

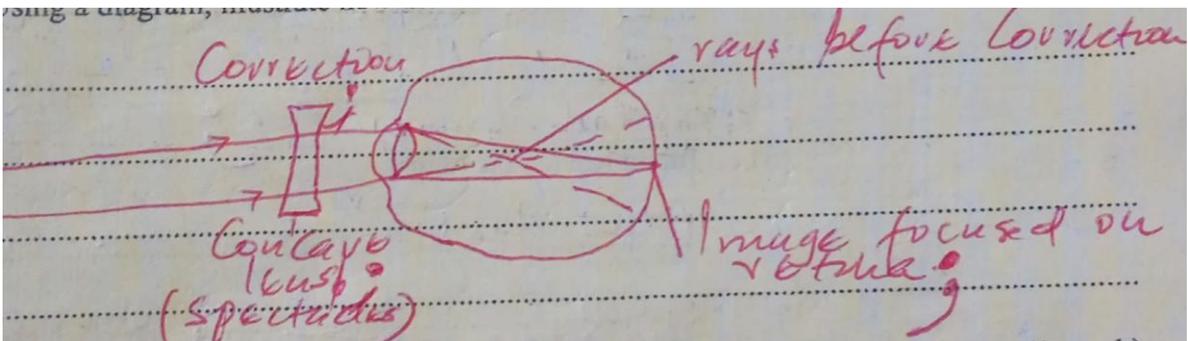
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BIOLOGY
PAPER 2
MARKING SCHEME
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THE KENYA NATIONAL EXAMINATION COUNCIL
KENYA CERTIFICATE OF SECONDARY EDUCATION
BIOLOGY
PAPER 2

MARKING SCHEME
(CONFIDENTIAL)

1. a) (i) Uric acid
(ii) Uric acid requires less water to eliminate / Removal of uric acid conserves water/
less poisoned/less toxic;
- b) The organism is an exothermal /poikilothermic / its body temperature changes with
environment;
- c) (i) Organism F;
(ii) Organism F occupies a lower trophic level / biomass/ energy decreases up the
trophic level.
- d) - It is dorsal – ventrally flattened hence able to move through penetrate the
crevices. (in Search of food, maths, for safety)
- Has exoskeleton /cuticle for protection /conserving
- Has a pair of wings to fly (for food and safety)
- Has a pair of antennae for sensory purposes
- Has legs to move.
2. a) Klinefelters
b) Chromosomal mutation result in the addition of a whole chromosome; it occurs during
Meiosis where the homologous chromosomes fail to segregate; and so move to the same
gamete cell; if gamete with XX fuses with gamete Y, the offspring becomes XXY;
- c) (i) It prevents the spindle formation during cell division thus leading to a cell with
extra set of chromosomes.

- (ii) Resistant to drought / pests/ diseases/
High yields
Early maturing.
- 3.
- a) (i) No germination; since this low temp; which inactivated enzymes;
(ii) Percentage germination was highest; since temp was optimum; enzymes worked at their best / activated ;
 - b) Embryo;
Seedcoat;
Growth hormones;
Enzyme inhibitors;
Viability;
- 4.
- a) Short sightedness/ myopia/near sightedness/short sight Rej short sighted.
 - b) Has a long eyeball/ thick lens; resulting in the light rays from the student who is 12M away being focused at a point in front of the retina; light rays from the book are focused on the retina
 - c)



- d) Vitamin A/Retinol
- 5.
- a) i) Blood entering the lungs has a lower conc of O_2 and high Conc of CO_2 ; since most of the CO_2 had been used during respiration ; yield more CO_2
ii) Blood leaving the lungs has a lower conc of CO_2 and a higher Conc O_2 ; since it has been purified; the volume of nitrogen remains unchanged as it is more used up in tissue respiration.
 - b) Pulmonary artery
 - c) High altitude areas have low O_2 Conc ; the body produces more RBC ; which carry more O_2 to the body tissues for respiratory; producing more energy for the athlete;
- 6.
- a) On graph paper
 - b) i) Decrease in the number of ticks; chemical was poisonous / killed the ticks had not adapted to the chemical/ had not developed resistance.

- ii) The number of ticks per animal increased; ticks had adapted to the chemical / developed resistance ; Resistant ticks produced enzymes that made the chemical harmless to them.
- c) 28 ± 2 (26 , 27, 28, 29 , 30)
- d) Grass; \longrightarrow Animal \longrightarrow tick; \longrightarrow bird \longrightarrow Vulture;
Energy flow
- e)
 - Estimation by marking based on the various parts of the animals body;
 - Physical counting / total counts / census
 - Sampling the animals

7.

- a) **The Role of the Liver in blood sugar regulation**
When the blood sugar level is high, insulin hormone is produced by the pancreas stimulating liver cells to convert excess glucose to glycogen;

When the blood sugar level in low, the glycogen hormone is secreted by the pancreas; stimulating the liver cells to convert glycogen /fats to glucose;
- b) **How human blood is adapted to its functions**
Plasma is the fluid part of blood, consisting of dissolved and undissolved substances; the plasma acts as a medium in which substance are transported in the body;

It acts as medium in which various metabolic reactions occur; plays a role in thermoregulation/distributed heat;

Platelets; contains proteins that help in blood clotting,; preventing loss of blood/anaemia; also prevent entry of the pathogens;

WBC; are irregular /amoeboid; they protect the body against attack by pathogens; by engulfing them and releasing antibodies against the pathogens; they are numerous; to enhance the body defense mechanism.

RBC; are bi concave in shape; to increase the SA for diffusion of gases / squeeze through blood capillaries; They lack nucleus to allow for packing of more hameoglobin; they are also numerous to increase the S.A to r=transport more oxygen ;

Has carbonic anhydrase; for loading and offloading carobdioxide

Have haemoglobin; that have a high affinity for oxygen.

8.

- a) **How the presence of chloroplasts in guard cells affect the opening of stomata**
 - Chloroplasts are sites of photosynthesis; During the day photosynthesis takes place; Glucose being osmotically active increases the internal conc. of guard cells; Water is drawn into the guard cells; Guard cells become turgid bulging outwards; Unequal expansion of the guard cells result in the opening of the stomata;
- OR
 - Chloroplasts are sites of photosynthesis during the day; Photosynthesis takes place; using CO₂ making the pH to rise in the Guard cells favoring the conversion of starch into glucose; Glucose being osmotically active increase the internal conc; of guard cells. Water is drawn into the guard cells; Guard cells become turgid; bulging outwardly

OR

Chloroplasts are sites of photosynthesis; During the day photosynthesis takes place; ATP accumulates in the guard cells to draw potassium ions; Osmotic pressure increases in the Guard cells; Water is drawn into the guard cells; Guard cell become turgid bulging outward; Unusual expansion of guard cells resulting in the opening of the stomata

b) **How the various environmental factors affect the rate of photosynthesis**

- Carbon (iv) Oxide concentration; CO_2 is a raw material for photosynthesis; An increase of CO_2 leads to an increase in the rate of photosynthesis, upto a given optimum. Beyond the optimum, the rate of photosynthesis remains constant ; due to other limiting factors
- Light intensity /quality of light; Light provides the energy required for photosynthesis/photolysis/light stage;
- The rate of photosynthesis increases as light intensity increases ; upto optimum level; Beyond the optimum ; the rate of photosynthesis remains constant; due to other limiting factors;
- At very high light intensity chlorophyll is damaged /bleached ; and the rate of photosynthesis drops;
- Temperature; very low temp inactivate enzymes thus reducing the rate of photosynthesis;
- As temp increases, the rate of photosynthesis increases; upto optimum;
- Temperature above optimum denature enzymes; reducing the rate of photosynthesis;
- Water; is a raw material for photosynthesis. It influences opening and closing of stomata ; which in turn affect the diffusion of CO_2 into the leaf;