PAVEMENT FORM 4 TRIAL 2 EXAMINATION 2021/2022

Kenya Certificate of Secondary Education (K.C.S.E)

BIOLOGY PAPER 2 MARKING SCHEME

1. a) Transpiration

b) A – no significant change in mass; B – a lot of mass loss;

c) B – presence of plant provide many stomata; hence large surface area for maximum water loss;

d) Loss of water from the leaves in form of water droplets;

e) Wilting leads to leaf folding; hence reducing the surface area of the leaf that is exposed to sunlight and stomata are less exposed hence reduce water loss (by transpiration);

2. a) i) -transparent to allow light into the eye; -curved to refract light to the eye;

ii) Rods for vision in dim light/low light intensity; cones for vision in high light intensity;

iii) Ciliary muscles relax; suspensory ligaments become tight and pull the lens; the lens become thinner and less refractive; light from a distant object is less refracted so the image is formed in the retina;

b) i) to show/investigate the effects of unilateral/ unidirectional light on growth in plant shoot;

ii) Shoot bends towards the unidirectional light; the unilateral light causes the diffusion of auxins to the darker side; cells on the darker side grows and elongates faster than those on the lit side; hence curves towards light;

3 a)

Parents:	Father	x	Mother
Parental phenotype:	roller	x	non-roller
Parental genotype:	Rr	x	rr ;

F1 parental gamete: R r x r r ;

b) Genotypes Father RR; Mother rr ;

F1 genotype: Rr Rr rr rr ;

Gametes R R r r

Phenotype: 2 Rollers : 2 Non-rollers;

1 : 1

♀ \ ♂	
r	
r	

4. a) i. Plant tissue ;

ii. It has got no centrioles;

iii R – anaphase;

T– Telophase;

b.) – Retention of chromosome number;

- give rise to new cells;

- Brings about growth in multicellular organisms; (**ANY** first 2)

c.) Root tip, Shoot tip, Cambium, Flower, Bud, Young leaf; (**ANY** first 2)

5. (a) 1st portion. - Blue; colour was observed

2nd portion – Purple; colour was observed

3rd portion – Purple; colour was observed

(b) A control experiment;

(c) Proteins are highly sensitive to temperature and pH changes; (*award if either temp of pH is stated singly*)

(d) 1st portion – Enzyme pepsin broke down proteins into peptones;

2nd portion – Enzyme pepsin works in acidic medium; (*not in basic medium*)

SECTION B (40MKS)

6)

a) Title - ½ mk,Scale - ½ mk, Correct curves - (2marks)
Y axis – mean length in mm **(2marks)**
X axis – acid concentration (mol dm x 10) **(2marks)**

b) i) Growth of shoot – as the acid conc. increases, growth of the shoot decreases; due to the low pH which is toxic to the cells; **(2marks)**

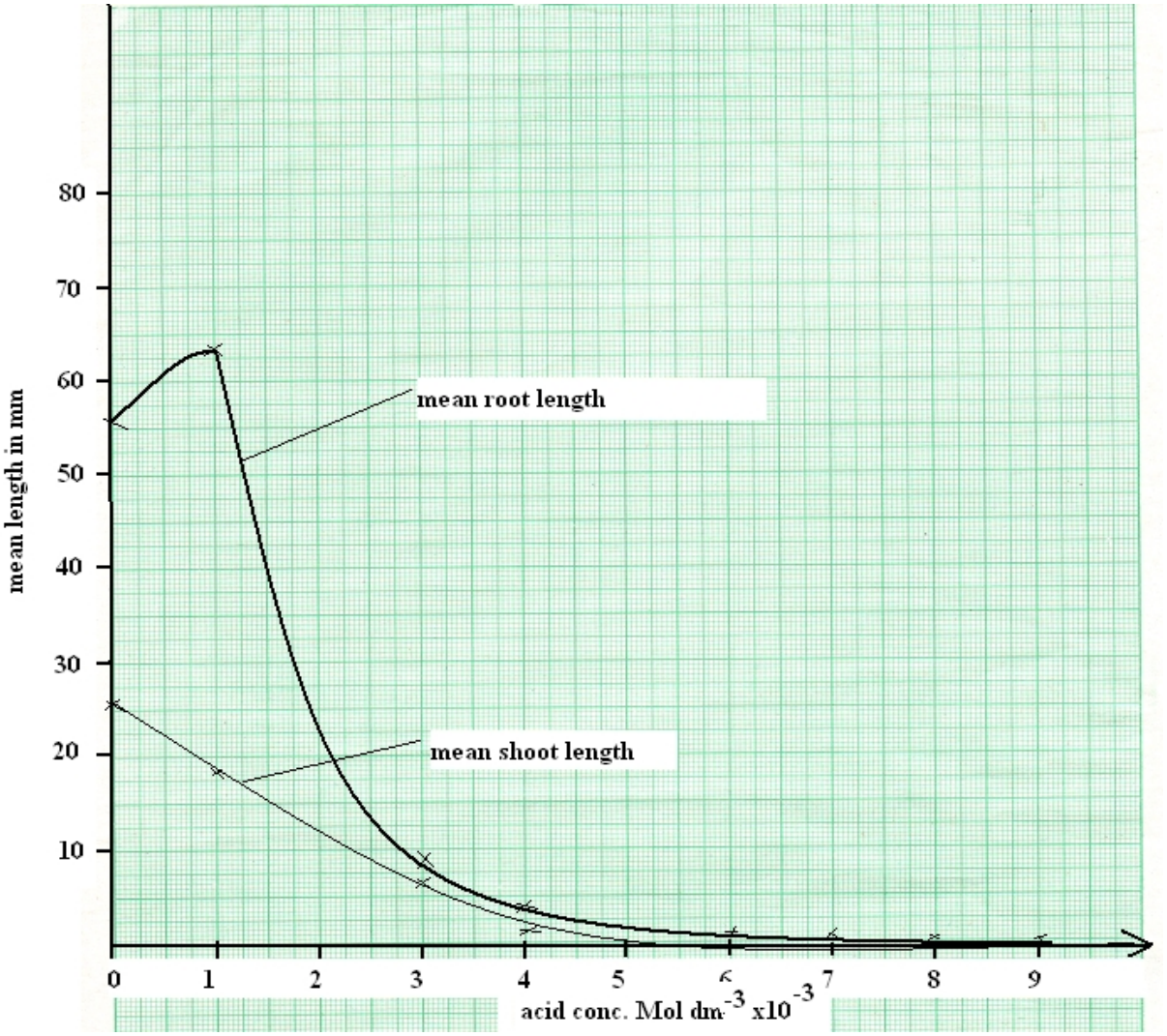
ii)The length of the root increases slightly at the beginning; but as the acid concentration increase, the growth of the root decreases; low pH is not suitable for the growth of root; **(2marks)**

c) At 5×10^{-3}
- Mean shoot length 2.0mm ± 0.1;
- Mean root length 2.0 mm ± o.1; **(2marks)**

d) - Kills organisms in water and soil;
- Corrodes walls and roofs of buildings;
- Causes leaching of aluminum from soil; **(any 2 points 2mks)**

e) - Use of substances that extract sulphur from sulphur containing substances;
- Fitting chimneys with scrubbers that dissolve gases like sulphur dioxide and nitrogendioxide;
- More use of electricity instead of fossil fuels;
- Fitting automobiles with filters and catalytic converters in their exhaust pipes to reduce emission of sulpur oxides; **(any 3 points, 3mks)**

f) Nitrogen (IV) oxide; and Carbon (IV) oxide;



7) (a)

Inhalation-External intercostal muscles contract ;internal intercostal muscles relax ; ribcage is raised upward and outwards; diaphragm muscles contract ,causing it to flatten; volume of thoracic cavity increases; while pressure decreases; due to higher atmosphere pressure Air is drawn in through nostrils ;making the lungs to inflate

Exhalation –External intercostal muscles relax ;internal intercostal muscles contract ;rib cage is lowered downward and inward ;diaphragm muscles relax and it arches upward/resumes dome shape; Volume of chest cavity decreases/reduces; pressure increases above that of atmosphere; and air is forced out of the lungs;

(b) -Exercise /Activities

- During vigorouse physical activities the rate of breathing increases so as to meet oxygen demand.
- Age -Young people have higher demand of oxygen since they are more active.
- Emotions –body emotions such as fear, anxiety and fright increases the breathing rate.
- Temperature – when the temperature is high, there is tendency to increase the breathing rate.
- Healthy –in health increases body temperature which tend to increase body metabolic rate hence increased breathing rate.
- Altitude –high altitude has low oxygen concentration leading to increase breathing rate.

8) a) Pollen grains lands and sticks/adheres onto the stigma;

- It absorbs nutrients/sugary substances and germinates to develop a pollen tube
- Pollen tube penetrates the stigma and grows down through the styles
- It obtains nutrient from the style (tissues)
- (As the pollen tube grows down the style), the pollen tube nucleus is located behind the tip as it directs the growth of the pollen tube while the generative nucleus follows behind it.

- The generative nucleus divides by mitosis (mitotically) into two male nuclei;
- When pollen tube reaches the ovary, it enters the ovule through the Micropyle; it enters the embryo sac; its tip bursts open/ruptures;
- The pollen tube nucleus disintegrates creating a clear passage for the male nuclei; (into the embryo sac)
- One male nucleus fuses with the (two/both) polar nuclei; to form a triploid endosperm nucleus;

o Total **16 max**

o **Max 15**

Rej. Degenerates for disintegrates

NB. If an illustration is used mark: -

1. Landing of pollen grains on stigma
2. Germination of pollen grains
3. Formation of pollen tube
4. Position of correctly labelled generative nucleus behind the tube nucleus in pollen tube.
5. Growth of pollen tube down the style
6. Entry of pollen tube into the ovule **(Max 6 marks)**

b) The stamens/petals/sepals/calyx/style wither and drop off/fall off

- The zygote (divides by mitosis to) form the embryo
- The endosperm nucleus (divides by mitosis) to form the endosperm. (Accept primary endosperm for endosperm)
- The integuments develop into a seed coat/testa
- The ovary develops into a fruit
- The ovary wall develops into a fruit wall/pericarp

Total **6 marks**

Rej. Legmen for Testa/seed coat Max. 5