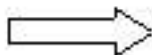


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M44



**Coimisiún na Scrúduithe Stáit
State Examinations Commission**

LEAVING CERTIFICATE EXAMINATION, 2004

BIOLOGY - HIGHER LEVEL

WEDNESDAY, JUNE 16 - AFTERNOON, 2.00 TO 5.00

Section A. Answer any **five** questions from this section.
Each question carries 20 marks.
Write your answers in the spaces provided on the examination paper.

Section B Answer any **two** questions from this section.
Each question carries 30 marks.
Write your answers in the spaces provided on the examination paper.

Section C Answer any **four** questions from this section.
Each question carries 60 marks.
Write your answers in the answer book.

You should spend not more than 30 minutes on Section A and 30 minutes on Section B, leaving 120 minutes for Section C.

You must return your examination paper with your answer book at the end of the examination.

Section A

Answer any five questions.

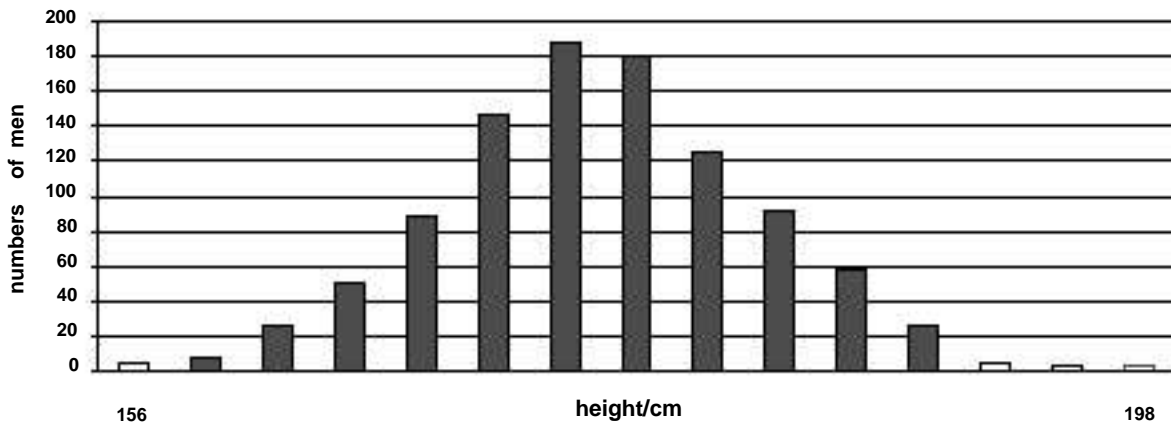
Write your answers in the spaces provided.

1. Answer **any five** of the following.

- (a) Name an autotrophic organism
- (b) Give an example of a catabolic reaction
- (c) The conversion of atmospheric nitrogen to nitrates by bacteria is called
- (d) What is the ratio of hydrogen atoms to oxygen atoms in a carbohydrate?.....
- (e) A relationship between two organisms in which both benefit is called
- (f) An example of a protein that has a structural role is

2. The diagram shows the distribution of heights in a group of men between the ages of 18 and 23.

Distribution of human heights



What term is used by biologists to describe differences within a population with respect to features such as height?

State **two** factors that could be responsible for the differences shown.

- 1.
- 2.

Would you expect a similar distribution if the students were weighed instead of being measured for height?

.....

Explain your answer.

.....

What is a mutation?

State **one** cause of mutation.

Give an example of a condition, found in the human population, that results from a mutation.

.....

1.	<i>any five</i>		2(7)+3(2)
	(a)	Any named plant or named photosynthetic bacteria or cyanobacteria [<i>allow grass, seaweed, fern, moss</i>]	
	(b)	Respiration or digestion or deamination or any correctly described reaction e.g. protein → amino acids or equation	
	(c)	(nitrogen) fixation	
	(d)	2:1 [<i>allow if correctly shown in formula e.g. C₆ H₁₂O₆</i>]	
	(e)	Mutualism or symbiosis	
	(f)	Keratin or myosin or elastin or collagen or other correct example [<i>allow fibrin</i>]	

2.			2(4)+6(2)
		Variation	
		Genetic or examples / environment or examples / age / [NOTE – environment + food = 1 point] any two points	
		Yes or No or implied in text (on this line)	
		Explanation: Weight is also determined by genetic or environmental factors [<i>for 'yes' above</i>] or valid reason e.g. reference to eating habits or exercise [<i>if 'no' given above</i>] [<i>Note: reason must match the Yes/No above</i>]	
		Change in genetic makeup (or in DNA, in gene, in chromosome, etc.)	
		Radiation or chemical or viruses or carcinogens or named example of any one of these [<i>allow smoking</i>]	
		Down's syndrome or other correct condition e.g. cancer or stripe in eye colour [<i>any spontaneous change - one incorrect does not cancel</i>]	

3. In tomato plants the allele responsible for purple stem (**P**) is dominant to that for green stem (**p**) and the allele for cut leaf (**C**) is dominant to the allele for potato type leaf (**c**). A plant with a purple stem and cut leaves was crossed with a plant with a green stem and potato type leaves. A total of 448 seeds was obtained. When the seeds were germinated four types of progeny resulted and they had the following phenotypes;

- 110 purple stem and cut leaves
- 115 green stem and potato type leaves
- 114 purple stem and potato type leaves
- 109 green stem and cut leaves

What were the genotypes of the tomato plants that gave rise to these progeny?

.....

Do the progeny of this cross illustrate the Law of Independent Assortment?.....

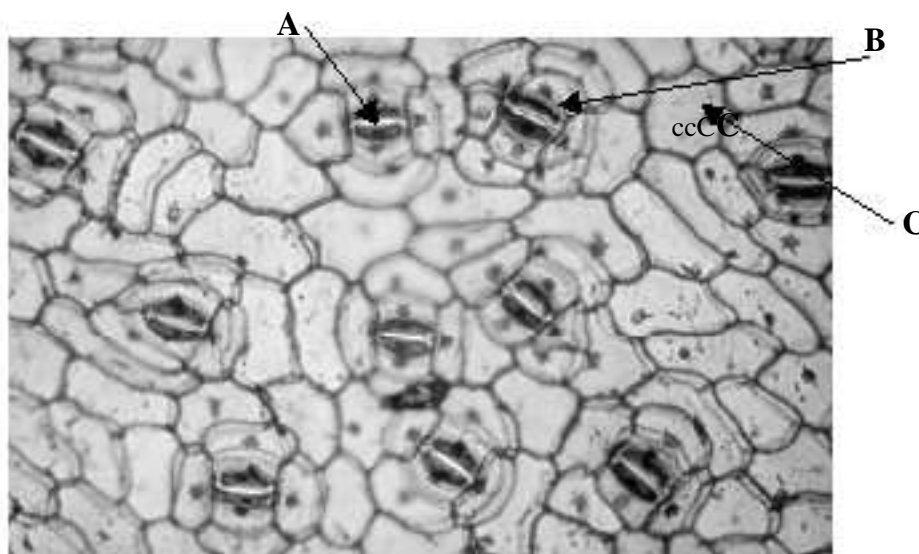
Explain your answer.....

.....

.....

.....

4. (a) The diagram shows part of the under surface of a leaf as seen through the microscope. A is an aperture. B and C are cells.



[Eric Grave/ Science Photo Library]

Name A, B, C.

A B C

What is the function of A?

Name a factor that influences the diameter of A.....

Name the apertures in stems that are equivalent to A.....

(b) In some species of flowering plants the leaves are modified for the storage of food.

Name a plant in which the leaves are modified for food storage

Name a carbohydrate that you would expect to find in the modified leaves of the plant that you named above.....

Name a type of modified stem that functions in food storage.....

3.	PpCc ppcc	4+4
	Yes [<i>or implied in statement</i>]	4
	Parentals and non-parentals (i.e. all possible phenotypes) or each allele can combine with either of the other pair / in 1:1:1:1: ratio (or in equal numbers or some indication of this)	4 4

4.		4+8(2)
	(a) A = stoma B = guard cell C = (epi)dermal cell	
	To allow movement (exchange) of gas (or air or water vapour) or transpiration	
	CO ₂ (allow light or potassium ions or water)	
	Lenticels or stomata	
	(b) Onion or tulip or daffodil or cabbage other correctly named plant	
	Starch or sucrose or cellulose or fructose or glucose [<i>not 'sugar'</i>]	
	Rhizome or corm or tuber [<i>allow stolon</i>]	

5. (a) What is meant by pollution?

.....

Give an example of a human activity that results in the pollution of air or water.....

.....

Suggest a means of counteracting this pollution.

.....

(b) Explain conservation in relation to wild plants and animals.

.....

.....

Suggest **two** reasons for conserving wild species.

(i)

(ii)

State **one** conservation practice from agriculture **or** fisheries **or** forestry.....

.....

6. Answer the following questions in relation to the human alimentary canal.

What is peristalsis?

State **one** reason why a low pH is important in the stomach

.....

Why is fibre important?

.....

Name an enzyme that is involved in the digestion of fat

What are the products of fat digestion?

What is the role of bile in fat digestion?

State a role of beneficial bacteria in the alimentary canal

.....

5.			2(5)+5(2)
	(a)	Any harmful (undesirable) (addition to) the environment (or named ecosystem)	
		Any correct example of human activity	
		Counteracting method (must relate to example given above) [<i>allow "clean up"</i>]	
	(b)	Explain conservation: Retention of viable populations (e.g. stopping extinction) or their habitats or comment on management or any one explained [<i>allow 'wise use of environment'</i>] (i) and (ii) NB <u>any two reasons for conservation</u> aesthetic / recreational / food supplies / possible sources of drugs /source of other materials / species right to existence / prevent extinction / biodiversity or balance / or any 2 correct examples <i>[Note: group term + example = 1 point; 2 examples = 2 points]</i>	
		One conservation practice: Control of fertiliser usage or control of mesh size or plant trees or any valid example explained	

6.			2(5)+5(2)
		Muscular activity or description e.g. contractions to move food [<i>allow 'movement of food'</i>]	
		Kills germs or optimal pH for enzymes or hydrolysis of starch or other correct reason	
		Peristalsis or explained (e.g. bulk for movement) [<i>accept reference to constipation or bowel cancer</i>]	
		Lipase	
		Fatty acids or glycerol	
		Emulsification (must imply smaller globules produced) or pH effect or explained	
		Production of vitamins or inhibition of pathogens or (aids) digestion or example	

Section B

Answer any two questions.

Write your answers in the spaces provided.

Part (a) carries 6 marks and part (b) carries 24 marks in each question in this section.

7. (a) Yeast cells produce ethanol (alcohol) in a process called fermentation.
Is this process affected by temperature?
- Explain your answer
-
-
- (b) Answer the following in relation to an experiment to prepare and show the presence of ethanol using yeast.
- Draw a labelled diagram of the apparatus that you used.
-
- Name a substance that yeast can use to make ethanol.
- What substance, other than ethanol, is produced during fermentation?
- Describe the control that you used in this experiment.
-
- Explain the purpose of a control in a scientific experiment.
-
-
- How did you know when the fermentation was finished?
-
-
- Why were solutions of potassium iodide and sodium hypochlorite added to the reaction vessels after a certain period of time?
-
- Name a substance produced during aerobic respiration that is not produced during fermentation.
-

7.	(a)		Yes	3
			(Rate of) enzyme reaction (affected by temperature)	3
	(b)		Diagram <i>[must include evidence of anaerobic conditions and two correct labels for 3 marks]</i>	3, 0
			Sugar or named sugar or starch	3
			Carbon dioxide or any product of glycolysis	3
			Yeast absent (or dead) in same set up	3
			Comparison or purpose described	3
			No more gas given off (no more bubbles)	3
			*NB - To test for alcohol – All candidates who attempt Q	3
			Water (allow other correct product from Krebs' cycle)	3

8. (a) Observation of a transverse section of a dicotyledonous stem reveals vascular and other tissues. Name **two** of the tissues that are not vascular tissues.

1 2

- (b) Answer the following questions in relation to the preparation of a microscope slide of a transverse section of a dicotyledonous stem.

State **one** reason why you used an herbaceous stem rather than a woody one.

.....
.....

Explain how you cut the section.

.....
.....
.....
.....

Why is it desirable to cut the section as thinly as possible?

.....

Draw a diagram of the section as seen under the microscope. Label the vascular tissues that can be seen.

State one precise function of each of the vascular tissues labelled in your diagram.

.....
.....
.....
.....

8.	(a)		dermal / ground / meristematic <i>[allow correctly named tissue e.g. cambium]</i>	<u>any two</u>	2(3)
	(b)		Why: Easier to cut (thin) sections or relevant comment on tissue arrangement (e.g. easier to see vascular bundles)		3
			Method described: Cut thin / named instrument e.g. blade, microtome, scalpel / between nodes / named support e.g. pith, carrot, wax / at right angle (across) / any safety procedure stated /	<u>any two</u>	2(3)
			To ensure light can pass through or to see (cells) clearly		3
			Diagram [Diagram - section with vascular bundles in ring (4) or at least one bundle divided] Labels: xylem and phloem in correct position		3, 0 3
			Functions: Phloem:– transport of food (or minerals or auxins) Xylem:– transport of water or minerals		3 3

9. (a) (i) Cardiac muscle may be described as a contractile tissue. Explain the meaning of of the underlined term.
.....
(ii) Which chamber of the heart has the greatest amount of muscle in its wall?
.....

(b) Describe how you dissected a mammalian heart in order to investigate the internal structure of atria and ventricles.

.....
.....
.....
.....
.....
.....
.....
.....

Draw a labelled diagram of your dissection to show the location and structure of the bicuspid and tricuspid valves.

State the procedure that you followed to expose a semilunar valve.
.....
.....
.....
.....

What is the function of a semilunar valve?

Where in your dissection did you find the origin of the coronary artery?

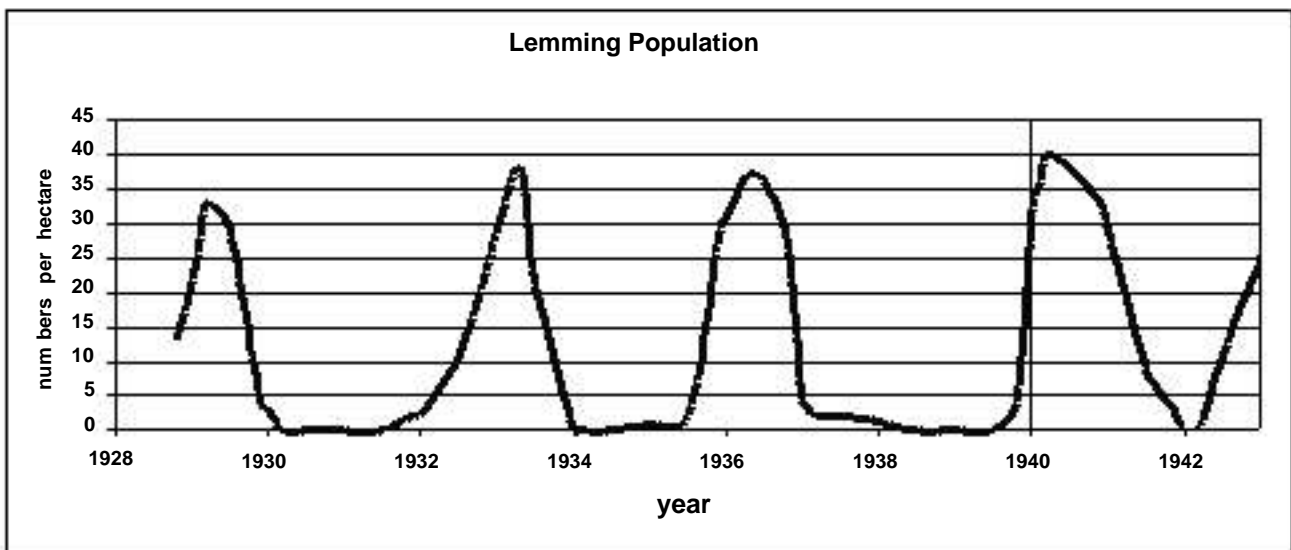
9.	(a)	(i)	it can shorten or contract	3
		(ii)	left ventricle	3
	(b)		Dissection: Identify sides (or front/back) / how identified / ventral side uppermost / / on board or dish /named cutting instrument / described (location of) cut / any safety procedure stated e.g. gloves, goggles, white coat <u>any three</u>	3(3)
			Diagram [4 chambers + indication of 2 valves] labels (bicuspid and tricuspid valves in correct position)	3, 0 3
			Expose semilunar valve: Cut aorta or cut pulmonary artery	3
			Function semi lunar valve: Stops back flow of blood (into ventricle or from artery)	3
			Origin of coronary artery: aorta or near semilunar valve	3

Section C

Answer any **four** questions

Write your answers in the answer book.

10. (a) Explain the following terms that are used in ecology: biosphere, habitat, niche. (9)
- (b) In ecological studies it is found that the distribution of organisms is influenced by abiotic and biotic factors.
- (i) Distinguish between the underlined terms.
 - (ii) Name an ecosystem that you have investigated and give an example of an abiotic factor that influences the distribution of a named plant in the ecosystem.
 - (iii) In the case of your named ecosystem give an example of a biotic factor that influences the distribution of a named animal.
 - (iv) What is meant by a pyramid of numbers? Construct a pyramid of numbers from organisms in the ecosystem that you have studied.
 - (v) What term is used by ecologists to describe the organisms that form the base of the pyramid? (24)
- (c) Lemmings are small rodents that are widespread in northern latitudes. The graph shows the fluctuations in lemming numbers in northern Manitoba between 1929 and 1943.



[Adapted from J. P. Finerty (1980). *The Population Ecology of Cycles in Small Mammals*. Yale University Press, New Haven.]

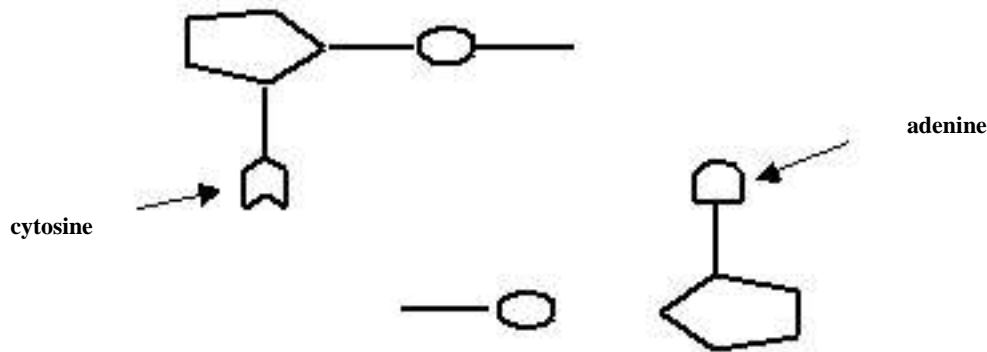
- (i) The graph indicates that population peaks occur at fairly regular intervals. What is the approximate average time between these peaks?
- (ii) What is the mean maximum population density (numbers per hectare) for the period covered by the graph?
- (iii) What is a predator? The Arctic fox is a predator of the lemming. Copy the graph into your answer book and draw on it a graph to show how you would expect the population of the Arctic fox to have varied in northern Manitoba during the period 1929 - 1943.
- (iv) Suggest **two** factors other than predation that might account for the declines in lemmings shown in the graph.
- (v) Suggest **two** factors that may have been responsible for the fairly regular increase in lemming numbers shown in the graph. (27)

10.	(a)		Biosphere: Parts of the earth that support life	3
			Habitat: Place where organism(s) live(s)	3
			Niche: Role of organism (in an ecosystem) or explained e.g. 'how it fits'	3
	(b)	(i)	Abiotic factors are non-living and biotic factors are living	3
		(ii)	Example of abiotic factor named or group e.g. climatic Named plant	3 3
		(iii)	Example of biotic factor named Named animal <i>[If ecosystem not named or incorrectly named can only get either animal or plant mark, NOT both]</i>	3 3
		(iv)	Pyramid of numbers: Shows numbers of different organisms in a food chain (or in trophic levels or named trophic levels) Pyramid	3 3
		(v)	Producers or autotrophs	3
	(c)	(i)	3.5 – 4.5 years	3
		(ii)	33 – 39	3
		(iii)	Predator: an animal (or organism) that eats another animal Graph: showing lower numbers and out of phase	3 3+3
		(iv)	Why decline: food shortage / disease / migration/ correct climatic change or example /decrease in reproductive rate / other correct reason e.g. lack of space, competition, or human activity e.g. trapping, poisoning etc. <u>any two</u>	2(3)
		(v)	Why increase: (increased) food supply/ decline in predator numbers/ increase in reproductive rate / correct climatic change or example / migration / other correct example e.g. more space <u>any two</u>	2(3)

11. (a) ATP is an abbreviation. What does it stand for? Explain briefly the role of ATP in the energy exchanges of a cell. (9)
- (b) (i) The first stage of photosynthesis is commonly known as the light-dependent stage. It involves the energising of electrons and their subsequent passage along two possible pathways. Give an account of what happens on each of these pathways. (27)
(ii) What is the fate of each of the products of the light-dependent stage?
- (c) The effect of changing light intensity or carbon dioxide concentration on the rate of photosynthesis may be investigated by using the pondweed *Elodea*. Answer the following in relation to this investigation. (24)
(i) Why is a water plant rather than a land plant used in this experiment?
(ii) How is the temperature kept constant in this experiment?
(iii) If pond water is used in the experiment, it is likely to contain dissolved carbon dioxide. Suggest **two** possible sources of carbon dioxide in pond water.
(iv) Explain how light intensity or carbon dioxide concentration may be varied.
(v) Each time light intensity or carbon dioxide concentration is varied a precaution is necessary. What is this precaution and why is it necessary?
12. (a) What is homeostasis? State the role of the kidneys in homeostasis. (9)
- (b) (i) Draw a labelled diagram of a nephron. Include blood vessels in your diagram. (27)
(ii) Filtration and reabsorption are vital processes that take place in the nephron. Describe how each of these processes occurs.
- (c) Answer the following questions in relation to human body temperature. (24)
(i) What is the source of the heat that allows the body to maintain a constant internal temperature?
(ii) State **two** ways in which the body is insulated against loss of heat.
(iii) Describe the ways in which the body responds when its internal temperature rises above the normal level.
(iv) Describe briefly the hormonal and nervous responses that occur when internal body temperature drops.

11.	(a)	Adenosine triphosphate Role: P – P bond / holds or stores (energy) / passes on or releases (energy) or $ATP \rightarrow ADP + P / + \text{energy}$ (or the reverse reaction) any two	3 2(3)								
	(b)	(i) Pathway 1. Light energising electrons or light into chlorophyll / (e-) from chlorophyll / ATP formed / (e-) returned to chlorophyll Pathway 2. (e-) to NADP / photolysis (or H ₂ O split) / H ⁺ (protons) to NADP / NADPH formed / ATP formed / O ₂ formed / different electrons / (e-) back to chlorophyll/ [maximum 4 points from either pathway]	6(3)								
		(ii) <table border="1"> <thead> <tr> <th>Product</th> <th>Fate</th> </tr> </thead> <tbody> <tr> <td>ATP</td> <td>for dark phase or explained or any metabolic reaction</td> </tr> <tr> <td>NADPH</td> <td>for dark phase or explained</td> </tr> <tr> <td>O₂</td> <td>respired or released (into atmosphere)</td> </tr> </tbody> </table> any three	Product	Fate	ATP	for dark phase or explained or any metabolic reaction	NADPH	for dark phase or explained	O ₂	respired or released (into atmosphere)	3(3)
Product	Fate										
ATP	for dark phase or explained or any metabolic reaction										
NADPH	for dark phase or explained										
O ₂	respired or released (into atmosphere)										
	(c)	(i) Why Elodea?: ease of measurement of rate or explained	3								
		(ii) How temp constant: water bath or described	3								
		(iii) Sources of CO₂ : animal respiration / plant respiration / from air / bacterial respiration or decomposition / <i>[Note: respiration alone = 1 point]</i>	2(3)								
		(iv) How varied: lamp / different distances (or different wattage) OR sodium hydrogen carbonate / different amounts	3+3								
		(v) Precaution at each change: Allow time (before counting bubbles) Reason: Plant adjusting or equilibration or explained	3 3								
12.	(a)	Maintaining (a constant) internal environment or described Role of kidneys: Maintaining salt balance or explained / Maintaining water balance or explained / <i>[Note: Osmoregulation = 2 points]</i>	3 3 3								
	(b)	(i) Diagram of nephron Diagram of blood supply labels	3, 0 3, 0 3(1)								
		(ii) Filtration: Blood in arteriole / under pressure/ plasma (accept blood) or small molecules or named from (or in) glomerulus /in or into (Bowman's) capsule /large molecules or named or cells or named cells cannot pass any three	3(3)								
		Reabsorption: Substance (or named) from (or in) tubule (or named part or from filtrate) / / into blood / active transport / diffusion / osmosis / mention of hormonal control any three	3(3)								
	(c)	(i) Source: respiration or named site e.g. muscle, liver, kidney, brain or named food e.g. carbohydrate or named	3								
		(ii) Two methods of insulation: fat (adipose tissue) / (trapped) air or hair	2(3)								
		(iii) When temp high: vasodilation (or explained) / (secretion of) sweat / hairs lie flat or less air trapped any two	2(3)								
		(iv) Response when temp drops: receptor (or detection) / receptor in skin / receptor in medulla or brain / shiver / generates heat / hairs stand up or goose bumps / air trapped / vasoconstriction (or explained) / increased metabolic rate or increased respiration / any relevant comment on named hormone e.g. thyroxine increases metabolic rate or increases respiration any three	3(3)								

13. (a) Copy the diagram into your answer book and then complete it to show the complementary base pairs of the DNA molecule. Label all parts not already labelled. (9)



- (b) The genetic code incorporated into the DNA molecule finds its expression in part in the formation of protein. This formation requires the involvement of a number of RNA molecules. List these RNA molecules and briefly describe the role of each of them. (24)

- (c) Read the following passage and answer the questions that follow.

Dolly, the most famous sheep in the world, was cloned in the Roslin Institute in Scotland in 1996. When this was announced in February 1997 it caused a sensation, because until then many scientists thought that such cloning was impossible.

Such cloning is the production of one or more animals that are genetically identical to an existing animal. This cloning technique is based on the fact that, with the exception of the sperm and the egg, every cell in the body contains in its DNA all of the genetic material needed to make an exact replica of the original body. During the normal development process from embryo to fully-fledged animal, all of the cells in the body are differentiated to perform specific physiological functions. Before Dolly, the majority view was that such differentiated cells could not be reprogrammed to be able to behave as fertilised eggs.

Dolly was produced by a process known as "adult DNA cloning", which produces a duplicate of an existing animal. The technique is also known as "cell nuclear replacement". During adult DNA cloning, the DNA is sucked out from a normal unfertilised egg cell, using a device that acts somewhat like a miniature vacuum cleaner. DNA that has already been removed from a cell of the adult to be copied is then inserted in place of the original DNA. Following this stage, the cell containing the inserted DNA is implanted in the womb of an animal of the same species, and gestation may begin.

To make Dolly, a cell was taken from the mammary tissue of a six-year-old sheep. Its DNA was added to a sheep ovum (egg) from which the nucleus had been removed. This artificially fertilised cell was then stimulated with an electric pulse and implanted in an ewe.

{Adapted from www.biotechinfo.ie}

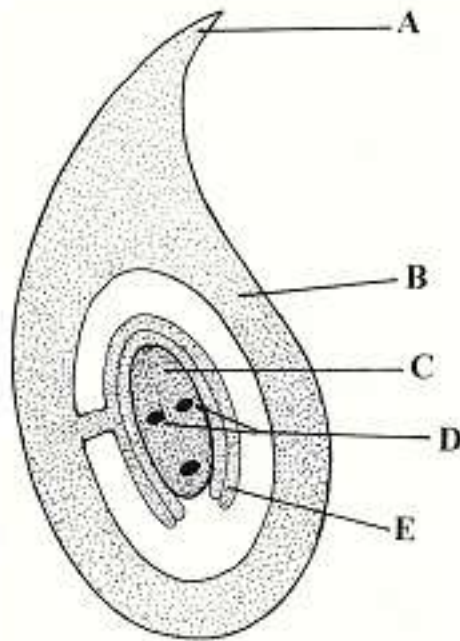
- (i) What is the difference between a nucleus of an egg cell and that of a somatic (body) cell of an animal?
- (ii) Suggest an advantage of producing genetically identical animals.
- (iii) Suggest a disadvantage of producing genetically identical animals.
- (iv) "Every cell in the body contains in its DNA all of the genetic material needed to make an exact replica of the original body". Comment on this statement.
- (v) What is the precise meaning of the term "implanted" in the extract above?
- (vi) Suggest a purpose for stimulating the fused egg with an electric pulse.
- (vii) What do you think is meant by the phrase "artificially fertilised cell"? (27)

13.	(a)	Completed diagram showing two additional sugar molecules and two more bases		
		diagram completed correctly or shapes of bases or show bonding new bases named and matched deoxyribose or phosphate labelled	3, 0 3, 0 3, 0	
	(b)	mRNA(messenger RNA) rRNA (ribosomal RNA) tRNA (transfer RNA) Functions: mRNA: mRNA formed to match DNA (or transcription or explained) / leaves nucleus or into cytoplasm / (carries instructions) to ribosomes or for translation rRNA: rRNA binds (holds) mRNA in place / for translation (or explained) / structure of ribosome tRNA: tRNA carries an amino acid / complementary to mRNA / to ribosomes	3 3 3	
		any five functions <i>[must be at least one point from each RNA type]</i>	5(3)	
	(c)	(i)	Difference: egg cell is haploid or somatic cell is diploid or quote from passage line 6 and 7	3
		(ii)	Advantage: any valid example e.g. same wool quality	3
		(iii)	Disadvantage: any valid example e.g. lack of variation or consequence e.g. prone to disease	3
		(iv)	Comment: valid / mitosis yields genetically identical nuclei / not all genes switched on / genetic potential to produce new organism or explained / comment on significance e.g. forensics <i>[If 'not valid' stated for one point, second point got from a reason why not e.g. not sex cells]</i> any two	2(3)
		(v)	Implanted: attached (embedded) <i>[allow inserted, placed or put]</i> to the endometrium <i>[allow uterus or womb]</i> or explained	3
		(vi)	Why electric pulse: any reasonable suggestion e.g. to initiate cell division, keep alive, boost viability, energise.	3
		(vii)	Artificially fertilised: (diploid) nucleus / into ovum without nucleus / rather than from fusion of haploid nuclei (or gametes) <i>[These 2 points will be got by quoting from last paragraph]</i> any two	2(3)

14. Answer **any two** of (a), (b), (c).

(30, 30)

- (a) The diagram shows a vertical section through a carpel.



- (i) Name A, B, C, D, E.
(ii) What happens to the two nuclei labelled D?
(iii) In the case of B and E state what may happen to each of them after fertilisation.
(iv) Copy the diagram into your answer book and add a pollen tube that has completed its growth. Label the nuclei in the pollen tube.
- (b) (i) Draw a labelled diagram of the reproductive system of the human female.
(ii) What is fertilisation? Indicate where fertilisation normally occurs on your diagram.
(iii) State **one** cause of infertility in the female and **one** cause of infertility in the male.
(iv) What is meant by *in vitro* fertilisation? What is done with the products of *in vitro* fertilisation?
- (c) Answer the following questions from your knowledge of human embryology.
(i) What is a germ layer? List the **three** germ layers.
(ii) Relate each of the germ layers that you have listed in (i) to an organ or system in the adult body.
(iii) From what structures does the placenta develop? State **three** functions of the placenta.
(iv) Name a hormone associated with the maintenance of the placenta.
(v) Describe the amnion and state its role.

14.	Answer any two of (a), (b), (c).		
	(a)	(i) A = stigma or style B = ovary C = embryo sac (<i>allow nucellus</i>) D = polar nuclei E = ovule (<i>allow integuments</i>)	2 2 2 2 2
		(ii) What happens to D: Fuse / form diploid (or primary endosperm) / (then fusion) to triploid or fertilisation / endosperm nucleus	2(3)
		(iii) E becomes the seed or testa B becomes the fruit	2 2
		(iv) Diagram 2 named nuclei labels	6, 3, 0 2(2)
	(b)	(i) Diagram female: labels	6, 3, 0 3(2)
		(ii) Fertilisation: fusion of gametes Indicate on diagram: <i>location indicated correctly on diagram</i>	3 3
		(iii) Female infertility: any named pathological condition e.g. hormonal or blockage or failure to ovulate Male infertility: low sperm count or reason for / named pathological condition / hormonal	3 3
		(iv) In vitro: fertilisation outside the body or description Fate: implanted in a womb or stored for future use or destroyed	3 3
	(c)	(i) Germ layer: Layer of cells / in the blastula (embryo) / (potential to) give rise to (specific) tissues (or organs) any two Name 3 germ layers: ectoderm endoderm mesoderm	2(2) 2 2 2
		(ii) Fate of 3 germ layers: <i>ectoderm</i> – skin or nails or hair or nervous system <i>endoderm</i> – (inner lining of) gut or named part of or liver or pancreas <i>mesoderm</i> – muscles or skeleton or excretory system or respiratory system or circulatory system (or blood)	2 2 2
		(iii) Placenta origin: uterine tissue and embryonic tissue <i>[allow from mother and baby]</i> 3 Functions: produces hormones (or named) / allows passage of food (or named) / and oxygen / antibodies / waste (or named) / acts as a barrier or explained any three	2 3(2)
		(iv) Progesterone	2
		(v) Amnion: sac or membrane holds or produces fluid or protects embryo (or foetus)	2 2

15. Answer **any two** of (a), (b), (c).

(30, 30)

- (a)
- (i) Draw and label sufficient of two neurons to show a synaptic cleft.
 - (ii) Describe the sequence of events that allows an impulse to be transmitted across a synapse from one neuron to the next.
 - (iii) Suggest a possible role for a drug in relation to the events that you have outlined in (ii).
- (b)
- (i) What is an auxin? State a site of auxin secretion. How may the action of an auxin be considered similar to the action of a hormone in the human body?
 - (ii) Define tropism. List **three** types of tropism.
 - (iii) Relate the role of an auxin to one of the tropisms that you have listed in (ii)
- (c)
- (i) Draw a labelled diagram to show the structure of *Rhizopus*. State **one** feature in your diagram that indicates that *Rhizopus* belongs to the kingdom Fungi.
 - (ii) Sexual reproduction in *Rhizopus* leads to the formation of a zygospore. Show, by means of labelled diagrams, the stages involved in the production of the zygospore.
 - (iii) Explain what happens when the zygospore reaches a location at which conditions for its germination are suitable.

15.	Answer any two of (a), (b), (c).		
(a)	(i)	Diagram of synaptic cleft: 3 labels	6, 3, 0 3(2)
	(ii)	Transmission of impulse: arrival of impulse / synaptic bulbs (or vesicles) / (secretes) transmitter (substance) / passage of neurotransmitter / impulse starts in next neuron / neurotransmitter broken down / by enzymes <i>any five</i>	5(3)
	(iii)	A drug may be used to inhibit or enhance transmission of impulse or similar comment <i>[any reasonable suggestion]</i>	3
(b)	(i)	Auxin: a (growth) regulator in plants Site: tip of shoot or buds or meristem / developing leaves or seeds or other correct location Action similar to hormone: Made in one place / transported to other part / causes response / slow acting / long lasting <i>any two</i>	3 3 2(3)
	(ii)	Tropism: growth response (of plant to a stimulus) Types of tropisms: thigmotropism/ phototropism/ geotropism (gravitropism) / hydrotropism / chemotropism <i>any three</i>	3 3(3)
	(iii)	Role of auxin: unequal distribution / caused by light or gravity / unequal growth / results in bending or direction <i>any two</i>	2(3)
(c)	(i)	Rhizopus diagram 3 labels	6, 3, 0 3(1)
	(ii)	Why a fungus: stolon or rhizoids or mycelium or hyphae or sporangium or spores <i>any one</i>	3
	(iii)	Diagram sexual reproduction: (series of diagrams or 3 stages in one diagram) 3 labels	6, 3, 0 3(1)
	(iii)	Fate of zygospore: meiosis / hypha grows / sporangium (produces) / (asexual) spores / released / spores germinate <i>any three</i>	3(3)

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