THE COPPERBELT UNIVERSITY

SCHOOL OF MATHEMATICS AND NATURAL SCIENCES

BI 110 – INTRODUCTORY BIOLOGY TEST 1 (2019) DURATION: 2HRS

Section A: Answer all Questions

1. During the S – phase in animal cells, DNA replication takes place in the.....while Centriole duplication takes place in the ..... . (2 marks)
2. The full set of DNA instructions in a cell is described as..... (2marks)
3. Mitosis is an ..... division, while meiosis is a..... division. (2 marks)
4. Stage between two meiotic divisions is ..... (2marks)
5. Asexual reproduction from a single parent is based on ..... (2 marks)
6. Meiosis usually results in the formation of ..... genetically, and ..... cells.
7. The ploidy of somatic cells is ..... and that of gamete cells is..... (2 marks)
8. In which cell organelle would RNA polymerase be found? (2marks)
9. The endoplasmic reticulum is an extension of which membrane? (2marks)
10. What is the role of the contractile vacuole in a protist? (2marks)
11. Which type of microscope would you use to study (a) the changes in shape of a living white blood cell and (b) the details of surface texture of a hair? (2marks)
12. What structure in eukaryotic cells is more easily seen in DIC than in bright-field microscopy? (2marks)
13. What organelle serves as a primary "packaging" area for molecules that will be distributed throughout the cell? (2marks)
14. The head of a glycerophosholipid is made up of.....(2marks)
15. The hydrolysis of lipids gives rise to.....(2marks)
16. When an amino acid is ionised, the COOH and NH_2 change to.....(2marks)
17. What products are formed when ATP is hydrolysed? (2marks)
18. The repeating units in both DNA and RNA are called.....(2marks)
19. In eukaryotes fatty acid breakdown occurs in the.....(2marks)
20. Name two isomers of glucose.....(2marks)

Section B Answer any five Questions

1. There are 3 check points in the cell cycle. Briefly explain the importance of each of these check points in the cell cycle. (4 marks)

2. Explain the significance of crossing over. (4 marks)

3 A classmate proposes that mitochondria and chloroplasts should be classified in the endomembrane system. Argue against the proposal. (4 marks)

4 Mitochondria and chloroplasts are sometimes referred to as 'cells within cell'. However, this does not make them completely autonomous. Give reasons why this is so. (4 marks)

5 Describe the characteristics of two poly-unsaturated fatty acids. (4 marks)

6 Describe the two classes of starch, their linkages and branching type. (4 marks)

ALL THE BEST

BI 110: INTRODUCTORY BIOLOGY 2019 TEST 1

Marking Scheme

SECTION A

1. Nucleus; Cytoplasm
2. Genome
3. *Equal; Reduction*
4. *Interkinesis*
5. *Mitosis*
6. Four (4) ; Different/ unidentical/non identical ***(the question was not asking on the ploidy of the cells, in which case they are the same or haploid)***
7. Diploid(y) / 2n ; Haploid(y) / n ***(46 or 23 is wrong as question not restricted to human cells)***
8. The nucleolus
9. Nuclear envelope 'outer membrane'
10. Osmoregulation
11. . (a) Light microscope, (b) scanning electron microscope
12. Nucleus
13. Golgi apparatus
14. phosphate (PO_4^-) and cholin
15. Fatty acids and glycerol
16. COO- and NH_3^+
17. Energy + ADP + Pi
18. Nucleotides
19. Mitochodria (walls)
20. Galactose, fructose

SECTION B

1.M – check point /mitosis check point OR spindle assembly check point

Checks for **correct attachment of chromosomes to the spindle**; (1 mark)

G1- checks point for **DNA damage;** *and any one of* **cell size, nutrients, and growth factors;** (2 marks) G2 - check point for **DNA replication** and **cell size.** (1 mark)

TOTAL = 4 MARKS

2. The non-sister chromatids in a homologous pair/ homologous chromosomes exchange genetic *material resulting in*

- *New allele combinations in the daughter cells/* new combinations of genes

- *Source of (creates)* variation/ genetic diversity in the offspring 4 MARKS

3. Mitochondria and chloroplasts are not derived from the ER, nor are they connected physically or via transport vesicles to organelles of the endomembrane system. Mitochondria and chloroplasts are structurally quite different from vesicles derived from the ER, which are bounded by a single membrane.

4. Most of the genes that encode the enzymes used in oxidative metabolism (mitochondria) and chloroplast components are located in the cell nucleus. --The components required for mitochondrial division are encoded by genes in the nucleus and are translated into proteins by cytoplasmic ribosomes

5. -They have more double bonds in their fatty acid chains, this causes the fatty acid chains to bend.

- They are liquid at room temperature.

-They have low melting points.

-There is no free rotation in the C-C bonds because of double bonds.

6. The two types of starch: **Amylopectin** is highly branched, leaving more surface area available for digestion. It's broken down quickly, which means it produces a larger rise in blood sugar (glucose) and subsequently, a large rise in insulin.

Amylose is a straight chain, which limits the amount of surface area exposed for digestion. This predominates in RS. Foods high in amylose are digested more slowly. They're less likely to spike blood glucose or insulin.

In amylose these are linked (1⟶4), with the ring oxygen atoms all on the same side, whereas in amylopectin about one residue in every twenty or so is also linked -(1⟶6)- forming branch-points.