**BIOLOGY OLYMPIAD MARKING SCHEMES**

**SOLUTIONS**

(a)(i)gene pool refers to all of the allels in a population’s genes

(ii)genetic counselling is counselling by trained professsionls about the probability of genetic or hereditary disorders.

(iii)genetic drift is the alteration of allelic frequencies in na population by chance events which result in disruption of genetic equilibrium.

(iv)gene splicing refers to the rejoining of DNA fragments by vectors and other enzymes.

(b)symbols; --- male XY, female XX

 --- alleic symbols; h,H

**Parents ; Male Female**

Parental phenotype; Normal Normal

Parental genotype; Xh Y X XH Xh

Meiosis stage

Gamate formation; Xh Y XH Xh

Random fertilization;

First filial generation; XhxH XhXh XHY XhY

Genotype

F1 phenotype carrier Haemophiliac Normal Haemophiliac

(c) $\frac{2}{4}$ x 12 = 6 children

**SOLUTIONS**

(a)(i)A community/group of organisms and their environments/habitats/surrounds.[1]

(ii)-A number of food chains linked together [1]

 -all food chains in a community

 - animals in a food chain with more than one source of food [1]

(b)(i)locusts or impalas [1]

 (ii)the leopard can be considered to be the 2nd consumer or 4th consumer. [1]

(c)(i)Numbers will drop due to lack of grass [1]

 (ii) scorpions will increase since there will be more locusts for scorpions to feed on. [1]

(d)- less impala for leopards to eat so leopards will eat more baboons [2]

 -locusts migrate and the locust levels drop and scorpion levels drop and less food for baboons.

 -grass was spread with insecticide and the number of locust dropped and so were scorpions and baboons. [2]

**SOLUTIONS**

(a)(i) Spermatogenesis [1]

(ii)the urethra in males transport both urine and sperms while the urethra in female transport urine only. [1]

(b)(i)Ovulation is the release of the egg(ovum)/eggs/ovules from the ovary/ovaries.[1]

(ii) X- Oestrogen

 Y- FSH –Follicle Stimulating Hormone [1]

 Z – LH – Luteinising hormone [1]

(iii) Day 21 and 25 [1]

(iv) Day 4 of the next month. [1]

(c)Mammals like dogs do not menstruate because copulation takes place just after ovulation has taken place and these mammals are said to be on heat(oestrous cycle). [3]

**SOLUTION**

(a)(i) It has cellulose cell walls. Large/permanent vacuole. [1]

 (ii)

|  |  |
| --- | --- |
| **KINGDOM** | **PLANT** |
| Phylum | Angiospermaphyta |
| Class | Dicotyledonae |
| Family | Scrophylarales |
| Oder | Orobranchaceae |
| Genus | Orobranhes |
| Species | Minor |

(iii) I would cross two of the hybrid plants. If they crossed and produced seeds that geminated, they would be the same species, if they did not produce seeds or their seeds failed to germinate, they would be different species of poppy.

(b)populations separated by physical barrier/named barrier; no mixing of gene pools;(populations)become adapted to local environment; by natural selection;(separated populations)accumulate different mutant alleles/diverge genetically; allele frequencies change rapidly in small populations; eventually the two populations cannot interbreed(even if together). [4]

**SOLUTION**

1. (i) interphase (ii) Prophase (iii) Metaphase

(iv) Anophase (v) Telophase

(b)interphase is the busiest phase.It is divided into three parts

* High protein production and cell grows
* Copying of chromosomes/DNA synthesis/chromosome duplication
* Formation of mitochondria and other organelles.

(c)Animal mitosis involves formation of asters while plant mitosis does not. Asters are not critical to animal mitosis.

(d)Cytokinesis

**SOLUTIONS**

(a)(i) 6CO2 + 6H2O C6H12O6 + 6O2 [3]

(ii) – light stage

* Dark stage [2]

(b)(i)starch is more stable than glucose or starch does not easily dissolve in liquids[1]

 (ii)destarching is the removing of starch without damaging the leaf. [2]

 (iii)it is important to remove all the starch from the leaf before the photosynthesis experiments so that all the starch that would be present after the photosynthesis would have come from photosynthesis. [1]

1. – roots, stems and seeds [2]

**SOLUTIONS**

(a)(i)Tissue respiration [1]

 (ii)Air sacs (Alveolus) [1]

(b)Adenosine Triphosphate [2]

(c) C6H12O6 + 6O2 6CO2 + 6H2O + 2880kj (energy)(2800kj) [3]

(d)(i)Anaerobic respiration [1]

 (ii) –walking, - running , -talking, other metabolic reactions [any one] [1]

**SOLUTIONS**

(i)(a) X – chloroplast Y—Mitochondrion

 (b) Chloroplast is site for photosynthesis which results in production of glucose. Mitochondrion is site for respiration which makes use of glucose.

(c) Photosynthesis Accept—Respiration

(d) X has chlorophyll while Y does not .

 X has single membrane while Y has double bond membrane.

(ii)(a)Water uptake ------------- Osmosis

 Water loss ……………….. Transpiration

(b)photometer

**SOLUTION**

(a)Digestion

(b)-Mouth for physical change

 -Stomach for chemical change

(c)(i)-insulin

 -glucagon

 (ii) –Trypsin

* Pancreatic lipase
* Pancreatic amylase

(d)(i) Enzyme is a biological catalyst that is protein in nature.

 (ii) -Protein in nature

-affected by temperature/PH/concentration

**SOLUTIONS**

1. X= artery Y = Vein [2]
2. Any two from;

1. X has thicker wall while Y has thinner wall

2. X has no valves along its stretch while y has valves along its stretch

3. X transports blood away from the heart under high pressure while Y transports blood towards the heart under low pressure. [2]

(c) Capillaries [1]

(d) Blood vessels Y is a vein; blood moves from the venacava; and enters the right atrium; of the heart; the blood is pumped from the right atrium to the right ventricle. The blood is then pumped out of the heart to the lungs; via pulmonary artery. From the lungs, the blood returns to the heart via the pulmonary vein into the left atrium. It then enters the left ventricle where it becomes pumped out into the aorta, the first vessel similar to X.

**SOLUTIONS**

(a)Plant cell

(b) A=cell wall B= cell vacuole C= chloroplast

(c)Cell wall is made up of cellulose

(d)Chlorophyll

(e)Cell sap

**SOLUTION**

(a)(i)-It adds plant nutrients to the soil

 - it improves soil texture

(ii)-plants moisture

 -enough warmth

 -presence of oxygen

(iii)-evaporation

 -plants manure

(i)-Adding manure

 -adding chemical fertilizers

 -crop rotation