



The University of Melbourne

Semester 1, 2005 Assessment

School of Agriculture and Food Systems

202154 - Introduction to Biology for Land and Food

Contact Phone Numbers: 0427 432 443 or 03 5833 9200

Reading Time 15 minutes

Writing Time 3 hours

This paper has three(3) pages.

Authorised Materials:

Non programmable Calculators may be used.

No other materials are authorised to be used in this examination.

Instructions to Invigilators:

Students may not remove the examination paper from the examination room.

Instructions to Students:

- i) This examination is divided into three sections; answer section A on the examination paper and B & C in an examination booklet(s).
- ii) You must answer all questions in section A and B and then SIX other questions from section C on this paper.
- iii) Each question is worth 10 marks. Marks given for each part of a question are shown with that part of the question. You should allocate your time in proportion to the marks allocated for each part.
- iv) Start a new page in the examination booklet for each question, clearly indicating the question you are answering.

Paper to be held by the Library:

DATE: Thursday 16 June 2005

TIME: 9:00 am

TOTAL MARKS: 160 (40% of unit total)

SECTION A –

TOTAL MARKS FOR THIS SECTION IS 40 MARKS

YOU MUST ANSWER ALL OF THESE QUESTIONS

ANSWER ALL OF THESE QUESTIONS ON THE EXAMINATION PAPER

Question 1

1a) In animal breeding and herd improvement the use of multiple ovulation and embryo transfer (MOET) has been used for some time. In addition, embryos are sometimes cloned. In order to understand the technical aspects of these important procedures of animal production some terms, including those below should be known.

Complete the following paragraphs by matching the Blanks (A – H) with the appropriate terms below:

“After the sperm pronucleus enters the egg and fuses with the egg’s pronucleus the new cell is called the A. After some time this cell divides by a process called B and the pattern of cell division for each species is influenced by the amount of C present in the original egg. In the early stages, after several divisions, the ball of cells is called a D. .

Within a short time – maybe days – individual cells become more specialised and their future development into body tissues is partially determined. As this begins, we see the flowing movement of cells and the forming of a hollow inner chamber. At this stage the developing embryo is called a E. The specialising cells at one end called the F will eventually form the foetus. At this stage three primitive lines of cells, which are partially determined, appear. The G cells form the outer germ layer, which will eventually form (among other things) nervous tissue , where the H cells form the digestive system and other organs .”

If here is no match leave the box blank

Term	Location (A to H)	Term	Location (A to H)
Animal pole		Oocyte	
Blastula		Placenta	
Cleavage		Polar body	
Ectoderm		Totipotent	
Endoderm		Vegetable pole	
Gastrula		Yolk	
Mesoderm		Zygote	

(4 marks)

1b) Match these words to the statements below them (not all words will be used):

- | | |
|---------------------|-------------------------|
| A adipocytes | H skeletal muscle |
| B cardiac | I smooth |
| C carpels | J squamous |
| D cartilage | K stratified epithelium |
| E connective tissue | L striated |
| F dorsal | M tarsals |
| G medial | N ventral |

Statement	Word (A to N)
This muscle surrounds “tubes” in the body when contraction for movement and strength is required.	
These cells contain a large amount of lipid enclosed in a vacuole	
This term means “towards the front or belly”	
This tissue group contains cells of various types distributed in a non cellular matrix	
Tissue which creates movement by moving bones	
Connective tissue which is found in young growing bones	

(3 marks)

1c) Complete the following paragraphs by matching the Blanks (A – F) with the appropriate terms below

“In the alimentary canal, food is subjected to a series of mechanical and chemical processes that break down the food into small molecules that can be absorbed by the body. In the rat, food is ground down by teeth and mixed with saliva containing the enzyme called A , which starts the digestion of carbohydrates. Boluses of food are carried down the B to the stomach, where the environment is C and the enzyme D starts to break down proteins. Aliquots of the chyme are passed through the pyloric sphincter into the E where they are neutralized by secretions from the pancreas. Bile from the liver is added to emulsify fats so that they can be broken down into their building blocks - F and fatty acids - by the enzyme lipase.”

If here is no match leave the box blank

Term	Location (A to F)	Term	Location (A to F)	Term	Location (A to F)
acidic		duodenum		liver	
amylase		Gall bladder		pyloric	
anal		glucose		oesophagus	
basic		glycerol		pancreas	
caecum		lipase		pepsin	

(3 marks)

Question 2

Complete the statements below by inserting the number which matches the appropriate term in the following list:(Not all terms must be used and some terms may be used more than once)

- | | | | | |
|----------------|---------------|------------------|--------------|---------------------|
| 1 anther | 9 cotyledons | 17 guard cells | 25 palea | 33 spikelet |
| 2 auricle | 10 dicot | 18 hypogeal | 26 periderm | 34 stele |
| 3 bark | 11 endodermis | 19 kranz anatomy | 27 pericycle | 35 stigma |
| 4 blade | 12 epidermis | 20 lemna | 27 petals | 36 stipule |
| 5 collar | 13 epigeal | 21 ligule | 29 petiole | 37 stomata |
| 6 cork | 14 exodermis | 22 mesophyll | 30 phloem | 38 style |
| 7 cork cambium | 15 filament | 23 monocot | 31 sheath | 39 vascular cambium |
| 8 cortex | 16 glumes | 24 ovary | 32 stamen | 40 xylem |

For example: **The initial leaf like structures to emerge are called xxxxxx** 7

Statement	Number (1- 40)
The anther is comprised of the xxxxxx and the stamen	
Root hairs are derived from the xxxxxx	
The xxxxxx can be used to identify major cereals, eg oats has none wheat has weeny, barley has big.	
Photosynthesis occurs mainly in the xxxxxx cells	
During secondary growth in plants, the vascular cambium produces the xxxxxx towards the outside of the plant.	
The pollen tube needs to grow down the xxxxxx, before entering the ovary	
The entry and exit of gases CO ₂ , O ₂ and water into the leaf is governed by xxxxxx	
A grass leaf is made up of the blade and the xxxxxx	
The most external tissue of the stele is the xxxxxx	
In C4 grasses CO ₂ is stored in the xxxxxx	
The perianth is comprised of sepals and xxxxxx	
A suberised layer in the root is contained within the xxxxxx	
In the stem of perennial plants, the xxxxxx is comprised of all tissues external to the vascular cambium	
In grasses, an awn is on the xxxxxx	
In a leaf the xxxxxx is usually on the adaxial (upper) part of the vascular tissue	
In roots the xxxxxx appears between the xylem vessels rays	
A plant where the cotyledon does not appear above the ground is said to have xxxxxx germination	
A xxxxxx is a type of leaf modification	
The first time that must water travels symplastically through a root tissue is through the xxxxxx.	
Mycorrhizial fungi colonise the xxxxxx of the root	

(10 marks)

Question 3**3a) Fill in the table below on the differences between prokaryotes and eukaryotes**

	Prokaryotes	Eukaryotes
Size		
Cellular control		
Internal organisation		
DNA		
Replication		

(5 marks)**3b) Write T/F (for true or false) next to the following statements**

Statement	T or F
All living cells have similar chemical reactions	
Protists are prokaryotes	
Proteins are made using fatty acid and glycerol	
Bacteria are the simplest life form	
The smaller the cell the larger the surface to volume ratio	
All cells contain DNA	
Plants were derived from cyanobacteria	
Endosymbiosis is where a phagotropic prokaryote engulfs a eukaryote	
The powerhouse of a eukaryotic cell is the chloroplast	
Communication between animal cells is through gap junctions	

(5 marks)

Question 4

4a) The study of animal health involves an understanding of the various behaviours and processes that keep an animal “normal”. This maintenance of a steady state and regulation of life processes is called homeostasis.

Match these words to the statements below them (not all words will be used):

- | | |
|-----------------|----------------------|
| A acetyl CoA | J glucagon |
| B acetylcholine | K insulin |
| C active | L oestrogen |
| D ADH | M oxytocin |
| E antibody | N paracrine hormones |
| F antigen | O passive |
| G antiserum | P pheromones |
| H axon | Q pituitary hormones |
| I dendrite | R secretin |

Statement	Word (A to R)
Released into the external environment, providing chemical communication between organisms	
Produced by neurosecretory cells of the hypothalamus and associated with milk let down	
Produced in the pancreas and is responsible for lowering of blood glucose levels	
Produced by the female gonads	
Part which carries the depolarisation wave away from the body of the neuron body or soma	
Protein which can attach to specific, foreign material in the body	
Raises blood pressure and reduces urine output	
Type of immunity which is stimulated by vaccination	

4 marks)

4b) Match these words to the statements below them (not all words will be used):

- | | | | |
|-------------------------|------------------|---------------------|----------------|
| A alveoli | H diastole | O negative pressure | V T cells |
| B aorta | I erythrocytes | P nephron | W urea |
| C atrioventricular node | J haemoglobin | Q pulmonary artery | X uric acid |
| D baroreceptors | K left ventricle | R pulmonary vein | Y vasodilators |
| E bicarbonate | L leukocytes | S right ventricle | Z Vena cava |
| F carbonic anhydrase | M lymph nodes | T systole | |
| G convoluted tubule | N lymphocytes | U sinus venosus | |

Statement	Word (A to Z)
Major blood vessel carrying blood from the left ventricle	
Blood passes through the mitral valve into this chamber	
The original source of the heart beat; also known as the pacemaker	
The point in time when the ventricles are in a relaxed state	
Microscopic air sacs in the lungs	
A lot of carbon dioxide is carried in the blood in this form	
A slightly acidic protein which forms an unstable link with oxygen at high oxygen concentrations	
A single excretory unit in the kidney	
This is a waste product of protein metabolism, found in the urine of mammals and a number of other vertebrates	
This is a main location where antigens stimulate specific T and B cell production	
This group includes a range of white blood cells	
These cells are part of the cellular immune system; they are directly involved in immune responses at the site of infection	

(6 marks)

SECTION B

TOTAL MARKS FOR THIS SECTION IS 60 MARKS

YOU MUST ANSWER ALL OF THESE QUESTIONS

**ANSWER ALL OF THESE QUESTIONS IN THE
EXAMINATION BOOKLET**

Question 5

5a) The diploid number in a particular mammalia species is 60 and the heterogametic sex is the male (as in humans). Describe fertilisation and the changes in chromosome number using the following terms

haploid number, diploid number, autosomes, sex chromosomes, zygote, fertilisation, progeny, gametes, slow block, fast block, sperm, ovum, zona pellucida, acrosome.

(4 marks)

5b) In cattle, the polled allele is dominant over the horns allele. If a heterozygous polled bull is mated to a group of horned cows, what is the probability that a calf from any of the cows will be horned? (**show all working to obtain full marks**)

(3 marks)

5c) AED (anhydrotic ectodermal dysplasia), is an X-linked recessive disease which occurs primarily in Holstein cattle. Calves are born with no hair, deformities of the mouth and a lack of sweat glands (called naked calf). **Polledness** is an autosomal dominant trait (horns being the homozygous recessive phenotype). Males are the heterogametic sex in cattle.

When a polled normal (no AED) bull was mated to a normal polled cow, a naked horned male calf was born. What is the genotype of each parent and the calf?

Use the following symbols:

A normal allele for AED

P polled allele

a deleterious recessive for AED

p horned allele

(show all working to obtain full marks)

(3 marks)

Question 6

Draw and label either the digestive tract **OR** the reproductive tract of a male rat (**NOT BOTH**).

In doing this you should use the following terms.

Digestive tract: mouth, anus, rectum, small intestines, caecum, stomach, duodenum, pancreas, bile duct, large intestines **and any other relevant labels that you wish to add**

OR

Reproductive tract: epididymis (head, body and tail) , vas deferens, testis, scrotum, seminal vesicles, urethra, penis **and any other relevant labels that you wish to add**

10 marks

Question 7

7a) In relation to animals, explain the term stress and how this may manifest itself in animals (i.e. the five freedoms

5 marks

7b) What are the two physiological systems in animals that stress affects?

1 mark

7c) What are main responses an animal has to stress?

4 marks

Question 8

8a) Explain the movement of photosynthates (sugars from photosynthesis or storage organs) around the plant, listing the plant tissues that are involved.

5 marks

8b) Water is required for photosynthesis in plants leaves. Explain the movement of water from the soil through to the leaves of a plant, listing the main plant tissues that water passes through enroute.

5 marks