Name: Solution

Trinity College

2020

SCIENCE DEPARTMENT

YEAR 11
2B HUMAN BIOLOGY EXAMINATION

Short Answer Booklet

TIME ALLOWED FOR THIS PAPER

Reading time before commencing work:	**Ten minutes**
Working time for paper:	**Three hours**

SECTION 1: **Multiple Choice – 40 Questions – 40 Marks – 40%**
Answer the multiple choice questions by crossing out the letter of your choice on the answer sheet provided.
Use a 2B pencil here.

SECTION 2: **Short Answers – 10 Questions – 90 marks – 40%**
Answer the questions in the spaces provided. Answers are to be in BLUE or BLACK ink.
GRAPHS and DRAWINGS to be in pencil and labelled in ink.

SECTION 3: **Extended Answer – 2 Questions – 40 marks – 20%**
Answer question 1 **OR** question 2

AND

Answer question 3 **OR** question 4.

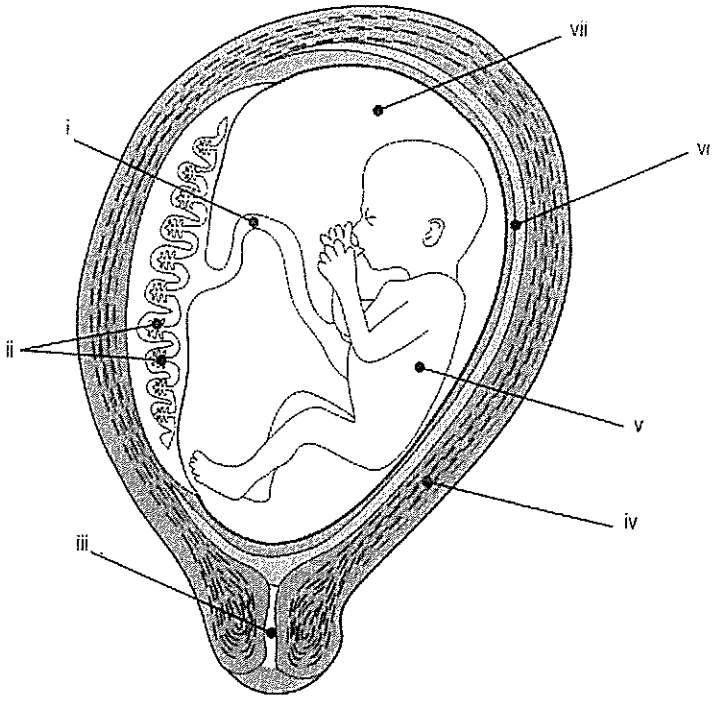
Section B: Short Answers (Total 90 marks)

(a) Give the term that best fits the description below. (5 marks)

1. The formation and development of the gametes.
   gametogenesis
2. The double walled cup like structure at the end of each of the kidney tubule.
   glomerular capsule
3. An antigen preparation used in immunisation.
   Vaccine
4. Possessing the same alleles for a given characteristic.
   homozygous
5. A method of removing wastes from the blood when kidney failure occurs.
   dialysis

(b) Write the definitions of the following terms. (5 marks)

6. Endometrium The soft mucous membrane lining the uterus.
7. Heterozygous possessing different alleles for a given characteristic
8. Nephron The functional unit of the kidney
9. Placebo An inactive substance that looks like the real medication
10. Ureter The tube that leaves each kidney and drains in the bladder.



1. Label the diagram above:

(i) Umbilical Cord

(ii) Placenta

(iii) Mucus Plug

(iv) Uterus

(v) Foetus

(vi) Amnion

(vii) Amniotic Cavity (7 marks)

2. Describe the function of the following parts from the diagram in Question 1:

(ii) Site for exchange of nutrients & waste.

(iii) closes of the cervix until labour begins

(2 marks)

3. (i) Why is blood diverted away from the foetal lungs?

Blood is oxygenated / oxygenated via the placenta so no need to go thru' foetal lungs. (1)

or lungs are collapsed so offer greater resistance (1) (1 mark)

* any (1)

(ii) Describe how blood is diverted away from the foetal lungs?

- Ductus Arteriosus (½) - lung bypass - blood flows into pulmonary artery → aorta (1)
- Foramen Ovale (½) - blood flows from right to left atrium (1)

(3 marks)

4. (i) Which part of the baby is normally delivered first?

Head is delivered first (normally)

(ii) What hormone is involved in the contractions in parturition?

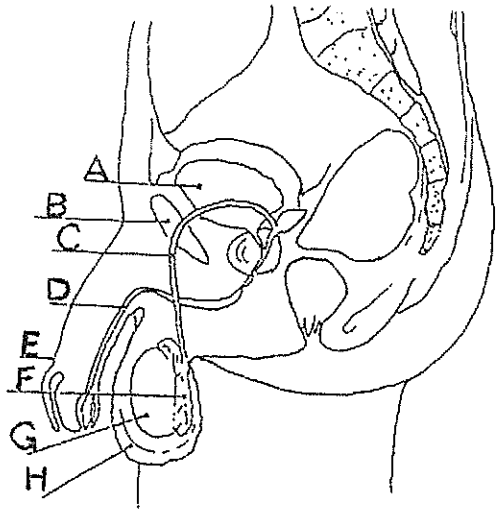
Oxytocin

(iii) Where is this hormone released from?

Pituitary Gland.

(3 marks)

5. Refer to the diagram below.



(a) Label the following parts from the diagram above. (5 marks)

C	Vas Deferens.
D	Urethra
F	Epididymis
G	testis
H	Scrotum

(b) Which structure produces the hormone responsible for male secondary sexual characteristics? (1 mark)

Testis

(c) In which organ is mature sperm stored? (1 mark)

Epididymis

(d) Name the part of the male reproductive system which produces thin, milky, alkaline fluid. (1 mark)

Prostate Gland

(e) Through which structure do sperm leave the body? (1 mark)

Urethra

(f) The testes develop in the abdominal cavity then descend into the scrotal sac. Why is it necessary for the testes to descend into the scrotum? (1 mark)

Temperature for optimum sperm production ~ 2°C below body temperature. This allows for better thermal regulation.

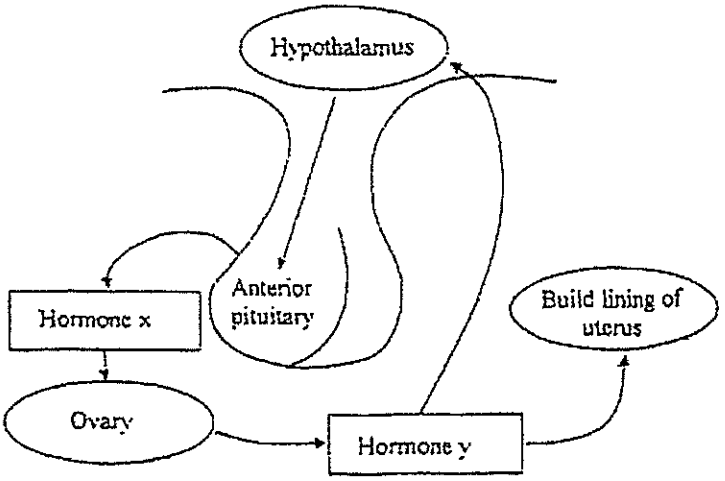
(g) Vasectomy is an operation used to sterilise men. Explain what structures are operated on and how the technique prevents conception. (2 marks)

- The vas deferens is cut and the ends tied up (1)
- fertile sperm are unable to combine with semen and leave the body (1).

(h) Describe 2 modes of operation of a spermicide. (2 marks)

- Contains a chemical which immobilises sperm (1)
- Combine with moisture in vagina to form bubbles of CO_2 which act as a physical barrier (1).

6. The diagram below shows partly how the hypothalamus regulates the menstrual cycle. Use this diagram to complete the questions below.



(a) Name and describe the function of hormone **X**. (3 marks)

follicle Stim. Hormone (FSH) (1)
- Stimulates development and maturation of the ovarian follicle. (2)

(b) Name the main hormone which is produced from the ovary in the first half of the ovarian cycle? (1 mark)

Oestrogen

(c) Around day 12-13 of the menstrual cycle the pituitary releases another hormone.

(i) What is it called? (1 mark)

Luteinising Hormone (LH).

(ii) What effect does this hormone have? (2 marks)

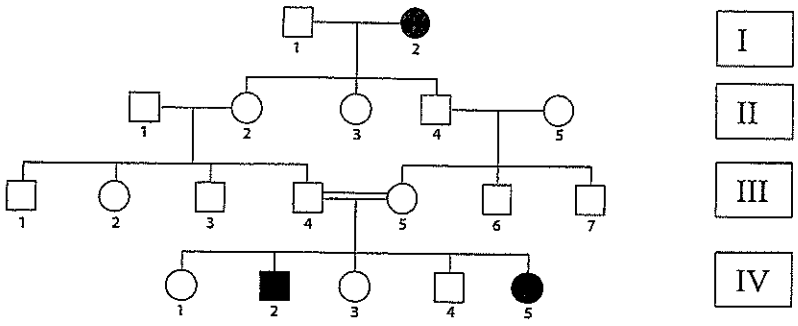
- final maturation of ovarian follicle (1)
- Ovulation (1) any 2
- formation of corpus luteum (1)

(d) The ovary secretes another hormone in increasing amounts after day 14 of the menstrual cycle. Name the hormone and state its purpose. (2 marks)

Hormone Progesterone

Purpose Maintains the endometrium

7. The following questions relate to the pedigree below.



(a) What term describes the relationship between the individuals III.4 and III.5? (1 mark)

1st Cousins

(b) Is the disorder inherited as a recessive or dominant trait? (1 mark)

Recessive

(c) Explain how you arrived at your answer in (b)? (2 marks)

It does appear in generation II or III
∴ Must be a recessive allele but still
within the gene pool

(d) Is the trait more likely to be autosomal or sex linked? Explain how you arrived at your answer in (c). (3 marks)

Autosomal. (1)
- Both males and females show the disease
with out infected parents. (2)

(e) Using the letters 'A' and 'a' to represent dominant and recessive alleles, write the full genotypes of Individual IV.2 (1 mark)

aa.

(f) What is the chance that the newborn baby IV.5 has the disorder? (1 mark)

25%. (1 in 4)

(g) The ABO blood grouping system displays two phenomena in genetics. Explain the following terms and give an example using the ABO system. (4 marks)

a. Multiple alleles

- Where 2 alleles / variation of the gene exists (1)
eg I^A, I^B, i (1)

b. Co-dominance

- Effects of both alleles are apparent / expressed in genotype (1)
eg AB (1)

(h) Apart from the ABO system, name ONE other blood grouping system. (1 mark)

Rhesus / Lewis / MNS / etc.

8. A drug company has developed a new influenza vaccine that is squirted into the nasal passages. The vaccine has been approved for testing in people to see if it prevents the symptoms of influenza. Consider how an experiment might be designed to test this vaccine and answer the following questions.

(a) State a suitable hypothesis for this experiment. (1 mark)

Administration of the vaccine to people at risk of influenza will prevent symptoms of the disease.

(b) What would be the independent variable in the experiment? (1 mark)

The vaccine

(c) What is the dependent variable in the experiment? (1 mark)

Symptoms of Influenza

(d) In this experiment, the subjects would be randomly assigned to two groups. Using your understanding of scientific method, what name would you use to describe each group and what would you give to the members of each group to test your hypothesis? (4 marks)

Treatment / Experimental Group (1)
Gets the vaccine (1)
Control group (1)
Gets the placebo (1)

(e) List two variables that would need to be controlled in this experiment? (2 marks)

Age, fatty tissue, exposure to other strains of virus, other diseases, other drugs.
* any 2

(f) What sort of immunity is being induced by the vaccine? (1 mark)

Active Artificial

9. The table below shows the percentage composition of certain materials in plasma and urine from a healthy individual.

Substance	Plasma %	Urine %
Water	90-93	95
Proteins & Fats	6.0	0.0
Glucose	0.1	0.0
Sodium	0.32	0.35
Potassium	0.02	0.15
Urea	0.03	2.0
Creatine	0.001	0.075

(a) Account for the following patterns between plasma and urine in the table by referring to nephron function and where in the nephron these processes are taking place

(i) The decrease in percentage composition for glucose. (2 marks)

Glucose is (actively) reabsorbed (primarily) in PCT

(ii) The increase in percentage composition for urea. (3 marks)

- due to more reabsorption of H2O (1)
- little or no urea being reabsorbed / urea in filtrate (1)
- in PCT / descending Loop of H / DCT / C. Duct + any (1)

(b) Explain why the percentage composition of proteins and fats in urine is zero.

molecules are too large (1) so cannot undergo (glomerular) filtration / to fit through barriers between glomerulus & Bowman's capsule.

(2 marks)

(c) The metabolic waste product urea is produced by the process of deamination. Describe where and how the process occurs.

- Deamination takes place in liver (1)
- Amino group is removed and converted to NH_3 then urea (2)
- Remaining part is converted to carbohydrate (1)

* any 3 mark but must provide the location. (3 marks)

10.

(a) Complete the following table.

Motor Development Type	Description
Cephalocaudal	Head to foot.
Proximo distal	Development outwards. Control of muscle/limbs close to the body and progressively towards the extremities until fine movement is obtained
Gross to Specific	gross muscle groups just then fine motor groups develop.

(3 marks)

(b) Describe 4 ways that HIV can be prevented from spreading from person to person.

1	Use of condoms
2	prevent sharing of needles / utensils etc.
3	tested before having unprotected sex
4	Blood Rule → Cover with bandaids etc.

(4 marks)

END OF SHORT ANSWER SECTION