that act as external defence mechanisms against invading pathogens. (10 marks)

**End of questions**

Question number: _____

Question number: _____

Question number: _____

Question number: _____

Question number: _____

Question number: _____

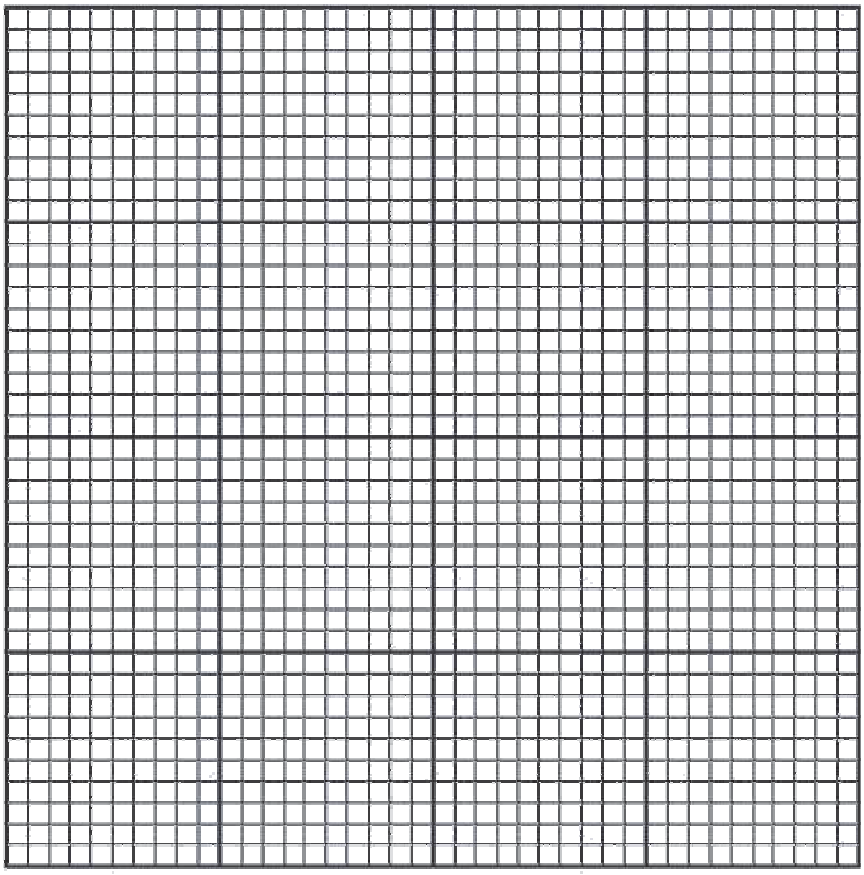
Question number: _____

Question number: _____

Additional working space

Question number: _____

Use the grid to answer question 37(a) if you have cancelled your first attempt.



**ACKNOWLEDGEMENTS**

## Section One

**Question 2** What is involved in treatment [image]. ( n.d.). In *Assisted Reproductive Technology*. Retrieved June, 2011, from http://jessica-lrp.wikispaces.com/Diagrams+%26+Links.

**Questions 4–6** Diagram adapted from: Villarreal, M.R. (2008). *Digestive system whitout labels* [Image]. Retrieved February, 2010, from http://commons.wikimedia.org/wiki/File:Digestive_system_whitout_labels.svg.

**Question 12** Diagram adapted from: IUPUI. (2003). *Human chromosomal disorders: Class notes* [Diagram of normal female karyotype]. Retrieved March, 2011, from www.biology.iupui.edu/biocourses/N100/2k2humancsomaldisorders.html.

**Question 17** Diagram adapted from: The M5 Project. (n.d.). Alcohol. In *Healthy lifestyle guide*. Retrieved July 22, 2011, from www.m5project.com.au/healthylifestyle.

**Questions 20–21** Diagram adapted from: Miraceti. (2005). *Female reproductive system lateral*. Retrieved January, 2011, from http://commons.wikimedia.org/wiki/File:Female_reproductive_system_lateral.png. Used under the Creative Commons Attribution-Share Alike 3.0 Unported license.

**Question 28** Diagram adapted from: 2over0. (2010). *Measles US 1944–2007.* Retrieved March, 2011, from http://en.wikipedia.org/wiki/File:Measles_US_1944-2007_inset.png.

## Section Two

**Question 31** Graphic adapted from: Collins, E.M. (2001). Lock & key model of enzyme specificity. Retrieved December, 2010, from http://waynesword.palomar.edu/molecu1.htm.

**Question 33** Diagram adapted from: Lynch, P.J. (2006). *Heart circulation diagram*. Retrieved March, 2011, from http://commons.wikimedia.org/wiki/File:Heart_circulation_diagram.svg. Used under the Creative Commons Attribution 2.5 Generic license.

**Question 34** Diagram adapted from: Sunshineconnelly. (2007). *Anatomy and physiology of animals Ovarian cycle showing from top left clockwise.* Retrieved December, 2010, from http://commons.wikimedia.org/wiki/File:Anatomy_and_physiology_of_animals_Ovarian_cycle_showing_from_top_left_clockwise.jpg. Used under the Creative Commons Attribution 3.0 Unported license.

**Question 36** Diagram adapted from: Eastern Kentucky University. (n.d.). *Nephron 97*. Retrieved February, 2011, from http://people.eku.edu/ritchisong/lec12.htm.

**Question 38** Diagram adapted from: Layman, D. (2003). *Presence of germ layers within the embryo* [Diagram]. New York: McGraw-Hill. Retrieved March, 2011, from www.education.com/study-help/article/biology-help-germ-layers-embryo/.

**Question 40** Diagram adapted from: National Gardening Association. (n.d.). Types of cell division, *From Seed to Seed*. Retrieved February, 2011, from www.kidsgardening.com/onlinecourse/PartI11.htm#celldivision.



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