DIRECTIONS: THIS BOOKLET CONTAINS BIOLOGY EXAMINATION FOR GRADE 12 FOR NATURAL SCIENCE ONLY.

THE EXAMINATION CONTAINS **100** ITEMS. THERE IS ONLY ONE BEST ANSWER FOR EACH ITEM. CHOOSE THE BEST AND MOST COMPLETE ANSWER FROM THE GIVEN ALTERNATIVES AND BLACK THE CIRCLE CORRESPONDING TO YOUR ANSWER ON THE SEPARATE ANSWER SHEET.

- Choose the single, best answer for each question and black the circle of the correct answer
- Mark **only** one answer per question
- If you change your answer, be sure that all previous marks are erased completely. Incomplete erasures may be read as multiple answers
- Each correctly answered question will be awarded one points

YOU ARE ALLOWED TO WORK ON THE EXAM FOR **2:00** HOURS ONLY.

1) Function of the *Acetobacter* bacteria:

   A. Treatment of Sewage C. Fermentation of Alcohol

   B. Production of Vinegar D. Production of Antibiotic

2) Which of the following statements are NOT true about nitrogen-fixing bacteria? They

   A. converts nitrogen gas into ammonium ions

   B. are found in nodules on the roots of legumes

   C. break down nitrate ions into ammonium ions

   D. plays a vital role in the nitrogen cycle in nature

3) The only acellular micro-organism is:

   A. Fungi B. Bacteria C. Viruses D. Protozoa

4) Which of the following are the most significant factors in determining biome type?

   A. Soil type and soil depth C. Temperature and climates

   B. Temperature and rainfall D. Climates and grazing animals

5) Biodiversity is:
   A. an area with specific biotic and abiotic conditions
   B. a measures taken by people to restore an ecosystem
   C. replacement of one ecosystem by another ecosystem
   D. a measure of the overall variability of life on the Earth
6) The presence of several different biomes within the Ethiopia results in:
   A. the high species richness of plants and mammals
   B. the low species richness of plants and mammals
   C. the high species richness of plants but low mammals
   D. the high species richness of mammals but low plants
7) In which of the following the population growth curve, all the organisms are adapted and reproduce rapidly due to the abundant resources?
   A. Lag phase C. Decline phase
   B. Log phase D. Stationary phase
8) The genetic code is NOT a:
   A. triplet code C. degenerate code
   B. universal code D. overlapping code
9) Chromosomes are made from two chemicals:
   A. DNA and a set of globular proteins
   B. RNA and a set of globular proteins
   C. DNA and a set of fibrous proteins
   D. RNA and a set of fibrous proteins
10) The traits determined by the genes found only on the X chromosome or on the Y chromosome are said to be:
   A. Sex-linked traits C. Sex-limited traits
   B. SRY gene traits D. Sex-influenced traits

11) A woman with unknown blood type and a man also with unknown blood type could potentially have four children with all blood groups in different years. What are the possible blood groups of the parents?

A. **A** and **B** blood group C. **B** and **O** blood group

B. **A** and **O** blood group D. **AB** and **O** blood group

12) Cytosine makes up 42% of the nucleotides in a sample of DNA from an organism. Approximately what percentage of the nucleotides in this sample will be thymine?

A. 58% B. 42% C. 16% D. 8%

13) A person who has type **O** blood has:

A. **A** antigens on the cell surface C. no surface antigens on the cells

B. **B** antigens on the cell surface D. both **A** and **B** antigens on the cell surface

14) In peas, a pure tall plant (TT) is crossed with a pure short plant (tt). The ratio of pure tall plants to pure short plants in F_2 generation will be:

A. **1:3** B. **3:1** C. **1:1** D. **2:1**

15) The four daughter cells produced in meiosis will have a:

A. n number of chromosomes and will differ genetically from each other

B. 2n number of chromosomes and will differ genetically from each other

C. 2n number of chromosomes and will be genetically identical to each other

D. n number of chromosomes and will be genetically identical to each other

16) Which blood type would NOT be possible for children of a type **AB** mother and a type **A** father?

A. **A** B. **B** C. **O** D. **AB**

17) The codon is found on _____, and the anticodon is found on _____.

A. tRNA, mRNA C. mRNA, tRNA

B. rRNA, mRNA D. mRNA, rRNA

18) In the process of transcription, _____.

A. DNA is replicated C. proteins are synthesized

B. mRNA is synthesized D. mRNA attaches to ribosome

19) What characterizes a prokaryotic cell?

A. the presence of mitochondria
B. the presence of chloroplasts
C. the membrane bound nucleus
D. the unicellular level of organization

20) A larger brain NOT allows humans to:

A. create life on the planet Earth
B. plan in advance to avoid attack
C. develop and use tools and weapons
D. run faster in a more upright posture

21) What is the classification criterion of the human races into Negroid, Caucasoid and Mongoloid?

A. Large brain
B. Exact nature
C. True bipedalism
D. Genetic analysis

22) When single-stranded DNA from a human is mixed with single-stranded DNA from a chimpanzee, we find that about 98% of the DNA is homologous. This can be taken as evidence that:

A. humans evolved from chimpanzees
B. chimpanzees evolved from humans
C. humans and chimpanzees are closely related
D. humans and chimpanzees originated in similar environments

23) Which of following is NOT the observations on which Darwin based his theory of evolution?

A. The offspring show a great deal of genetic variation
B. Characteristics are inheritable from parent to offspring
C. The inheritance the acquired traits from parent to offspring
D. Competition of offspring for resources (survival of the fittest)

24) Which of the following determines the sex of a child?

A. The length of the mother's pregnancy period
B. The presence of a Y chromosome in a sperm
C. The presence of a X chromosome in an ovum
D. The length of time between ovulation and copulation

25) A cross between two individuals results in a ratio of 9: 3: 3: 1 for four possible phenotypes of progeny. This is an example of a:

A. Trihybrid cross C. Test or back cross

B. Dihybrid cross D. Monohybrid cross

26) In the human blood grouping, the four basic blood types are type **A**, type **B**, type **AB**, and type **O**. The blood proteins (antigen) **A** and **B** are: Use the concept of types of dominance.

A. Sex linked traits C. Incomplete dominant traits

B. Co-dominant traits D. Dominant and recessive traits

27) A pregnant woman has an equal chance of her baby being blood group **A** or blood group **AB**. Which one of the following shows the possible genotypes of the woman and the father of her child?

A. $I^A I^A$ and $I^B I^O$ B. $I^A I^B$ and $I^B I^O$ C. $I^A I^O$ and $I^B I^O$ D. $I^A I^B$ and $I^A I^O$

28) Functions of transferases enzymes:

A. Change of the molecular form of the substrate molecules

B. Joining of two molecules by the formation of new bonds

C. Transfer of a specific group from one substrate to another

D. Removal of nonhydrolytic group from a substrate molecules

29) Some enzymes have been named based on the source from which they were first identified. An example of this is:

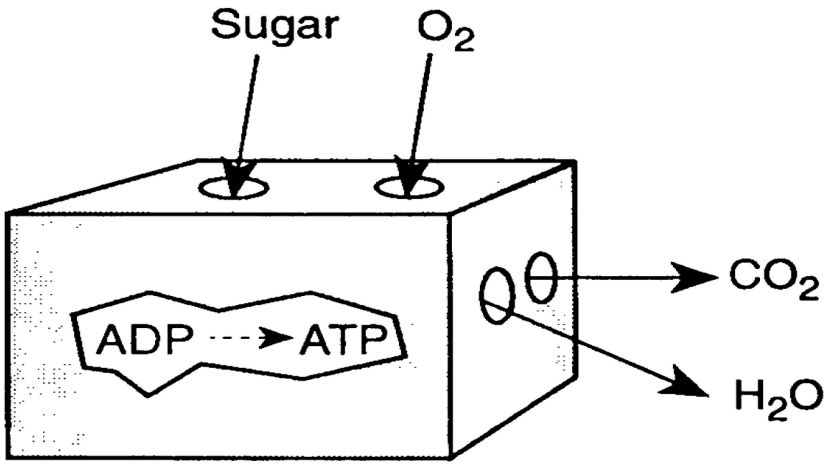
A. Pepsin B. Papayin C. Nuclease D. Amylase

30) Fermentation of glucose by yeast produces:

A. Lactic acid and oxygen C. Lactic acid and carbon dioxide

B. Ethyl alcohol and oxygen D. Ethyl alcohol and carbon dioxide

The diagram below represents some events that take place in plant cells.



31) In which organelle would the above events most likely occur?

A. Lysosome B. Ribosome C. Mitochondrion D. Chloroplast

32) In cellular respiration process, the carriers for the electron transport system are located:

A. within stroma of chloroplast C. within matrix of mitochondria

B. on the critae of mitochondria D. within the cytoplasm of a cell

33) Which of the following pathways will use **coenzyme A** during aerobic cellular respiration?

A. Glycolysis C. Kreb cycle

B. Link reaction D. Calvin cycle

34) How many times does the Krebs cycle turn per glucose molecule break down?

A. Five times C. Two time

B. Four times D. Three times

35) Which one of the following metabolic pathways is common in aerobic and anaerobic respiration?

A. the glycolysis C. the citric acid cycle

B. the chemiosmosis D. oxidative phosphorylation

36) The light reactions occur in the _____ while the Calvin cycle occurs in the _____

A. cytosol of cytoplasm . . . stroma C. stroma . . . thylakoid membranes

B. thylakoid membranes . . . stroma D. cytoplasm . . . thylakoid membrane

37) Which of the following processes produces the most ATP per molecule of glucose oxidized?

A. Aerobic respiration C. Alcoholic fermentation

B. Anaerobic respiration D. Lactic acid fermentation

38) What are the products of the light reactions that are subsequently used by the independent reaction of photosynthesis?

A. Carbon dioxide and RuBP C. ATP and NADPH

B. Oxygen and carbon dioxide D. Electrons and photons

39) The immediate products of C_3 and C_4 photosynthesis in the light-independent reactions of the Calvin cycle are, respectfully:

A. Ribulose bisphosphate and malic acid

B. Carbon dioxide and glucose molecule

C. Phosphoglycerate and oxaloacetate

D. Glyceraldehydes phosphate and phospho-*enol*-pyruvate

40) In which of the following type of dominance, both extremes have a selective advantage compared with the mean and the two distinct types begin to emerge showing the extreme values of the original population?

A. Disruptive selection C. Artificial selection

B. Stabilising selection D. Directional selection

41) The structure of a protein that describes the overall shape formed by several polypeptide chains which compose the protein?

A. Primary structure C. Secondary structure

B. Tertiary structure D. Quaternary structure

42) All the following reactions involve condensation reactions, EXCEPT?

A. the formation of a disaccharide C. the digestion of a polysaccharide

B. the production of a polypeptide D. the production of a complex sugar

43) Which pairs of element is required in order for the compound to be considered organic?

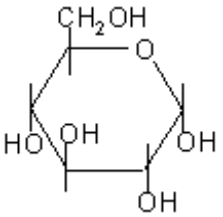
A. Carbon and hydrogen C. Nitrogen and oxygen

B. Hydrogen and oxygen D. Carbon and nitrogen

44) All of the following are storage carbohydrates, EXCEPT**?**

A. Starch B. Glycogen C. Amylose D. Cellulose

Based on the following structure below to identify this monosaccharide



45) Which of the following is the correct name for the above monosaccharide structure?

A. α-glucose C. Fructose

B. β-glucose D. Galactose

46) Which of the following organisms have the greatest problem with photorespiration?

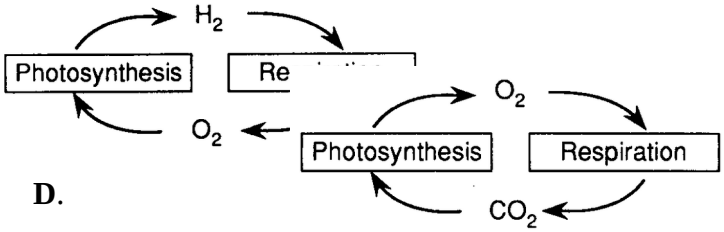
A. C2 plants B. C3 plants C. C4 plants D. CAM plants

47) Which of the following diagrams represents the correct cycling of gases?

A.

B.

C.



D.

48) Which of the following is NOT archaebacteria?

A. Sulphobacteria B. Methanobacteria C. Halophilic bacteria D. Cyanobacteria

49) Intra-specific competition is:

A. competition between members of different species in the same habitat

B. competition between members of the same species in the same habitat

C. competition between members of the same species in the same ecosystem

D. competition between members of different species in the same ecosystem

50) Which of the following is abiotic factors that influence how quickly a population of the same species or of a different species increases in size or decreases in size?

A. Predation B. Pathogens C. Temperature D. Competition

51) Which of the following is NOT true about importance of water? Water is a (an):

A. essential requirement of respiration

B. essential requirement of photosynthesis

C. basis of all transport systems in organisms

D. provides a means of removing excretory products

52) Which of the following carbon cycle process increases the carbon dioxide concentration in the atmosphere?

A. Feeding, respiration and photosynthesis

B. Combustion, fossilisation and respiration

C. Assimilation, feeding and photosynthesis

D. Combustion, fossilization and decomposition

53) Which of the following is most diverse of all marine habitats?

A. Coral reef B. Estuarine C. Wetlands D. Freshwater

54) A disease that is caused by a disease causing micro-organism infecting the body is called:

A. Social diseases C. Infectious disease

B. Genetic diseases D. Deficiency diseases

55) What are the four main classes of large biological organic molecules in a cell?

A. Proteins, carbohydrates, lipids and nucleic acids

B. Proteins, carbohydrates, minerals and vitamins

C. Amino acids, carbohydrates, steroid and nucleic acids

D. Amino acids, monosaccharide, glycerol and nucleic acids

56) The conversion of one molecule of glucose to two molecules of pyruvate results in the net formation of:

A. two molecules of ATP C. thirty-six molecules of ATP

B. four molecules of ATP D. thirty-eight molecules of ATP

57) Pairs of electrons carried in the form, $FADH_2$ and NADH+H, collectively contain enough free energy to rephosphorylate:

A. 6 ATP B. 5 ATP C. 4 ATP D. 3 ATP

58) Unknown enzyme was added into two test tubes. The first tube contained starch, the second one – sucrose. After 10 minutes incubation the solution in the first tube gives the positive result, in the second one – negative. What enzyme was added?

A. Lipase B. Sucrase C. Amylase D. Lactase

59) Competitive inhibitors stop an enzyme from working by:

A. changing the shape of the enzyme molecule

B. binding with the substrate to form complex product

C. combining with the end product of the biological reaction

D. blocking the active site of the enzyme in a reversible manner

The table below provides information about the composition and function of four important molecules in living organisms.

Molecule	**Composition**	**Function**
1	amino acids	Reaction catalyst
2	fatty acids	Membrane component
3	monosaccharides	Energy source
4	nucleotides	Genetic information

60) Which of the molecules in this table is a carbohydrate?

A. 1 B. 2 C. 3 D. 4

61) Which of the molecules in this table provide a barrier to the movement of substances in and out of the cell?

A. 4 B. 3 C. 2 D. 1

62) A researcher made an interesting observation about a protein made by the rough ER and eventually used to build a cell's plasma membrane. The protein in the membrane was actually slightly different from the protein made in the ER. The protein was probably changed in the:

A. Rough ER C. Mitochondrion
B. Smooth ER D. Golgi apparatus

63) You are studying the transport of a certain type of molecule into cells. You find that transport slows down when the cells are poisoned with a chemical that inhibits energy production. Under normal circumstances, the molecule you are studying is probably transported into the cell by….

A. simple diffusion C. active transport
B. facilitated diffusion D. passive transport

64) The stage of meiosis when pairs of homologous chromosomes separate from each other and migrate to opposite poles of a cell is called…..

A. Prophase I B. Metaphase I C. Anaphase I D. Telophase I

65) Which of the following is a feature found in BOTH prokaryotic and eukaryotic cells?

A. Multiple linear chromosomes in each cell
B. Ribosomes accomplish protein synthesis
C. Extensive array of membrane bound nucleus
D. Mitotic partition chromosomes into four cells

66) What make parts of the endoplasmic reticulum rough? The presence of….

A. ribosomes organelles C. lipids in the membrane
B. different amino acids D. proteins in the membrane

67) Glucose + galactose produces:

A. Lactose B. Sucrose C. Cellulose D. Maltose

68) The method of gathering information by using your senses is called a/an_____

A. Observation C. Prediction
B. Experiment D. Conclusion

69) Which of the following is NOT a principle of the cell theory?

A. Cells are the basic units of life C. Very few cells are able to reproduce

B. All living things are made of cells D. All cells comes from pre-existing cells

70) Bacteriophages:

A. a plant-infecting viruses C. an animal-infecting viruses

B. a fungus- infecting viruses D. a bacteria-infecting viruses

71) A secondary succession differs from a primary succession to the same climax in that it:

A. requires pioneer species to start C. an existing seed bank to draw on

B. takes a greater period of time D. starts from uncolonised ground

72) The most usual way to think of biodiversity is:

A. species richness C. cultural variability

B. genetic variability D. ecological variability

73) A type of biome consisting of an area of land is termed as:

A. Marine biomes C. Terrestrial biome

B. Estuarine biome D. Freshwater biomes

74) Ethiopia has a high biodiversity at the moment, but the biodiversity is threatened by all, EXCEPT?

A. Commercial logging C. Subsistence farming

B. Burning of vegetation D. Maintaining habitats

75) In exponential population growth pattern, numbers:

A. increase by a fixed amount in each time period

B. decrease by a fixed amount in each time period

C. increase by an increasing amount in each period

D. decrease by an increasing amount in each period

76) Which of the following RNA type has the potential to treat conditions such as AIDS by preventing replication of HIV and cancers by silencing genes that enhance cell division?

A. mRNA B. tRNA C. rRNA D. siRNA

77) Which of the monomers of the organic compounds NOT synthesized according to Alexander Oparin and John Haldene in biochemical theory those results in the origin of life on Earth?

A. Fatty acids C. Amino acids

B. Nucleic acids D. Sugar units

78) Which of the following is the most likely explanation for a high rate of crossing-over between two genes?

A. The two genes code for the same protein

B. The two genes are on different chromosomes

C. The two genes are both located near the centromere

D. The two genes are far apart on the same chromosome

79) Which of the following is the group of organisms responsible for production of the first oxygen on the Earth?

A. Archaebacteria C. Eukaryotes

B. Ordinary bacteria D. Cyanobacteria

80) Which of the following enzymes used to dissolve clots of heart-attack patients?

A. . Xylanase B. Esterases C. Pectinase D. Streptokinase

81) Which of the following is NOT the use of enzymes in industry?

A. allow less energy spent on heating the reactants molecules

B. allow the substrate molecules to have complementary shape

C. allow the reactions to take place at much lower temperatures

D. allow less accumulation of carbon dioxide in the atmosphere

82) Which type of energy transformation occurs in photosynthesis?

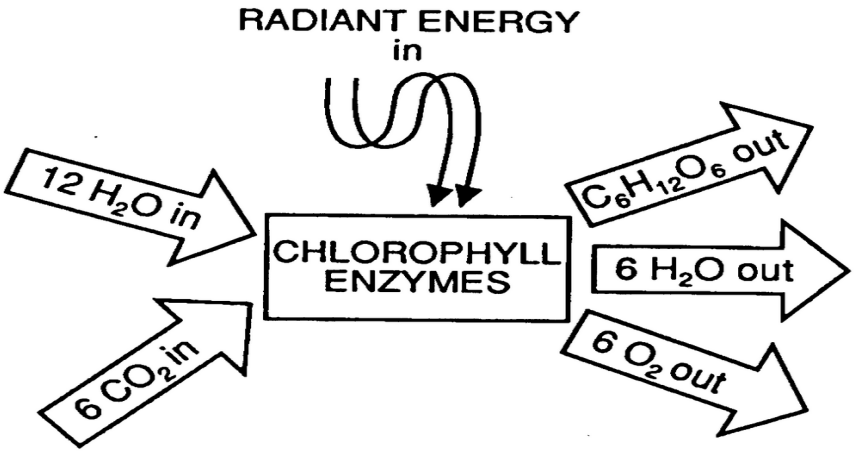
A. heat energy to electrical energy

B. light energy to chemical energy

C. mechanical energy to electrical energy

D. chemical energy to mechanical energy

83) Which process is best illustrated by the diagram?



A. Cellular digestion C. Yeast fermentation

B. Cellular respiration D. Plant photosynthesis

84) Most of mistakes (mutation events) during DNA replication are corrected by

A. DNA ligase C. RNA polymerase

B. DNA helicase D. DNA polymerase

85) Changes (mutation) in the nucleotide sequence of DNA which are **not** passed to offspring occur in:

A. Non-sexual cells C. Haploid and diploid cells

B. Eggs & sperm cells D. Cells that produce a sex cell

86) A chromosome mutation in which extra base pair is added in DNA sequence is called:

A. Deletion B. Insertion C. Inversion D. Translocations

87) Which two plant cell structures are responsible for storing energy from sunlight and later releasing it for cells to use?

A. Chloroplast and vacuole C. Mitochondria and chloroplast

B. Protoplasm and cytoplasm D. Chloroplast and mitochondria

88) Which British scientist is credited with coining the term "cell" from the Latin cellulae?

A. Robert Hooke C. Matthias Schleiden

B. Rudolf Virchow D. Anton van Leeuwenhoek

89) Hypothesis:

A. step by step plan of an experiment
B. educated guess that can be tested
C. procedures to conduct an experiment
D. make observations in scientific method

90) In post-industrial society such as USA, Japan, France and Germany, the stages of development of the human population shows changes from high birth rate and death rate to low. All are the reasons for changes in birth rate in post industrial age, EXCEPT?

A. Later marriages
B. Family planning
C. Good health care
D. Natural decreases

91) The diameter of your cells ranges from:

A. 1.0 to 10 µm
B. 0.01 to 0.1 µm
C. 10 to 100 µm
D. 100 to 1000 µm

92) Which of the following is NOT the characteristic of the instinctive behaviour patterns?

A. common to all members of a species
B. involve the strengthening of existing responses
C. fully functional the first time they are performed
D. there is a key stimulus that triggers the behavior

93) Which one of the following do bees use to inform other bees about the location and distance of a new source of nectar they discover?

A. Pheromones
B. Waggle dance
C. Buzzing noise
D. Wings vibration

94) Which of the following is NOT classified as learned behavior?

A. Insight
B. Innate
C. Latent
D. Conditioned

95) If a suspension of a mixture of cellular organelles is spun in a centrifuge, which organelle settles to the bottom first?

A. Nucleus
B. Ribosome
C. Chloroplast
D. Mitochondria

96) An experimental animal stopped responding to a stimulus that has been repeated so many times. What type of learned behavior is this?

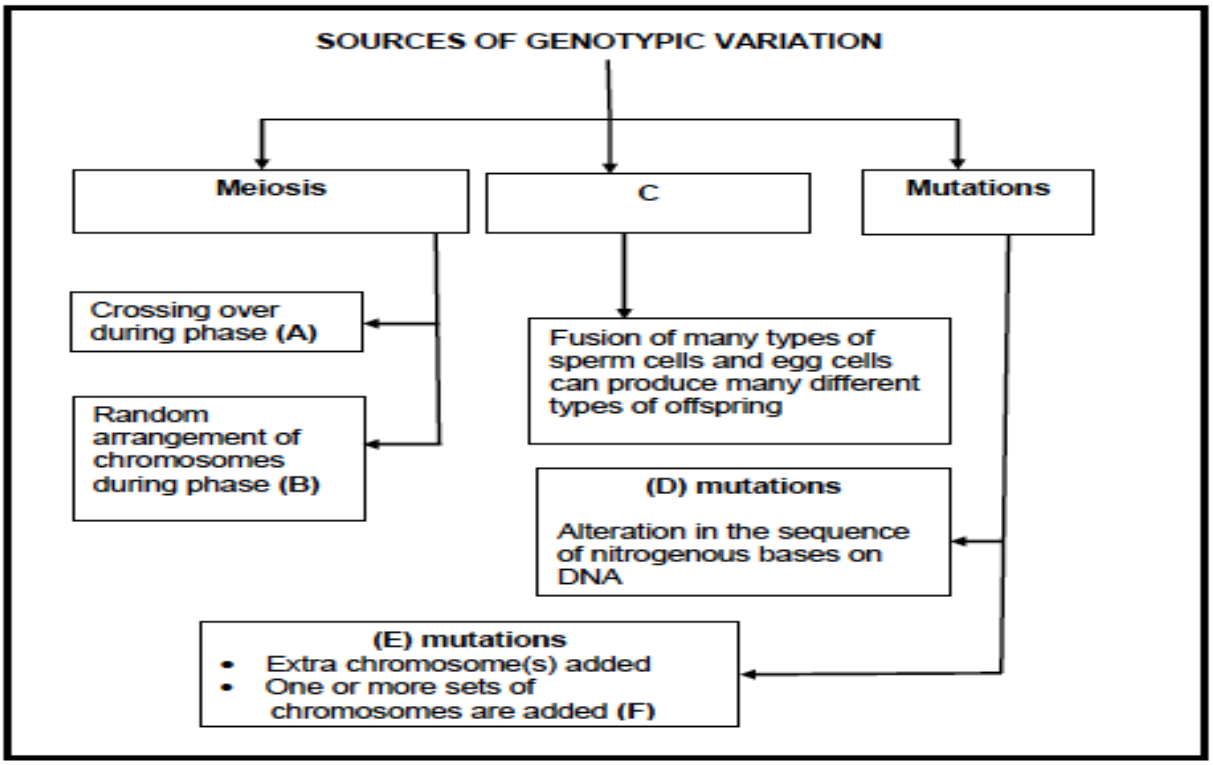
A. Imprinting C. Latent learning

B. Habituation D. Operant conditioning

97) Woodlice are observed avoiding light and heat by quickly moving to moist and darker areas. Which behavior of these animals helps them to detect differences in light intensity and move to the darker and moist part of the habitat?

A. Insight learning C. Negative phototaxis

B. Positive phototaxis D. Instinctive learning



98) What is the process labelled **C** that is a source of genetic variation?

A. Sexual Reproduction
B. Asexual Reproduction
C. Segregation of chromosomes
D. Recombination of chromosomes

99) What are the phase of meiosis, labeled **A** and **B**, respectively?

A. Prophase I and Metaphase I
B. Metaphase I and Prophase I
C. Telophase I and Anaphase I
D. Anaphase I and Telophase I

100) What are the TWO types of mutations, labeled **D** and **E**, respectively?

A. Addition and substitution mutations
B. Gene mutation and point mutations
C. Gene mutation and chromosome mutations
D. Harmful mutations and harmless mutations