

WAKISSHA JOINT MOCK EXAMINATIONS
MARKING GUIDE
 Uganda Advanced Certificate of Education
BIOLOGY P530/2
 July/August 2023



1. (a) (i)

At 0 weeks; as weed density was high bean seed density was low;

From 0 to 4 weeks as the weed density decreased rapidly, bean density increased rapidly; to a peak; at 5 weeks.

From 5 to 7 weeks, as weed density decreased gradually, bean density also decreased rapidly.

From 7 to 9 weeks as weed density remained constant bean seed density increased rapidly;

(05 marks)

(a) (ii)

At 0 weeks as weed density was high ~~and~~ bean seed density was low because interspecific competition was high; weeds outcompeted beans for resources; as weeds germinate and grow faster, preventing beans from obtaining sufficient resources hence many fail to flower; and produce seeds.

From 0 to 5 weeks as weed density decreased bean density increased because of decreased interspecific competition; For resources making more resources available for beans; which multiply and grow rapidly; and many flower; to produce seeds.

From 5 weeks to 7 weeks, as weed density decreased bean seed density also decreased a little because of increased intraspecific competition between bean plants; for resources due to high density causing increased death rate; more than reproductive rate due to the population of weeds;

From 7 to 9 weeks, as weed density remained constant bean seed density increased; due to reduced intraspecific and little interspecific competition; so reproductive rate is greater than death rate many bean plants flower producing seeds;

@ 1 mark (11 marks)

(b) Interspecific competition;

Importance

- leads to resource partitioning, allowing populations of different species to co-exist in a given habitat /occupying different niches;
- leads to competitive exclusion (decrease in number of organisms of a given species in a habitat;
- increase survival of better adapted organisms;
- regulate population density;
- influence distribution

any correct 3 answers for importance

@ 1 mark

(04 marks)

- c) At a distance of 5 meters from the road side, seed production per plant was low less due to the small distance, hence more dust particles settled on the leaf surfaces, reducing light penetration and blocking many stomata; preventing entry of carbon dioxide; hence reducing rate of photosynthesis / productivity which in turn reduced seed production per plant.
 more dust settle on flower; Preventing pollination

From a distance of 5 meters to 30 meters from the road side, seed production per plant increased rapidly / steeply / drastically; where a maximum was reached; distance from the road was decreasing (thus a rapid decrease in amount of dust particles that settle on leaf surface; increasing light penetration, and number of open stomata for entry of more carbon dioxide; increasing rate of photosynthesis / net primary productivity. Flowers are more conspicuous and less shading less dust settles are blocked for pollination

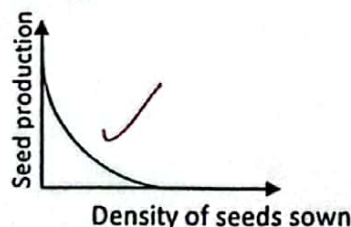
From distance of 30 meters to 35 meters, seed production per plant increased gradually / slowly; because dust is no longer a limiting factor other factors are limiting seed production. E.g. increased competition limiting seed production / photosynthesis / productivity.

From distance of 35 meters to 40 meters, seed production per plant remained almost constant / constant; because carrying capacity is reached (maximum seed production per plant is reached) / available resources cannot support any further increase in seed production;

@ 1 mark, max = 13 marks

1)

- Temperature affects enzyme activity; hence rate of photosynthesis;
- Low density of seeds sown results in high seed production this is because of low intraspecific competition for the available resources. Increase in density of seeds sown increases intraspecific competition and thus reduced seed production



Graph - 1 mark
 Description - 1 mark
 Explanation - 2 marks

Any 04 marks

- Reduces competition for food; leading to reduced death rates.
- Increases species diversity; due to availability of food.
- Reduces carbon dioxide accumulation in the atmosphere;
- Increases oxygen release for aerobes;
- Decreases species extinction;

Any 3

Any = 03 max = 03

TOTAL = 40 MARKS

SECTION B

2. (a) (i)

Carrier proteins present; have ^{binding sites} on which molecules like glucose can bind; then the carrier proteins alter shape; permitting specific molecules to be moved from ⁰⁴ where there concentration is higher into the cell; by facilitated diffusion;

Carrier proteins carryout active transport of molecules; where ATP bind onto them and the hydrolysis of the ATP release energy; which allow movement of molecules / ions from ⁰² where the concentration is low into the cell.

Channel proteins have pores which open; allowing passive diffusion of ions / molecules into the cell;

@1 mark, max = 08 marks

(a) (ii)

- Provide separate compartments into which specific reactions occur;
- Contain specific enzyme for specific reactions;
- Regulation of rates of metabolic reactions by regulating supply of raw materials for processes;
- Prevent mixing of intermediates of different pathways which would be damaging;
- Prevent release of hydrolytic enzymes e.g. in lysosomes that would cause autolysis;
- Mitochondria - Energy pdn
- Nucleus - Control cellular activities
- Chloroplast - site for photosynthesis
- ER - pdn of proteins
- Lysosomes - lytic enzymes

Peroxisome - important Enz like catalase
vacuole - food store
@ 1/2

Max = 04 marks

(b) Competitive inhibitors have ^{any} similar shapes to enzyme site, so fit into the active site of enzyme; preventing formation of enzyme - substrate complexes, and so reduce the reaction rate; such inhibitors are concentration dependent;

@ for the type of inhibitor

Non - competitive inhibitors have shapes not complementary to enzyme active site; so inhibitors bind at site away from active site; changing shape of active site; preventing formation of enzyme-substrate complexes; reducing rate of reaction; these are substrate independent;

Max = 08 marks

TOTAL = 20 MARKS

1. (a)

Anaerobic respiration in yeast	Anaerobic respiration in muscle tissue
- Final product is ethanol	- Final product is lactic acid
- Involves an intermediate step of forming ethanol	- Pyruvate is directly converted (reduced) to lactic acid
- Ethanol is substrate reduced by NADH ₂	- Pyruvate is the substrate reduced by NADH ₂
- Mediated by two enzymes i.e. pyruvate decarboxylase and alcohol dehydrogenase	- Mediated by only one enzyme; lactate dehydrogenase
- Accompanied by production of carbon dioxide	- Not accompanied by carbon dioxide production

@ 1 mark 4/5 marks

- Rich blood supply maintains steep concentration gradient.
- Well ventilated to maintain steep concentration gradient.
- Pores on walls / permeable walls for passage of gases

@ 1 mark, max = 05 marks
TOTAL = 20 MARKS

4. (a) Differences between,

Fertilization in flowering plants	Fertilization in mammals
- Double fertilization occurs	- It's a single fertilization;
- Takes place within embryo sac.	- Takes place within oviduct / fallopian tube;
- Chemical attract male gametes towards the female gametes	- Male gametes swim to get into contact with the female one by chance;
- Immediate processes <i>prior to</i> fertilization occur slowly	- Immediate processes <i>prior to</i> fertilization occur fast / rapidly;
- Both a diploid zygote and triploid endosperm are formed;	- Only diploid zygote is formed;
- Male gametes involved are pollen grains	- Male gametes involved are sperms;
- Male gametes are carried in pollen tube to reach the female one	- Male gametes (sperm) swim on their own to reach the female gamete (egg);

@ 1 mark, max = 06 marks

- (b) (i) *Acc. makes contact with cell membrane of*
Sperm head penetrates into the secondary oocyte; cortical granules in the cytoplasm secrete enzymes, which causes zona pellucida to thicken and harden; the enzyme also destroy sperm receptors on membrane of the secondary oocyte / zona pellucida; no any other sperm can penetrate other than the first sperm which successfully entered into the secondary oocyte; *only one penetrates* *= 06 marks*
- Each sperm and ovum carries one nucleus
@ 1 mark, max = 06 marks

- (b) (ii) Human chorionic gonadotrophic hormone (HCG); maintains the activities of the corpus luteum, which continues to secrete oestrogen and progesterone.

Oestrogen; stimulates further development of receptors in the endometrium sensitive to oxytocin/ inhibit secretion of FSH, Prolactin, so inhibit lactation / stimulate development of mammary glands;

Progesterone; stimulates development of milk glands in the breast / maintain thickness of the lining of endometrium; inhibits contraction of myometrium / inhibit secretion of FSH / Prolactin;

Any 1 mark for the hormone mentioned and 1 mark for any one role mentioned.

Human Placental Lactogen (HPL); stimulates the growth and development of the breast in preparation for Lactation / stimulates oestrogen and progesterone to cause development of the breasts; *Any one role*

Relaxin; relaxes connective tissues which causes enlargement of cervix in preparation for birth. @ 1 mark, max = 08 marks
TOTAL = 20 MARKS

5. (a) How micro-organisms are denied entry into bodies.

- Thick cuticle e.g. in plants
- Thick epidermis
- Having wax.
- Having / secretion of mucus
- Possession for follicles / hairs on bodies / cilia
- Different uncondusive PH ranges in cavities e.g. Vagina, mouth, stomach
- Clothing
- Sneezing, vomiting, diarrhea
- Enzymes that digest organism e.g. in saliva & tears
- Muscles assist in closure e.g. eye lids & anal sphincter muscles
- *Blood clotting*
- *Environmental health and personal hygiene*
-
-

Any 7 well explained (7 marks)

(b) (i) Plants adaptations against herbivory

- Thick cuticle
- Having thorns and hooks.
- Reduced surface area e.g. leaves
- Awful and unpalatable *taste*
- Secretion of bad odours / smells once epidermis is damaged.
- Being poisonous and toxic.
- Secretion of itchy substances e.g. Sap
- Thick cell wall / having cellulose cell walls.
- Growing long especially Juicy parts are high up
- *Thick motropisms folding of leaves*
- *mimicry eg. Stone plants*
- *attracting natural predators of herbivores eg. wasps*

Any 7 well explained @ 1 mark
Total 7 marks

(ii) Herbivorous adaptations to herbivory

- Possession of long digestive system
- Having diastema.
- 4 chambered stomach
- Have cellulose digestive enzyme/ *form mutualistic relationship with microbes - cellulose secreting organisms*
- Thick *fur*.
- Thick skin / epidermis
- Having waxy fur
- Tall to reach up in the canopy
- *long tongue and highly muscular*
- *Teeth that grow continuously.*
-

Any 6 @ 1 mark total (6 marks)
TOTAL = 20 MARKS

Similarities

- Both release energy in form of ATP; ✓
- Both are enzyme controlled reactions; ✓
- Both occur within the cytoplasm of the cell; ✓
- In both NAD is involved as hydrogen acceptor; ✓
- Both occur in absence of oxygen ✓

Accept standard abbreviations eg. ATP, NAD etc.

of

@ 4/5 marks
08 marks

(b) Short term effects of exercise

- Cardiac output increases ✓
- Blood pressure increases ✓
- Vasodilation of blood vessels of heart and muscles ✓
- Heart rate increases ✓
- Stroke volume increases. ✓
- Vasoconstriction of vessels to non – vital organs; ✓ Any 3
- Increased ventilation rate ✓

Max = 03 marks

Long term effects on; circulatory system;

- Blood supply to lungs increases ✓
- Affinity of blood / hemoglobin for oxygen increases ✓
- Red blood cell count increases. ✓
- Heart / heart chambers become enlarged; ✓
- Mass of muscles on heart wall increases; ✓
- Increased capillary density ✓
- Increased concentration of blood. ✓

Any 2

Max = 02 marks

Respiratory system;

- Respiratory muscles become stronger and thicker. ✓
- Concentration of respiratory enzyme in cells increases. ✓
- Number and size of mitochondria in cells increases; ✓

Any 2

Max = 02 marks

- (c)
- Being very many increases surface area for gaseous exchange. ✓
 - Thin epithelium reduces diffusion distance. ✓
 - Moist lining dissolves gases for easy diffusion. ✓

6. (a)

1. CO_2 combines with RUBP to form GP catalyzed by RUBISCO's
 2. GP is phosphorylated, using ATP from light stage to form TP; and
 3. Reduced, using reduced NADP from light stage; to form TP;
 4. TP is converted to RUP;
 5. RUP is phosphorylated using ATP from light stage; to form RUBP;
 6. 2 molecules of TP combine to form hexose sugars.
 7. Hexose sugar is converted to proteins, fats, polysaccharides;
- Max. 07
@ 1 mark, max = 07 marks

(b) Similarities

- Both produce organic substances;
- Both are affected by temperature change;
- Molue enzymes;

But carbon acceptor is PEP and RUBP

But carbon acceptor is only RUBP

Occurs in bundle sheath and mesophyll cells

Occurs in bundle mesophyll cells

Differences

Efficiency of C_4 plants	Efficiency of C_3 path-way
- Results into more rapid increase in dry mass of plant	- Less rapid increase in dry mass of plants.
- Better adapted in drier regions / more tolerant to drier conditions	- Better adapted in cooler & moisture conditions
- Maximum rate of CO_2 fixation is greater	- Maximum rate of CO_2 fixation is less / lower.
- Light saturation takes place at higher light intensities	- light saturation takes place at lower intensities
- Faster growth	- Slower growth
- Steep CO_2 conc. Gradient is maintained between environment & plants stomata are reduced	- CO_2 conc. Gradient is reduced when stomata reduces.
- Optimum temp ⁰ c for growth on C_4 is higher.	- Optimum temp ⁰ c is lower
- Require extra energy to fix CO_2	- Requires less energy to fix CO_2
- Photorespiration does not occur	- Photorespiration occurs
- Involves RUBP carboxylase which is inefficient	- PEP carboxylase & RUBP are more efficient. Efficient.

- (c) Produces sugars, which are food for heterotrophs and are used in synthesis of other complex substances such as polysaccharides; proteins; and lipids; Calvin cycle regenerates ADP, and NADP, which are utilized in light stage to produce ATP; and NADPH₂; Regenerates RUBP which is a carbon dioxide acceptor; Intermediates like Glycerate 3 - phosphate are used in other processes e.g. Respiration;

07

Max = 06

Max = 07

TOTAL = 20 MARKS

END

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Question 1

1. a) i) Outline drawn accurately; ✓
 Method for calculating total skin surface area in cm^2 :-
 No. of complete squares ($1\text{cm} \times 1\text{cm}$) + $\frac{\text{Incomplete Sq}}{2} = x \text{ cm}^2$ ✓ For final answer
 Since specimen has skin on dorsal & ventral sides,
 total skin surface area = $x \times 2 \text{ cm}^2$; ✓
 = $2x \text{ cm}^2$ ✓ For final answer, reject without units. 04
- ii) New volume depends on size/volume of specimen D but greater than 250 mls < 500 mls; ✓

If divide indicate units
 Ratio = no need bw units
 Ignore 16
 - Simplest ratio
 - whole number
 - ignore ratio to dp.

- iii) S.Area : Volume = S. Area in a) (i) above: increase in volume above 250ml in (ii) above. ; New volume/Volume of specimen = Final Volume of water - initial volume of water
 S.A : Volume = - cut mark both Ratio of H₂O

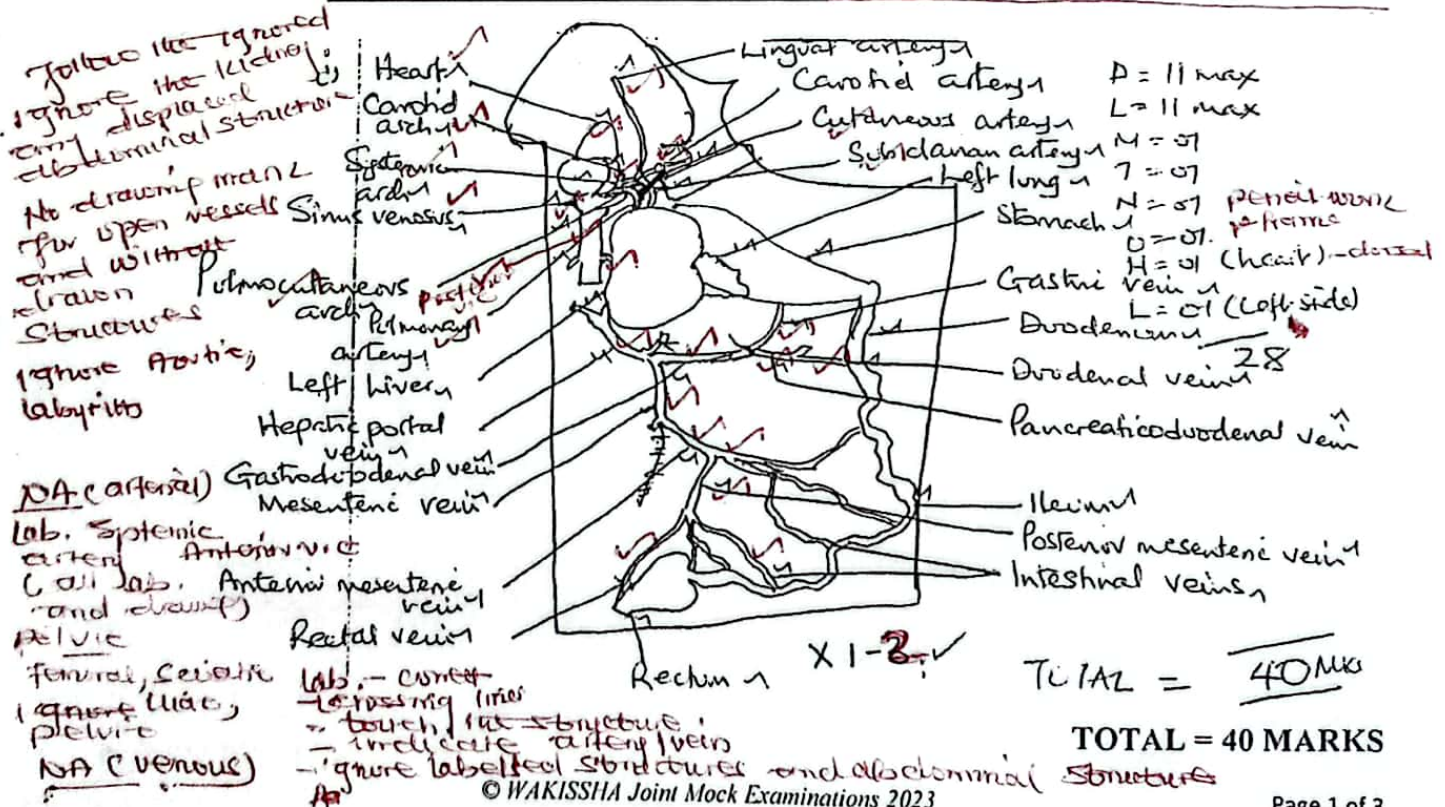
- iv) Ratio shows specimen D has a large surface area to volume ratio; for faster rate of (cutaneous) gaseous exchange; ✓
 Exchange of materials

- b) Liver lobes, stomach, Duodenum, Ileum, Colon, Rectum, Bladder, Gall bladder, Fat body ✓
 @ 1/2 mark each 8 structures

Reject if heart, lungs, xiphoid cartilage and cloaca included and any abdominal structure listed when is visible on displacement of other structures.

Drawing showing blood vessels draining visceral abdominal organs and

supplying blood to head to chest of D; with heart in dorsal view



Question 2

2. a) i)

Appearance of Extract

Nature of residue

B - Very turbid / milky; ✓

Fine / smooth texture; ✓

C - Less turbid / milky; ✓

Rough and fibrous; ✓

A - 72 hours

B - 24 hours

C - 144 hours

L. soya beans

Show comparative mark awards

03

ii)

Extract B very turbid due to presence of much starch being stored; with fine / smooth residue since tissues are not yet formed; while extract C is less turbid since it has less starch / (some hydrolyzed into sugar for energy production;) of new tissues since the residue is rough and fibrous;

b)

No observation of mark without procedure.

TESTS	OBSERVATIONS	Ignore soft
1. To 1cm ³ of extract was added 1/2/3 drops of iodine solution; ✓	A - Turbid solution; turned to pale black; ✓ B - Turbid solution; turned to black; ✓ C - Turbid solution; turned to blue / grey; ✓	03
2. To 1cm ³ of extract was added 1 cm ³ of NaOH (aq) solution; ✓ followed by 1/2/3 drops of CuSO ₄ solution; ✓	A - Turbid solution; turned to purple solution; ✓ B - Turbid solution; turned to deep purple solution; ✓ C - Turbid solution; turned to pale purple / violet solution; ✓	03

10 marks

A - has moderate starch and proteins since moderate hydrolysis of proteins occurred. (i) Extract from youngest B, A and C; oldest seedlings: 01

(ii) B had highest amount of starch and proteins which are still stored; while C had the least amounts since much of the starch had been hydrolyzed; into sugars for energy production; needed for growth of new cells/tissues; from hydrolysis of proteins; ✓
A - has moderate starch and proteins since moderate hydrolysis of proteins occurred. 05

Jw c drops are higher than in B

c) (ii)

1 - 2 drops ✓

01-02

(iii)

3 - 5 drops ✓

01-02

25 marks

d) i)

On addition of Litmus solution there is change in color from clear solution / turbid solution to pale blue / purple solution; indicating formation of a weak alkaline product in the period of 90 minutes; After reaching the end point on addition of drops of acid, the color changed to pale red / pink; due to the excess acid; 03

ii)

Fewer drops added in B than C due to more alkaline product formed in C; since extract C had higher concentration of an active substance; that catalyzed the breakdown of solution S at faster rate than in B; ✓
more chance of reaction between substrate and substrate / metabolic activity 04 max

03

05

TOTAL = 30 MARKS

Question 3

(a) (iii)

Rounds	X			Y			Z		
No. of pairs	WW	WB	BB	WW	WB	BB	WW	WB	BB
	10	20	10	14	12	6	15	10	01
Ratio	1	2	1	2.3	2	1	15	10	01

@ 1/2 mark Consider trend

09

NB: - No of pairs should add as follows-

$$X = 40$$

$$Y = 32$$

$$Z = 23$$

- Difference / deviation from figure above should be + - 1 and observe the trend for each round as above.

(b) (i) black & white seed color – alleles / genes; since they occur on the seeds;

Accept (factors for inheritance/genes)

Accept gametes, phenotype, genotype

02
03

(ii) Envelopes A & B – heterozygous parents; since we draw from the envelopes; and each envelope has seeds of both colors;

02
03

(iii) Picking seeds – gametogenesis/meiosis; since seeds are picked singly from each envelope (haploid parent)

Accept: Release / pdn / formation of gamete

02
03
18

(iv) Pairing seeds – pollination followed by random fertilization; since seeds picked from separate envelopes (heterozygous parents) are brought together;

02
03

(c) Envelopes shaken thoroughly to mix the white and black seeds uniformly; to ensure random picking of the seeds;

02

(d) Suggesting and explaining the genetic principles exhibited by results in round;

(i) X – Mendel's 1st law of segregation in alleles or independent assortment; - when heterozygous F₁ parents are selfed, during gamete formation / meiosis; the pair of alleles separate in gametes and are transmitted independent of each other; such that all possible genotypes result in F₂ in ratio 1:2:1

= 03 marks

(ii) Round Y and Z – Natural selection; due to changing environment there is selection pressure on the gene pool resulting into the advantageous alleles (w) being selected for, while the disadvantages alleles (B) is selected against; With successive generations Y and Z there is high specialization/adaption in Specie WW which dominate in the population; while specie BB with disadvantageous characteristics is eliminated;

@ 1/2 mark

= 04

(e) (i) Directional selection. This is because with subsequent generation crosses the homozygous black individual numbers decreases yet the heterozygous and homozygous white individual increase.

= 02

(ii) Still all the individual would appear WW, WB and BB because no gene / allele can be excluded / eliminated from the population because both homozygous white and heterozygous individuals are selected for.

@ 1/2

04

12

TOTAL = 30 MARKS

END

Question 2

60 MINUTES (30 marks)

You are provided with extracts A, B and C prepared from three lots of soya seedlings at different stages of development plus the residues obtained during preparation of extracts B and C.

(a) Examine extracts B and C plus nature of their residues.

(i) Describe the appearance of the extracts and nature of residue in:- (03 marks)

B	Very turbid / milky	Nature fine / smooth texture
C	less turbid / milky	Rough and fibrous

(ii) Account for the difference between extracts and residues from B and C. (02 marks)

B - due to presence of much starch being stored.
~~issues not yet faced~~ / no hydrolysis has taken place.
 C - less ~~starch~~ food substrates much has been hydrolyzed
 in usable form for metabolism

(b) Using the reagents provided, compare the amount of starch and proteins in the extracts. Record your tests and observations only in the table below:- (10 marks)

TEST	OBSERVATIONS
1. Iodine test 1 cm ³ of extract add 1/2 / 3 drops of Iodine Solution ✓	A - turbid / milky solution turn pale black B - turbid / milky soln — black C - turbid / milky soln — blue / grey
2. Biuret test To 1 cm ³ of extract add 1 cm ³ of NaOH solution, then 1/2 / 3 drops of CuSO ₄ solution ✓	A - turbid / milky solution — purple solution B - turbid / milky solution — deep purple solution C - Turbid / milky solution — pale purple / violet solution

- (i) From your observations, arrange the extracts starting with that prepared from youngest to oldest seedlings. (01 marks)

B, A, C ✓

- (ii) Explain how you have arrived at the order in (b) (i) above. (05 marks)

B - highest amount of starch and proteins stored
C - least amount due to ^{much} hydrolysis of starch into sugars, for energy. Proteins for growth of cells
A - has moderate starch and proteins, moderate hydrolysis

- (c) You are required to investigate the effect of extracts B and C on substrate S.

- (i) To 5 cm³ of solution S in each boiling tube labelled B and C, add the same quantity of the respective extracts. Incubate tubes B and C at temperature range 35 - 40°C for 90 minutes.
(ii) After this period, transfer the contents of tube B into a small conical flask and add 1 cm³ of litmus solution (Take note of the color change). Then using a dropper and counting the number of drops, add the dilute acid drop wise into the contents of the flask. (Shake the flask on adding each drop). Continue adding the acid till there is a color change. Record the number of drops added. (01 marks)

fewer drops ✓

- (iii) Repeat the above procedure using content of tube C and record number of drops added. (01 marks)

Much drops ✓

- (d) Explain the:-

- (i) changes in color of solutions in the flask. (02 marks)

change from clear solution/turbid to pale blue/purple solution showing a weak alkaline solution product then to a pale red/pink due to excess acid

- (ii) difference in number of drops of acid added in B and C (03 marks)

accept: enzyme/active substance
Few drops in B than C due to a more alkaline product in C
C had a higher concentration of active substance thus increased activity catalysing the breakdown of S at a faster rate
Few drops in B than C / C had more than B
A: C forms more alkaline product / B forms less alkaline product
C has higher conc of active substance / B has less conc
Increased activity/breaking down S / low activity breaking down S
faster rate
slow rate

0 of marks

Turn Over

Question 3

(30 marks)

You are provided with seeds of two contrasting colours representing factors for inheritance in plants. Label the envelopes provided A and B.

In the envelopes put seeds of contrasting colours as indicated in Rounds X, Y and Z in table of instructions. Rounds Y and Z represent crosses of subsequent generations carried out.

(a) (i) Table of instructions

	Envelope A	Envelope B
Round X	20 white seeds (W) 20 black seeds (B)	20 black seeds (B) 20 white seeds (W)
Round Y	20 white seeds (W) 12 black seeds (B)	12 black seeds (B) 20 white seeds (W)
Round Z	20 white seeds (W) 06 black seeds (B)	06 black seeds (B) 20 white seeds (W)

- (i) Starting with round X, shake the seeds in each envelope thoroughly, without hesitation and looking into the envelope, pick one seed from each envelope to make a pair. Place the envelopes back carefully taking care not to spill the seeds out. Transfer the pair of seeds picked into petri dishes labelled WW, WB and BB, corresponding to the colours of the pairs picked. Continue picking seeds from both envelopes till the envelopes are empty. Count the number of pairs of seeds in each petridish and record in the table below:-

- (ii) Repeat the procedure in a) (ii) above to obtain results for rounds Y and Z.

Table of Results:

(09 marks)

Rounds	X			Y			Z		
No. of pairs	WW	WB	BB	WW	WB	BB	WW	WB	BB
	4	4	4	4	4	4	4	4	4
ratio	1:1	2:1	1:1	2:1	2:1	1:1	1:1	1:1	1:1

- (b) From your results in round X, suggest giving reasons what the following represent in genetics:-

- (i) black and white color of seeds. (02 marks)

alleles / genes / factors for inheritance
since they occur / expressed / shown on seeds

- (ii) envelopes A and B. (02 marks)

heterozygous parents: since we pick draw from envelopes has seeds of both colours

(iii) procedure of picking seeds. (02 marks)

gametogenesis / meiosis; Since seeds are
picked singly from
accept: formation / production / release

(iv) procedure of pairing seeds. (02 marks)

random fertilisation / - seeds picked from
separate envelopes and brought / added together.

Explain why the envelopes were shaken thoroughly before seeds are picked. (02 marks)

to mix uniformly to ensure random picking

Suggest and explain the genetic principles exhibited by the results obtained in:-

(i) Round X-

all monohybrid inheritance (03 marks)
Segregation / independent assortment. when
during meiosis the pair of alleles separate / segregate
and are transmitted independent of each other

03
Turn Over

(ii) Round Y and Z-

(04 marks)

Natural Selection: There is a selection pressure on the alleles favouring alleles ~~(b)~~ while working against allele ~~B~~ in successive generations ~~Y and Z~~. There is more of allele ~~b~~ than allele ~~B~~ .

(e)

(i)

With evidence deduce the type of selection taking place.

(02 marks)

Directional Selection: Subsequent generation crosses, homozygous black individuals (BB) decrease, homozygous white (bb) and heterozygous (Bb) individual increase.

(ii)

With explanations predict, what will happen if the crosses were continued in further subsequent generations.

(02 marks)

All alleles would appear / genotypes would appear; no genes/allele can be excluded/eliminated both homozygous white and heterozygous (Bb) individual are selected for.

END