1. Answer five of the following: (5 \* 4m) (20)

(a) Name the trace element which is an essential component of haemoglobin in human blood. (4m)

- iron / Fe

(b) Name a disorder associated with a deficiency of a **named** water-soluble vitamin in the human diet. Any 1: (4m)

Vitamin named (2m), Disorder named (2m).

C // ascorbic acid – scurvy

B // - beriberi //pellagra //pernicious anaemia // *etc.*

(c) Give **one** role of fat in the human diet.

Any 1: (4m)

energy //

- to insulate //

to form membranes //

a source of fat-soluble vitamins

(d) What is the ratio of hydrogen atoms to oxygen atoms in a carbohydrate? (4m)

2:1

(e) Give an example of a protein that has a structural role

Any I: (4m)

keratin //

myosin //

elastin //

collagen//

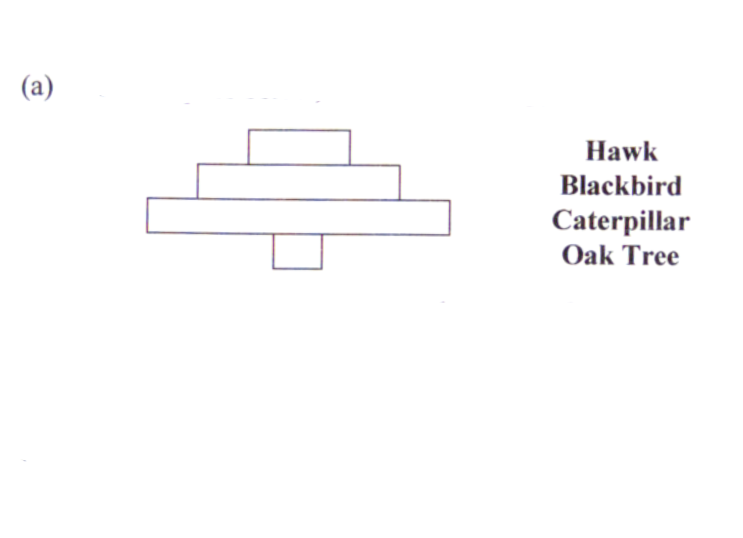
fibrin *II etc.*

(f) Where in a cell would you expect to find phospholipids? (4ni) - cell membrane \* \* Accept any named membrane.

2. A food chain from a terrestrial ecosystem is:

0akTree -- Caterpillar -► Blackbird ► Hawk

1. In the space below, draw and label a pyramid of numbers for the food chain. (3m)



\*\* Shape and labels must be correct for full marks.

(b) What term is used to describe the shape of this pyramid? (3m)

inverted (pyramid)

(c) Explain why ecologists use pyramids of numbers.

Any I: (3m)

to compare (feeding levels / trophic levels) of different communities // to compare energy losses in different food chains //

to represent the energy loss in a food chain

(d) Give **one** limitation which applies to the use of a pyramid of numbers Any I: (3m)

organism size can change shape of pyramid //

not possible to represent large numbers of organisms correctly //

large numbers mean the pyramid cannot be drawn to scale

(e) Identify the secondary consumer in the pyramid of numbers you have drawn

blackbird

(f) If a disease reduced the population of secondary consumer referred to in (e), what would be the

likely effect on the populations of primary and secondary consumers

Primary consumers **(3m)**

- increase

Tertiary consumers **(2m)** reduce

3. (a) Name the nucleotide base found in messenger RNA (mRNA) but not in DNA. (3m)

uracil

(b) In addition to a base, name the two other components of a nucleotide. (3m)

\*\* Both must be correctly named for full marks.

phosphate

sugar / ribose / deoxyribose

(c) A female mouse has a diploid number of 40. Name a cell in the mouse which would have a haploid number of 20. (3m)

egg

(d) What cellular process would result in the number reduction referred to in (b)? (3m)

meiosis

(e) The following five letters A C G C A represent a piece of mRNA produced from the transcription ot a certain piece of DNA. List the five corresponding letters in the transcribed DNA. (3m)

TGCGT

(f) Apart from the base referred to in (a), give two other differences between DNA and mRNA.

Any 2: (3m + 2ni)

DNA - double stranded //

RNA - single stranded //

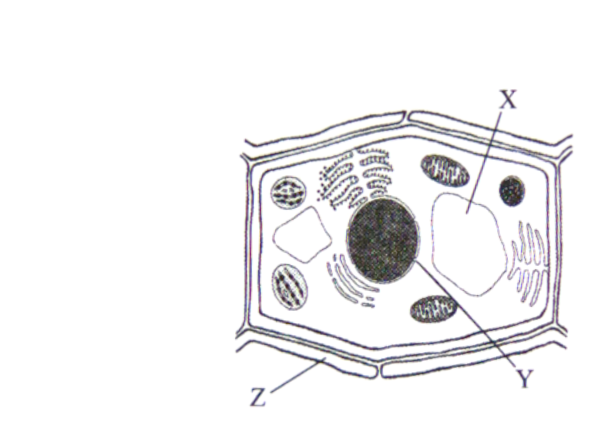
DNA - coiled / helix spiral //

RNA - not coiled / straight //

DNA - found in nucleus only //

RNA - found in nucleus and cytoplasm

4. The diagram shows a plant cell.



(a) Name the structure where enzymes are manufactured in the cell. (3m) ribsome(s)

(b) Name the structure in which the reactions of Photosynthesis occur. (3m) chloroplast(s)

(c) Give one reason for the occurrence of gaps in Y. Any 1: (3m)

to allow passage of mRNA //

to allow passage of rRNA //

to allow passage of enzymes //

- to al low passage of ribosomes //

- to allow passage of growth factors //

- to al low passage of nucleotides

(d) What is Z made of? (3m) cellulose

(e) (i) Name X. (3m) vacuole

(ii) State a function of X.

Any I: (3m)

support / strengthen / turgor // storage

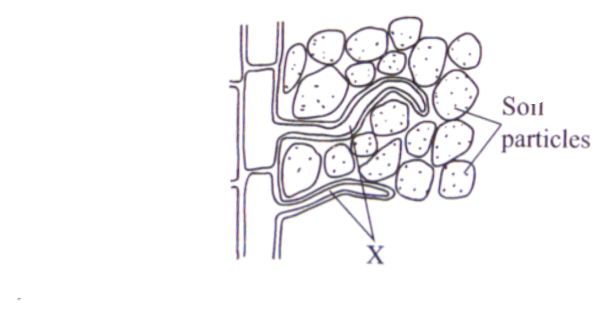
(0 Name a structure present in this cell which would be absent from an animal cell.

Any I: (2m)

- cell wall //

chloroplast //

- vacuole



5. The diagram shows part of a root in soil,

(a) Identify X. (2m)

- root hair

(b) In which region (zone) of the root is X found? (2m) - zone of differentiation

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (c) The table shows the concentration of potassium and magnesium ions in the cytoplasm of root cells and in soil water. There is a movement of potassium and magnesium ions from the soil water into the cytoplasm of the root cells  Name the process by which the root cells take up potassium ions from the soil water through X. (4m)  active transport | |  |  |  | | --- | --- | --- | |  | Concentration (mg/1) | | | Cytoplasm | Soil water | | Potassium ions | 4.00 | 0.12 | | Magnesium ions | 0.40 | 0.80 | |

(d) Give a reason for your answer to part (c).

Any l: (4m)

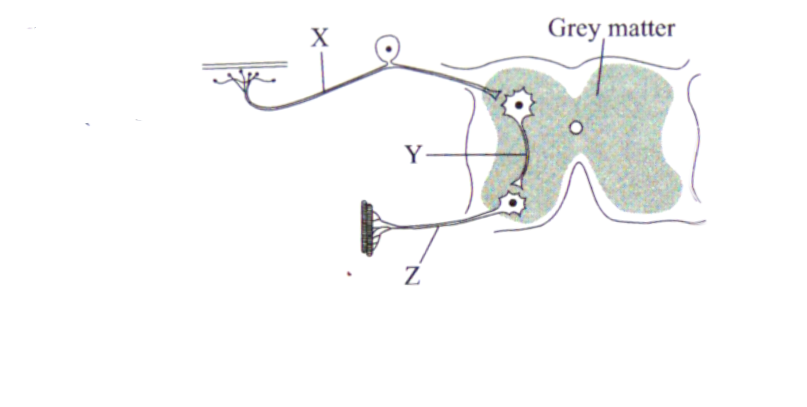
(movement) against a concentration gradient // requires energy

(e) Name the process by which the root cells take up magnesium ions through X. (4m) - diffusion

(0 Give a reason for your answer to part (e). (4m)

(movement) along a concentration gradient / or explained using the table

6. The diagram shows a nerve pathway that is activated when a person touches a very hot object.

(a) Name parts X, Y and Z in the diagram. (3 x 2m)

X - sensory neuron Y - interneuron Z - motor neuron

(b) What is the general name given to the type of nerve pathway shown in the diagram? (3m) a reflex arc

(c) Indicate using arrows on the diagram the direction in which the nerve impulse travels. (2m)

\*\* Arrows indicating X —» Y —> Z

(d) Give one structural difference between X and W.

Any 1: (3m)

motor neuron / Z has cell body at end of axon / within the CNS //

sensory neuron / X has cell body outside the CNS //

motor neuron / Z has short dendrites //

sensory neuron / X has long dendrites //

motor neuron / Z exits via ventral root //

motor neuron / Z has a long axon //

sensory neuron / X has a short axon

(e) How many synapses can be seen in the diagram? (3m) **2**

(f) Give the general name for a chemical which is released at a synapse. (3m) neurotransmitter

**Section B**

7. (a) Give two limitations of the scientific method.

Any 2: (2 x 3m)

extent of knowledge //

- basis of investigation //

how results are interpreted //

changes in nature //

accidental discoveries //

limits of instruments

(b) Answer the following by reference to some of the investigations that you carried out in the c your studies.

(i) In conducting a habitat study, for what purpose did you use a biological key? (3m) to identify fauna and flora

(ii) Which of the four chambers of the heart did you observe as having the thickest muscle wall in your dissection of a heart? (3ni)

left ventricle

(iii) Why did you cut sections as thinly as possible when you prepared a transverse section of a dicotylcdenous stem for viewing under a light microscope? (3ni)

to allow light through / to clearly see the cells

(iv) What chemical (reagent) did you use to test for the presence of a reducing sugar in a food sample? (3m)

Benedict's solution / Fehling's solution

(v) Why did you add enzymes to the mixture of plant tissue when isolating DNA? (3ni)

to break down the proteins (around the DNA)

(vi) In which of your investigations did you use starch or skimmed milk agar plates? (3ni)

to show digestive activity during germination

(vii) What control did you use when investigating the effect of heat denaturation on enzyme activity? (3m)

unboiled enzyme solution

(viii) Using the capture-recapture method, 40 woodlice were captured, marked and released. When a second sample of 40 woodlice was captured in the same habitat, only 5 were ft to be marked. Calculate the population of woodlice in the habitat. (3m)

(40 x 40) / 5 = 320

8. (a) (i) Enzymes can be immobilised for use in industry.

Explain the term *immobilisation* when used in relation to enzymes.

Any 1: (3m)

fixed in gel / fixed to each other //

attached to an inert substance (or example of inert substance)

((ii) State one advantage of using immobilised enzymes.

Any 1: (3ni)

(can be) recovered //

(can be) renewed / reused //

cheaper than using free enzymes //

increased stability (less enzyme needed in a reaction) // - more efficient

Answer the following in relation to the preparation of an immobilised enzyme and the examination of its application. (24)

(i) Why did the glassware need to be thoroughly washed before beginning the procedure? Any 1: (3m)

to ensure no contamination //

(formation of alginate beads) is a delicate process

(ii) What is the purpose of the sodium alginate?

Any 1: (3m)

to trap the enzyme //

(to trap the enzyme) but allow substrate to enter / exit // - is permeable to substrate //

to form a gel (with the calcium chloride solution)

(iii) What is the purpose of the calcium chloride? (3m) to harden the beads

(iv) Why are the beads washed in water before being used? (3m)

to remove enzyme / yeast cells (from outside surface of beads)

(v) In the space below, draw a labelled diagram of the apparatus that you used to *investigate the activity* of the immobilised enzyme.

Diagram **(Om, 3m)**

Labels:

Any 3: **(3** x **lm)**

- named substrate //

enzyme [accept yeast] or beads //

named product //

any one apparatus label

(vi) Briefly describe how you used the apparatus referred to in (b) (v). (3 x **2m)**

add named substrate (to immobilised enzyme)

- test for named product

- how tested / test at set intervals **or** control described

9. (a) (j)) What is an *autotroph*? (3m)

an organism that makes its own food

(ii) Suggest **two** possible sources of carbon dioxide for a plant in nature. Any 2: (2m + 1m)

plant respiration //

animal respiration //

atmosphere / air //

- combustion

(b) Answer the following questions in relation to an activity that you carried out to investigate the effect of light intensity **or** carbon dioxide concentration on the rate of photosynthesis. (24!

(i) Name the plant that you used. (3m)

pondweed / *Elodea II etc.*

(ii) Why is a water plant rather than a land plant used in this investigation? (3m) you can see the bubbles

(iii) Apart from the factors named above, name **one** factor you kept constant during this investigation. (3m)

temperature

(iv) Flow did you keep the factor referred to in (b) (ii) constant throughout the investigation? (3m) water bath

(v) Explain how you varied light intensity **or** carbon dioxide concentration.

Any 1: (3m)

light intensity - moved the lamp / used a dimmer switch//

carbon dioxide concentration - used different concentrations of

sodium hydrogen carbonate

\*\* How varied should correspond to the factor named.

(vi) What precaution did yoii taxO m evict\* change of light intensity **or** carbon dioxide concentration before measuring the rate of photosynthesis

— allowed time for the plant to adjust to the new conditions

(vii) Use the axes below to summarise the results of your investigation.

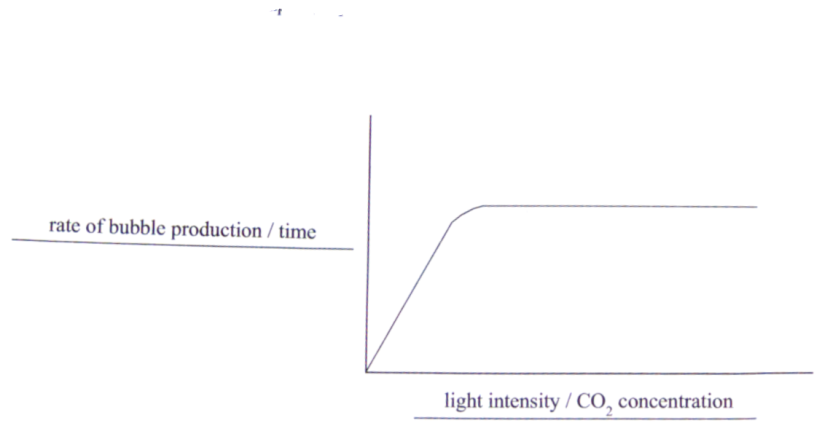
Do this by:

1. labelling the axes,

2. drawing a graph to show how the rate of photosynthesis varied over a large change in light intensity **or** carbon dioxide.

Labels correct (3m)

Correctly shaped graph drawn (3m)



**SECTION C**

10 (a) (i) Define *pollination.* (3m)

the transfer of pollen from anther to stigma

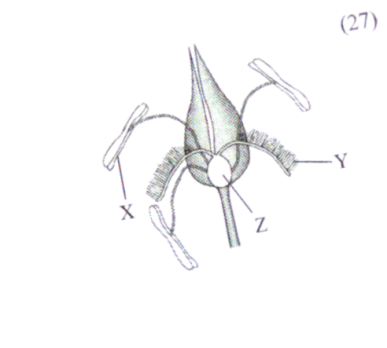
(ii) Distinguish between *self-pollination* and *cross-pollination.*

*Self-pollination* (3 m)

the transfer of pollen from an anther to the stigma of the same plant

*(Cross-pollination* (3 m)

the transfer of pollen from an anther to the stigma of a different plant of the same species



(b) The diagram shows the structure of a wind-pollinated flower.

Name the structures labelled X,Y,Z (3 \* 1m)

X anther. Y stigma and Z ovary

(ii) Give one way in which each of the structures X and Y is adapted to carry out its function.

X / anther

Any 1: (3m)

large (produces a large quantity of pollen) //

outside flower //

loosely attached to the filament

Y /' stigma

Any I: (3m)

large'

feathery //

outside flower

(iii) 1. Which of the labelled parts produces pollen grains? (3m) X / anther

2. What does a pollen grain produce?

Any 1: (3m)

2 male gametes //

2 male gamete nuclei //

- generative nucleus and tube nucleus

(iv) 1. Which of the labelled parts produces the embryo sac? (3m)

Z / ovary

What does the embryo sac produce?

Any I: (3m)

1 egg nucleus //

2 polar nuclei

(v) Other than by reference to X and Y mention one other structural feature of wind-pollinated flowers.

Any 1: (3m)

small petals *i* petals absent //

not brightly coloured / usually green // no nectaries //no scent

(vi) Explain the link between pollen and hay fever. (3m)

large amounts of air-borne pollen cause(s) an allergic reaction / inflammation of the mucous membranes of the nose when inhaled (hay fever)

(c) (i) Describe the development of a pollen grain from microspore mother cells.

Any 4: (4 x 3m)

divide by meiosis //

to form 4 or tetrad of pollen //

haploid //

divide by mitosis //

to form tube and generative nucleus //

pollen grain matures / forms coat (exine)

\*\* Accept diagram of mature pollen grain

(ii) Describe the development of an embryo sac from a megaspore mother cell.

Any 4: (4 x 3m)

divide by meiosis //

to form 4 haploid cells //

3 of the cells disintegrate //

divide by mitosis 3 times //

to form 8 cells or nuclei //

haploid //

5 nuclei degenerate //

1 (of the remaining 3) forms the egg cell //

2 become polar nuclei

(9)

11. (a) (i) Explain the term *evolution.*

Any 2: **(2** x **3m)**

(inheritable) change within a population (or species) // in response to change in the environment //

by natural selection //

over time

(ii) Name **either** of the scientists associated w ith the Theory of Natural Selection.

Any 1: (3m)

(Charles) Darwin //

(Alfred Russel) Wallace

b) (i) What do scientists mean by the term *species'?* **(2** x 3m) (27)

organisms capable of inter-breeding to produce fertile offspring

(ii) 1. Explain the term *variation* in relation to a species. (3m)

differences between individuals

2. List **two** types of variation **and** give an example of a variation in humans.

Types **(2** x 3m)

acquired / caused by environment inherited / genetic

Example

Any 1: **(3ni)**

sporting prowess // musical ability // IQ values //

some mental illnesses // weight //

growth // *etc.*

(iii) I. Explain what ais *mutation*. (3m)

a change in the amount or structure of DNA / a genetic change / an inherited change

2. Name **two** different types of mutationsand give an example of each

Tvpes of mutations **(2** x 3m)

\*\* Named (2m), Example (1m)

gene mutation : cystic fibrosis / haemophilia / sickle cell anaemia / albinism / cancer // *etc.*

chromosome mutation: Down's syndrome // *etc.*

12. (a) (i) Explain the terms *pollution* and *conservation* in relation to ecology.

*Pollution* **(3m)**

- any harmful addition to the environment

**(9)**

*Conservation* (3 m)

wise management of an ecosystem or habitat (not protection), *etc.*

(ii) Give an account of the effects of **one** pollutant of domestic **or** agricultural **or** industrial origin

|  |  |
| --- | --- |
| Any I: (3m)  Pollutant named (1 m), Effect (2m).  Domestic  household waste //  - sewage // *etc. –*  Agricultural  - slurry / silage effluent // | sprays and overuse of fertilisers // *etc. -*unsightly / causes litter / attracts vermin //   * causes water pollution // *etc.*   can cause water pollution // *etc.* damaging to environment // *etc.* |

Industrial causes acid rain // *etc.* may damage streams / rivers / lakes // *etc.*

(b) Read the following extract from a report and answer the questions below. (27)

Water hyacinth *(Eichhornia crassipes)* is a free-floating aquatic plant native to South America that has infested freshwater ecosystems in the south eastern United States. The plant is a real menace, affecting water traffic, water quality, infrastructure for pumping and hydroelectric operations, water use and biodiversity. Other problems include fish kills due to low oxygen levels and increases in populations of vectors of human and animal diseases.

*Megamelus scutellaris* is a small plant hopper native to South America whose nymphs and adults feed on the sap of water hyacinth. The insects' population increases rapidly which will enable it to quickly impact the water hyacinth population. Researchers have now released this insect at a water treatment plant in Florida as a form of biological control for the invasive weed, water hyacinth.

*[Adapted from the Irish Times, Science Today, May 8, 2010.]*

(i) State the trophic levels to which the water hyacinth and the plant hopper belong.

Water hyacinth (3m) producer / 1 st

Plant hopper (3m)

primary consumer / first-level consumer / 2nd

smoke //

chemical wastes // *etc.*

( ii) Suggest **one** possible advantage and **one** possible disadvantage of using the plant hopper to biologically control the water hyacinth.

Advantage

Any 1 (3 marks)

Cheaper

Effective

No pollution

Disadvantage

Any 1: (3m)

control population may become a pest //

control population may change the balance of nature // - not under human control // *etc.*

\*\* Accept any reasonable disadvantage.

(iii) The article suggests that a lack of oxygen in the water is one of the problems caused by the spread of the water hyacinth. Suggest why this might be so, considering that plants produce oxygen as they carry out photosynthesis.

Any 1: (3m)

rotting water hyacinth plants release nutrients which can lead to eutrophication //

bacteria (micro-organisms) use up oxygen when decomposing water hyacinth plants //

too much dissolved oxygen in the water can lead to cultural eutrophication //

fish use up dissolved oxygen //

its leaves are in the air, its roots are in the water // *etc.*

(iv) The failure of native plants to compete successfully with the water hyacinth has led to human intervention to try and solve the problem. What is meant by *competition*? (3m)

fight or struggle between organisms for the same resource (or named resource)

(v) List **two** factors, other than competition, which can control populations in the wild.

Any 2: (2 \* 3m)

predation / food supply //

parasitism / disease //

symbiosis //climate//weather

climate / weather

Outline an adaptive feature of a **named** organism you may have encountered during your habitat study which helps it to survive competition.

Any 1: (3m)

\*\* If no organism named **or** if adaptive feature is not appropriate Om.

- fox // - has sharp teeth //

hawk // - has sharp talons or claws //

- nettles// - have stinging cells//

limpet // - shell for protection and to prevent drying out at low-tide //

ladybird // *etc. -* brightly coloured to warn predators // *etc.*

\*\* Accept any reasonable example. (24)

(c) (1) Give an account of how you carried out a quantitative study of a **named** plant species in an ecosystem that you have studied. ' '

Species **(3ml**

any named plant

Procedure

Any 4: **(4** x 3m)

choose sample area or transect //

quadrat //

random throw or along transect // count //

repeat several times //

calculations // *etc.*

(ii) Describe how you presented the results of your survey. Any I: (3m)

draw a bar chart / pie chart / graph //

calculate frequency / percentage cover / density

(iii) Suggest **two** possible sources of error in your survey.

Any 2: (2 \* 3m)

misidentification //

non-random //

- not 'thrown' enough times //

- unsuitable quadrat size //

- miscount //

- miscalculation

(a) (j) Write a balanced equation to summarise aerobic respiration. (6m)

C6H12O6 + 6O2 = 6H20 + 6CO2 (+energy)

\*\* Deduct 3 m for I error.

\*\* Two or more errors Om.

\*\* Deduct 3ni if equation is not balanced.

(ii) What is the role of respiration in living organisms? (3m) (to provide) energy

1. (ii) Give **two** differences between *aerobic* and *anaerobic* respiration.

Any 2: (2 \* 3ni)

*Aerobic vs Anaerobic*

requires oxygen // - does not require oxygen //

releases more energy // - releases less energy //

complete breakdown of glucose // - incomplete breakdown of glucose //

produces C02 + H20 - produces lactic acid or ethanol

(ii) Aerobic respiration occurs in two stages.

**1**. Name the **tw o** main stages of aerobic respiration. **(2** \* 3ni)

glycolysis - Krebs cycle

2. State the precise location in the cell where **each** of the stages occurs. (2 x 3m)

glycolysis - cytosol / cytoplasm

Krebs cycle - mitochondrion

\*\* Location must match stage named.

(iii) Where in the process is acetyl coenzyme A (acetyl CoA) produced? (3m) between stage 1 and stage 2 / at the beginning of stage 2

(iv) How many carbon atoms are contained in one acetyl CoA molecule? (3m)

**2**

(v) The electron transport system operates during stage 2 of respiration. What is the function ot this transport system? (3m)

to produce ATP

(c) (i) To which kingdom does yeast belong? (3m) - fungi

(ii) Draw a labelled diagram of a yeast cell.

Diagram (0m,3m)

Labels

Any 3: (3\* Im)

cell wall //nucleus //granular cytoplasm //vacuole // bud

(iii) Yeast may be described as a eukaryotic cell. What is meant by *eukaryotic*(3m)

possessing a nucleus and cell organelles, all of which are enclosed by membranes

(iv) Briefly describe how yeast reproduces.

Any 3: (3 x **3m)**

a small extension (bud) is formed //

the bud enlarges or is filled with cytoplasm // - nucleus divides by mitosis //

one nucleus moves into the bud //

bud breaks free or forms a colony

(v) Yeast is often used in bioreactors to carry out industrial fermentation. Explain the underlined word.

Any 1: (3m)

- anaerobic respiration //

respiration that produces alcohol //

respiration that produces lactic acid //

- release of energy in the absence of oxygen

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

(a) (i) Outline the importance of water to living organisms.

(30)

Any 2: (2 x3m)

is a component of cytoplasm / bodily fluids //

- is a good solvent //

acts as a medium for chemical reactions to take place //

is a participant in chemical reactions *(e.g.* condensation, hydrolysis,

photosynthesis, respiration) //

controls cell shape - can move through ccll membranes //

- a good absorber of heat energy //

provides stable temperature for living things //

transports dissolved substances

(ii) Homeostasis is derived from the Greek, homeo or "same", and stasis or "stable" and remaining stable or remaining the same.

Suggest two reasons why homeostasis is important in the human body.

Any 2: (2 x **3m)**

- maintains constant conditions in cells //

maintains (constant) internal body temperature of 37 C //

fluid balance (constant) //

maintains pH levels (in blood and tissues, close to pH 7.4) //

prevents build-up of toxins in the body //

- maintains sufficient levels of oxygen in the body //

- regulates blood glucose levels (close to 0.1 %) //

maintains a (constant) heart rate or blood pressure //

- maintains a constant rate of metabolism // *etc.*

(iii) The kidneys are part of a feedback system involved in homeostasis in the body.

This feedback system is responsible for the maintenance of salt levels in the blood.

1. Name the hormone involved in this feedback system. (3ni)

ADH / anti-diuretic hormone / vasopressin

2. From which specific site is this hormone secreted? (3m)

pituitary (gland)

3. Give the precise site of action of this hormone in the nephron.

Any 1: (3m)

distal convoluted tubule //

collecting duct

4. Outline how an *increase* in this hormone affects the concentration and the volume of urine produced by the kidney. (2 x 3m)

- urine is more concentrated

- a lower volume of urine is produced

5. Describe the effect of a high protein diet on urine produced by the kidney.

Any 1: (3m)

- urine contains a high level of urea //

- same volume of concentrated urine

(30,30)

Blood acts as a transport system in the body.

(i) Describe the composition ol blood plasma as a transport system for nutrients.

Any 3: (3 x im)

plasma transports water //

minerals //

glucose //

amino acids //

salts //

vitamins //

fats / fatty acids / glycerol

(ii) Describe the process of absorption of nutrients into the blood from the small intestine.

Any 2: (2 x 3m)

blood capillaries in the villus //

- absorb glucose and amino acids //

by diffusion

(iii) Describe the pathway that transports each of the following from the small intestine to the liver:

I. Digested carbohydrates. (3m)

hepatic portal vein

2. Digested fats.

Any 2; **(2 \*3m)**

- lacteal //

lymph vessel / thoracic duct //

- vena cava //

- aorta //

hepatic artery

(iv) Give **three** functions of the liver.

Any 3: (3 \* 3m) .

Expect 1 point from each function tor full marks.

Stores: glycogen //iron // vitamins A, D and K

Produces: urea // bile // heat

Breaks down: red blood cells //toxic chemicals (alcohol)

(v) Outline the role of fibre in the diet.

Any 1: (3m)

stimulates peristalsis //

helps to prevent constipation

(C) Answer the following questions in relation to the transport system of flowering plants (30)

(i) Explain how water:

1. Moves into a plant from the soil. (3m)

through root hairs by osmosis

2. Reaches the transport tissues in the stem.

Any 2: (2 \* 3m)

(from cell to cell) by diffusion //

across the ground or cortex tissue //

to xylem

(ii) Water can rise to extreme heights in a plant against the force of gravity. Explain in detail how this happens.

Any 5: (5 \* 3m)

up the xylem //

(helped by) root pressure //

pushes water up //

evaporation or transpiration (in leaf) //

cells become less turgid //

osmotic gradient created //

attractive forces between water molecules // - cohesion //

water molecules held in continuous column //

tension //

adhesion to wall of xylem vessels

(iii) Name the two scientists who first explained the mechanism referred to in (c) (ii). (2 x 3m)

Dixon - Joly

15. Answer any **(wo** of (a), (b), (c). (30, 30)

(a) (i) Give **two** examples of the human general defence system in action. (30

Any 2: (2 \* 3m)

the skin acts a structural barrier to entry of pathogens //

sebaceous glands release a chemical in the sebum that kills bacteria //

blood clotting prevents entry of further pathogens if the skin is broken //

lysozyme (in sweat, tears and saliva) attacks the cell walls of bacteria //

mucous which lines body systems traps pathogens to prevent their entry //

cilia (in respiratory system) - move mucous back up the respiratory system to be swallowed into the stomach //

hydrochloric acid in the stomach - kills many pathogens //

beneficial bacteria in the body, *e.g.* bacteria in the vagina, produce lactic acid which prevents growth of pathogens

(ii) What is meant by the term *immunity*? (3m) resistance to infection / to antigens

(iii) Distinguish between *active immunity* and *passive immunity* by writing a sentence about each.

Active immunity Any I: (3m)

when a person / body produces their own antibodies //

provides long-term immunity //

a disease is only contracted once

Passive immunity Any I: (3m)

antibodies introduced to body //

antibodies are obtained from another organism //

provides short-term immunity //

disease will not be contracted as long as antibodies are present

(iv) Diphtheria is a bacterial disease. Describe **three** different ways in which a six-month-old baby may develop immunity either naturally or artificially, to diphtheria. (3 x 3m)

antibodies from mother (through breast feeding)

vaccine

by contracting the disease and making antibodies

(v) Where precisely in the human body do lymphocytes originate? (3m) bone marrow

(b) (i) Draw a labelled diagram of the human female reproductive system.

Diagram (Om, 3m, 6m) Labels

Any 3: (3 x I m) ovaries // fallopian tubes // uterus // endometrium // vagina//cervix // *etc.*

(ii) On your diagram, indicate where each of the following occur:

1. Egg production. (2m)

ovary

2. Fertilisation. (2m)

- fallopian tube

3. Implantation. (2m)

endometrium

(iii) Outline the roles of the hormones oestrogen and progesterone in the menstrual cycle

Oestrogen

Any 1: (3m)

repairs endometrium //

inhibits follicle stimulating hormone (FSH) //

stimulates release of luteinising hormone (LH)

Progesterone

Any 1: (3m)

thickening (or maintenance of) endometrium //inhibits FSH// inhibits luteinising hormone (LH)

Events Which occur after the egg has been fertilised until implantation occurs.

Any 3: (3 x3m)

(solid ball of cells) morula develops by mitosis //

morula travels down the oviduct to the uterus //

morula divides to form the (fluid filled ball of cells) blastocyst //

outer cells of the blastocyst form villi (trophoblast) which embed in the endometrium

(30)

(c) "(i) Our skeletal system acts as a framework for the body.

Give two functions of the skeleton besides support.

Any 2: (2 x **3m)** movement // protection // to make blood cells

(ii) Specialised cells in bone help to maintain the skeletal system throughout life and allow the body to grow.

Explain how this growth and development is brought about.

Any 4: **(4 \* 3m)**

- osteoblasts form bone / cartilage replaced //

- osteoblasts produce collagen //

calcium phosphate forms around collagen fibres, trapping osteoblasts

(which become dormant bone cells) //

ossification occurs in the growth plates of cartilage (between epiphysis and diphysis of bone) //

- bone is broken down (by osteoclasts) //

bone absorbed (by osteoclasts) //

calcium is deposited (by osteoclasts) //

- bone removed from medullary cavity //

extra material deposited on the outside

(iii) Name two factors on which the renewal of bone depends.

Any 2: (2 x 3m)

physical activity //

- hormones //

- diet

(iv) Osteoporosis and arthritis are examples of musculoskeletal disorders.

For one of these disorders give:

1. A possible cause.

2. A possible method of treatment.

Any 1 possible cause (3m)

any **i** method of treatment **(im)**

\*\* Answers given must correspond to disorder.

Osteoporosis

*Possible cause*

Any I:

- reduction in bone density //

- menopause //

- change in hormones

*Possible method of treatment*

Any 1':;

- regular weight-bearing exercise //

- intake of vitamin D //

- intake of calcium //

hormone replacement therapy (HRT)

Arthritis

*Possible cause* Any 1:

wearing down of cartilage in synovial joints (osteoarthritis) genetic (auto-immune response) (rheumatoid arthritis)

*Possible method of treatment* Any 1:

rest //

exercises to maintain mobility and strength //

weight loss //

- steroids //

anti-inflammatory medicines //

- surgery to replace joint