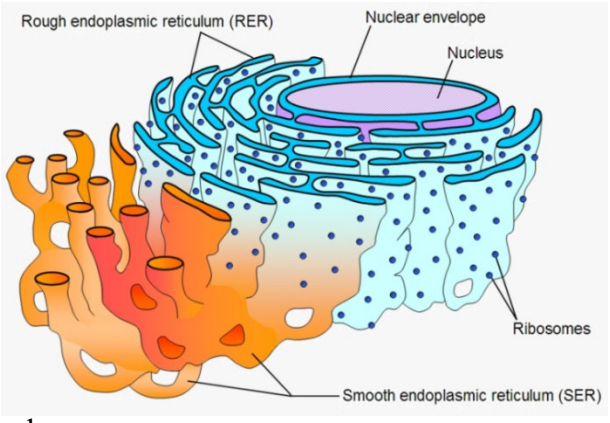
TEST BIOLOGY

***Dear applicants, please clearly mark by X your answers in the** Answer sheet!*

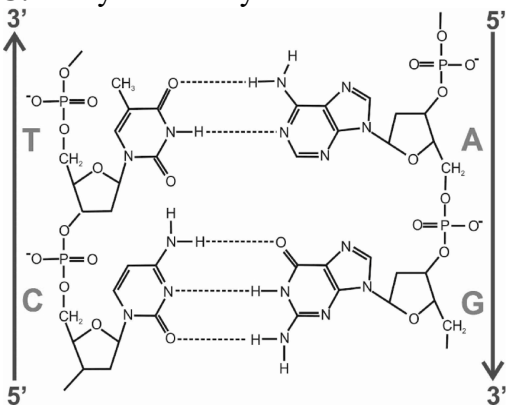
1. Which of the following organelles control intracellular digestion of macromolecules with the help of hydrolytic enzymes?
A. peroxisome s **B.** lysosomes **C.** ribosomes **D.** plastids

2. Which of the following statement is INCORRECT regarding endoplasmic reticulum?
A. Plasma cells has RER only
B. Mature red blood cells lack both RER and SER
C. The adipose tissue has both SER and RER
D. Hepatocytes has both RER and SER



3. Smallest blood cells are:
A. small lymphocytes **B.** platelets
C. red blood cells **D.** neutrophils

4. Which of the following statements are correct regarding *Golgi apparatus***?**
A. sorting and packaging **B.** exocytosis of melanin granules
C. exocytosis of thyroxine hormone **D.** all of the above



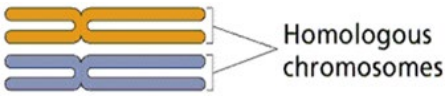
5. See the figure and answer of the question. DNA is made up of three components in nucleotide monomer: *pentose, phosphate and base***. What is the maximum number of** *covalent bond/bonds* **that one base is/are formed in a DNA molecule?**
A. one covalent N-glyosidic bond to deoxyribose
B. one covalent N-glyosidic bond to ribose
C. two covalent bonds to deoxyribose and complementary base
D. two covalent bonds to phosphate group and complementary base

6. A double-stranded DNA molecule contains a total of 120 purines and 120 pyrimidines. This DNA molecule could be comprised of:
A. 120 guanine and 120 adenine molecules **B.** 120 adenine and 120 thymine molecules
C. 240 guanine and 240 thymine molecules **D.** 240 adenine and 240 cytosine molecules

7. Enzymes that break down DNA catalyze the hydrolysis of the covalent bonds that join nucleotides together. What would happen to DNA molecules treated with these enzymes?
A. The phosphodiester bonds between deoxyribose sugars would be broken.
B. The two strands of the double helix would separate.
C. The pyrimidines would be separated from the deoxyribose sugars.
D. The hydrogen bonds between bases would be broken.

8. The process of DNA replication involves:
A. binding of transcription factors to origins of replication
B. multiple origins of replication per chromosome in eukaryotes
C. continuous synthesis on both strands of the double helix
D. conservative replication, with one original double helix and one totally new double helix as products

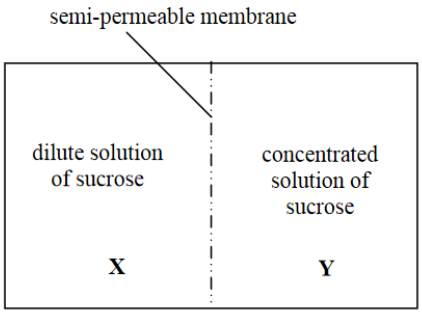
9. How can increase the rate of a biochemical reaction?
A. Increase the entropy of the reactants. **B.** Decrease the concentration of the reactants.
C. Add an appropriate enzyme. **D.** Increase the temperature to 60 °C.



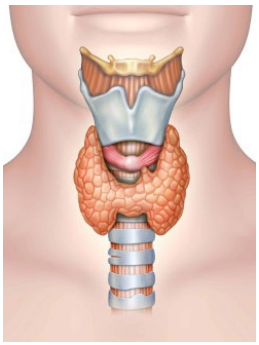
10. Homologous chromosomes move toward opposite poles of a dividing cell during:

A. mitosis **B.** meiosis I **C.** meiosis II **D.** fertilization

11. The diagram shows two solutions that are separated by a semi-permeable membrane. In which direction will most water molecules move?



A. From X to Y, decreasing the concentration gradient of sucrose.
B. From X to Y, increasing the concentration gradient of sucrose.
C. From Y to X, decreasing the concentration gradient of sucrose.
D. From Y to X, increasing the concentration gradient of sucrose.



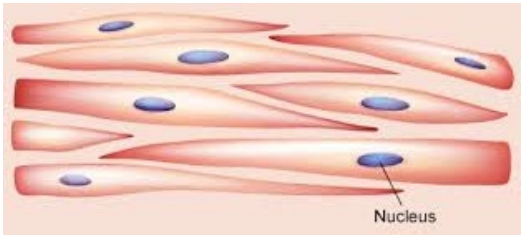
12. Name the gland that is located at the base of the throat, just inferior to the laryngeal prominence (Adam's apple).
A. pituitary
B. pineal gland
C. hypothalamus
D. thyroid

13. Which of the following hormones are responsible for the glucose homeostasis in human body?
A. epinephrine and norepinephrine **B.** insulin and glucagon
C. esrtogen and progesterone **D.** thyroxin and melatonin

14. During heavy exercise, we get cramps in the muscles due to the accumulation of .....
A. sodium chloride **B.** fructose **C.** carbon dioxide **D.** lactic acid

15. Deficiency of which one of these vitamins is a major cause of blindness?
A. vitamin A **B.** vitamin B_{12} **C.** vitamin K **D.** vitamin D

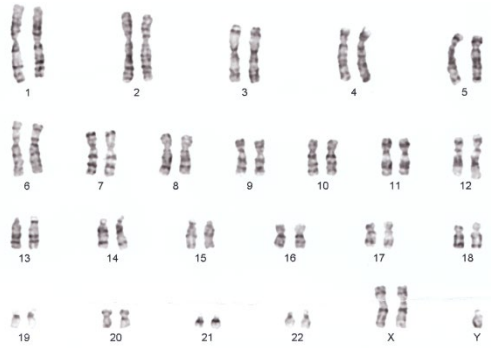
16. Smooth muscle consists of thick and thin filaments that are not arranged into sarcomeres giving it a non-striated pattern. On microscopic examination, it will appear homogenous (*see the picture*). Smooth muscles occur in:



A. uterus **B.** artery
C. stomach **D.** all the above

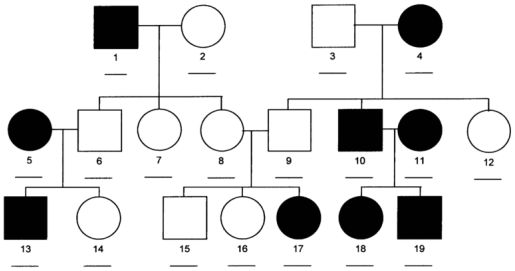
17. Tendon is a structure that connects:
A. a bone with another bone **B.** a muscle with a bone
C. a nerve with a muscle **D.** a muscle with a muscle

18. Chromosome constitution of secondary oocyte is: **A.** 23, Y **B.** 23, X **C.** 46, XY **D.** 46, XX



19. The karyotype shown is the scheme associated with which of the following genetic disorders?

A. Turner syndrome
B. Klinefelter syndrome
C. Down syndrome
D. hemophilia



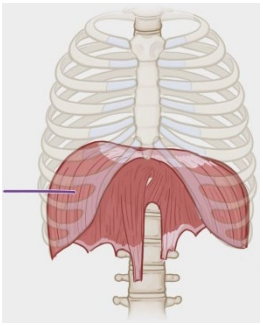
20. What pattern of inheritance is shown in the pedigree?

A. autosomal dominant
B. autosomal recessive
C. sex linked dominant
D. sex linked recessive

21. Human saliva contains enzymes that act upon which of the following nutrients?

1. starch **2.** albumin **3.** cholesterol **4.** glycogen **5.** casein **6.** cellulose

Answers: **A.** 1 and 4 **B.** 1, 4 and 6 **C.** 2, 3 and 5 **D.** 3, 5 and 6



22. Which statements for the organ on the scheme *(marked by "?")* **are true?**

1. it is composed of smooth muscle cells and fibrous cells
2. it is composed of skeletal muscle cells and fibrous cells
3. it is active in **inspiration**
4. it is active in **expiration**
5. originates from the mesoderm
6. originates from endoderm

Answers: **A.** 1, 3 and 5 **B.** 1, 4 and 6 **C.** 2, 3 and 5 **D.** 2, 4 and 6

23. Which four structures together make up the brain?

1. cerebrum **2.** thalamus **3.** brainstem **4.** meninges
5. diencephalon **6.** cerebellum **7.** spinal cord

Answers: **A**. 1, 2, 3 and 4 **B.** 1, 3, 5 and 6 **C.** 2, 5, 6 and 7 **D.** 3, 4, 6 and 7

24. If four babies are born on a given day in Lozenetz hospital:

(a) What is the chance that two will be boys and two will be girls?
(b) What is the chance that all four will be girls?
(c) What combination of boys and girls among four babies is most likely?
(d) What is the chance that at least one baby will be a girl?

Answers: **A.** a-1/2; b-1/8; c-2 boys:2 girls; d-1/10 **B.** a-1/4; b-1/16; c- c-2 boys:2 girls; d-15/16
C. a-1/8; b-1/32; c-1 boys:3 girls; d-1/3 **D.** a-1/16; b-1/64; c-1 boys:3 girls; d-1/4

25. Which of the following organs are correctly paired with its function?

(1) thymus – important for formation of red blood cells
(2) spleen – regulates glucose levels in the body
(3) gallbladder - stores and releases bile to help digestive system break down fats

(4) liver – involved in detoxification of drugs and toxins
(5) kidney – regulates blood pressure, water and electrolyte balance
Answers: **A.** 1, 2 and 3 **B.** 1, 4 and 5 **C.** 2, 3 and 5 **D.** 3, 4 and 5