



ENGLISH

Read the passage to answer questions 1-2

Due to the extremely hot weather, the electric company is planning to turn off power in certain districts during the day. This will reduce the total demand for electricity and prevent a city-wide shutdown of electrical services. Power will not be out longer than two hours in your area. For further information, please visit our Web site at www.electricity.com. All areas affected by the shutdown are listed there, as well as the times that the power will be turned off in each area.

1. Why is power being turned off?
 - A. To reduce total demand.
 - B. To save money.
 - C. To make it cooler.
 - D. To make the city pay its bill.
2. How long will power be off?
 - A. Longer than two hours.
 - B. Less than two hours.
 - C. For one day.
 - D. Until the weather changes.

Complete the sentences by choosing the most appropriate option, from the given lettered choices (A to D) below each.

3. There _____ many students waiting to hear the results of the test.
 - A. has
 - B. have
 - C. was
 - D. are
4. Some people _____ claim to be vegetarians actually allow themselves to eat fish and chicken.
 - A. which
 - B. whom
 - C. who
 - D. why

Identify the word or phrase that needs to be changed for the sentence to be correct:

5. During the day, there is often two guards at the entrance. No error
A B C D E

6. Because of their identical appearance and dress, the twins were
A B C D
often mistaken for each other. No error
E

Choose the word most similar in meaning to the capitalized one.

7. PROVOKE:

- A. deface
- B. lionize
- C. remove
- D. punish
- E. aggravate

8. THREATENING:

- A. flighty
- B. aggressive
- C. chaste
- D. hallowed
- E. global

Choose the lettered word or phrase that is most nearly opposite in meaning to the word in capital letters.

9. MANDATORY:

- A. dispassionate
- B. obligatory
- C. voluntary
- D. confirmed
- E. unhappy

10. HONESTY:

- A. clever
- B. dishonesty
- C. resolution
- D. failure

PHYSICS

11. If 500 cm^3 of gas, having a pressure of 760 millimeters of mercury, is compressed into a volume of 300 cm^3 , the temperature remaining constant, the pressure of the gas will be, in millimeters of mercury, approximately:
- A. 500
 - B. 900
 - C. 1,100
 - D. 1,270
 - E. 1,500
12. Two springs fixed at one end are stretched by 5 cm and 10 cm, respectively, when masses 0.5 kg and 1 kg are suspended at their lower ends. When displaced slightly from their mean positions and released, they will oscillate with time periods in the ratio:
- A. $1 : \sqrt{2}$
 - B. 1:2
 - C. $\sqrt{2} : 1$
 - D. 2:1
 - E. $2 : \sqrt{2}$
13. A unit _____ of induction is said to exist at a point where the force per unit charge experienced by a positive test charge, moving with a velocity of 1 ms^{-1} in the direction perpendicular to the field is 1 Newton.
- A. Gravitational Field
 - B. Magnetic Field
 - C. Magnetic Flux
 - D. Flux density
14. A _____ is a positively charged particle with properties similar to the α -particle. Its mass is one fourth and charge is one half of that of an α -particle. It is smaller in size and carries less energy at the same velocity.
- A. Beta particle
 - B. Gamma ray
 - C. Neutron
 - D. Proton

15. Which pair includes a vector quantity and a scalar quantity respectively?

- A. Power, speed
- B. Work, potential energy
- C. Displacement, acceleration
- D. Force, kinetic energy

16. A ball falls vertically and bounces on the ground. The following statements are about the forces acting while the ball is in contact with the ground. Which statement is correct?

- A. The force that the ball exerts on the ground is always equal to the weight of the ball.
- B. The force that the ball exerts on the ground is always equal in magnitude and opposite in direction to the force the ground exerts on the ball.
- C. The force that the ball exerts on the ground is always greater than the weight of the ball.
- D. The weight of the ball is always equal and opposite to the force that the ground exerts on the ball.

17. A car is travelling with uniform acceleration along a straight road. The road has marker posts every 100 m. When the car passes one post, it has a speed of 10 m/s and when it passes the next one, its speed is 20 m/s. What is car's acceleration?

- A. 0.67 m/s^2
- B. 1.5 m/s^2
- C. 2.5 m/s^2
- D. 6.0 m/s^2

18. A sample of an ideal gas may:

- I. expand adiabatically, or
- II. expand isothermally

The net flow of heat into the gas from the exterior is:

- A. positive in each case
- B. negative for I and positive for II
- C. positive for I and negative for II
- D. zero in each case
- E. zero in I and positive for II

19. With the usual notation, the first law of thermodynamics applied to one mole of an ideal gas can be written in the following form:

$$C_v \Delta T = \Delta Q - p \Delta V$$

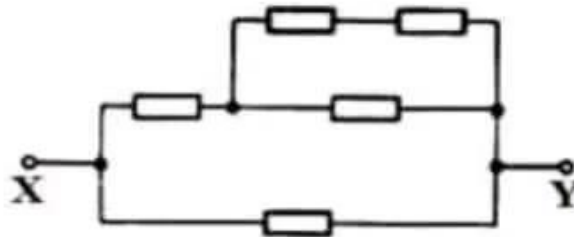
In a change for which Boyle's law is obeyed, which of the following would necessarily be zero?

- A. ΔQ
- B. C_v
- C. ΔT
- D. p
- E. ΔV

20. Four particles independently move at the same speed in a direction perpendicular to the same magnetic field. Which particle is deflected the most?

- A. a copper ion
- B. a helium nucleus
- C. an electron
- D. a proton

21. The circuit diagram shows a network of resistors each of resistance R .



What is the effective resistance between the points X and Y?

- A. $2R/7$
- B. $R/2$
- C. $5R/8$
- D. $2R/3$
- E. $3R/4$

22. A row of 25 decorative lights, connected in series, is connected to a main transformer. When the supply is switched on, the lights do not work. The owner uses a voltmeter to test the circuit. When the voltmeter is connected across the third bulb in the row, a reading of zero is obtained. Which of the following cannot be the only fault in the circuit?

- A. The filament of one of the other bulbs has broken
- B. The filament of the third bulb has broken
- C. The fuse in the mains transformer has blown.
- D. There is a break in the wire from the supply to the transformer.

23. Charges of $+2 \mu\text{C}$ and $-2 \mu\text{C}$ are situated at points P and Q respectively, as shown below. X is midway between P and Q.



Which of the following correctly describes the electric field and the electric potential at point X?

- | | Electric field | Electric potential |
|----|----------------|--------------------|
| A. | Towards Q | zero |
| B. | Towards Q | negative |
| C. | Towards P | zero |
| D. | Towards P | positive |

24. A fixed mass of gas in a thermally insulated container is compressed. After compression, the temperature of the gas will have:

- A. fallen, since more molecules bombarded the container and so they must be moving slower
- B. fallen, since more molecules collide more frequently with one another and so their average speed is lower
- C. remained constant if the compression is very slow
- D. risen, since doing work on the gas increases the kinetic energy of the molecules
- E. risen, since there are more intermolecular collisions and so more heat is produced by them



25. A fixed mass of an ideal gas absorbs 1000 J of heat and expands under a constant pressure of 20 kPa from a volume of $25 \times 10^{-3} \text{ m}^3$ to a volume of $50 \times 10^{-3} \text{ m}^3$. What is the change in internal energy of the gas?

- A. -1000 J
- B. -900 J
- C. Zero
- D. +500 J
- E. +1000 J

26. In an experiment, an object was placed on the principal axis of a convex lens 25 centimeters away from the lens. A real image 4 times the size of the object was obtained. The focal length of the lens is:

- A. 20 cm
- B. 25 cm
- C. 33 cm
- D. 50 cm
- E. 100 cm

27. An object with constant mass rests on a horizontal surface whose coefficient of friction is 0.2. If a horizontal force F is applied to the object, what will be the effect(s) on the object?

- I. It may move with constant speed in the direction of F once it has been set in motion.
 - II. It may remain at rest.
 - III. It may accelerate.
 - IV. It may move with constant speed in a direction opposite to F .
- A. I, II and III only
 - B. I and III only
 - C. II and IV only
 - D. IV only
 - E. III only

28. A person having a mass of 60 kilograms exerts a horizontal force of 200 newtons in pushing a 90 kilogram object a distance of 6 meters along a horizontal floor. He does this at constant velocity in 3 seconds. The weight of this person is approximately, in newtons: ($g=9.8 \text{ m/s}^2$)

- A. 40
- B. 90
- C. 200
- D. 400
- E. 600

29. Which unit expresses work per unit charge?

- A. Hertz
- B. Watt
- C. Joule
- D. Volt
- E. Half-life

30. The time of one vibration of a simple pendulum may be decreased by:

- A. increasing the length of the pendulum
- B. decreasing the length of the pendulum
- C. using a heavier bob
- D. using a lighter bob

31. The sum of all forms of molecular energies in a thermodynamic system is known as:

- A. Entropy
- B. Enthalpy
- C. Internal energy
- D. Red shift

32. _____ is also known as anti-electron.

- A. Photon
- B. Proton
- C. Positron
- D. Nucleon

33. When describing the isotopes of the same element, the most accurate statement is that they have:

- A. the same spin
- B. the same atomic mass but different atomic numbers
- C. the same atomic number but different atomic masses
- D. the same chemical properties and therefore can not be separated
- E. a coexistence limit, that is, no element can have more than three isotopes

34. In Nuclear reactions, we have the conservation of:

- A. Mass only
- B. Energy only
- C. Momentum only
- D. Mass, energy and momentum

35. The lightest element which exhibits radioactivity is:

- A. Hydrogen
- B. Deuteron
- C. Tritium
- D. Helium

36. Nucleus with an excess of neutrons may decay radioactivity with the emission of:

- A. a neutron
- B. a proton
- C. an electron
- D. a positron

37. _____ is defined as the sensation that sound produces in the ear of a listener and is clearly related to the frequency of sound. Frequency and _____ are both measured in Hertz (Hz). Thus greater the frequency the greater the _____ and lower the frequency lower the _____.

- A. Quality ... Pitch ... Loudness ... Pitch
- B. Pitch ... Pitch ... Pitch ... Pitch
- C. Loudness ... Quality ... Pitch ... Quality
- D. Quality ... Quality ... Quality ... Quality
- E. Loudness ... Loudness ... Loudness ... Loudness

38. Light can be polarized by:

- I. reflection
- II. double refraction
- III. scattering of light

- A. I only
- B. II only
- C. III only
- D. I and II only
- E. I, II and III

39. Incident rays of light parallel to the principal axis of a convex lens, after refraction by the lens, will:

- A. converge at the principal focus
- B. converge inside the principal focus
- C. converge outside the principal focus
- D. converge at the center of curvature
- E. diverge as long as they are close to the lens

40.If two sounds have the same wavelength in air at the same temperature, what other property must they also have in common?

- I. Intensity**
 - II. Amplitude**
 - III. Frequency**
-
- A. I only**
 - B. III only**
 - C. I and II only**
 - D. II and III only**
 - E. I, II and III**

CHEMISTRY

41. Which of the following statement about H_2S is false?

- A. It is a covalent compound
- B. It is a gas with bad smell
- C. It is a stronger reducing agent than H_2O
- D. It is a weak base in water

42. What is the volume in cm^3 of 3.01×10^{23} molecules of O_2 gas at S.T.P.?

- A. 1000 cm^3
- B. 11000 cm^3
- C. 1120 cm^3
- D. 11200 cm^3

43. The amount of solute present in the given amount of solvent is called:

- A. Molarity
- B. Molality
- C. Concentration
- D. Solubility

44. In the reaction $2\text{Fe} + \text{Cl}_2 \leftrightarrow 2\text{FeCl}_3$

- A. Fe is reduced
- B. Fe is oxidized
- C. Cl_2 is oxidized
- D. None of the above

45. The process in which electric current is used to carry out a non-spontaneous redox reaction is called:

- A. Electrolyte
- B. Electrolysis
- C. Metallic conductor
- D. None of the above

46. A correct formula must:

- A. be balanced with proper coefficients
- B. always have subscripts
- C. always conform to the valency rules
- D. always conforms to the law of multiple proportions

47. A compound was found to contain nitrogen and oxygen in the ratio 28 g : 80 g. The formula of the compound is:

- A. NO
- B. N_2O_3
- C. N_2O_4
- D. N_2O_5

48. When β -particles are sent through a thin metal foil, most of them go straight through the foil as:

- A. β -particles are much heavier than electrons
- B. β -particles are positively charged
- C. Most part of the atom is empty space
- D. β -particles move with high velocity

49. Electronic Configuration of M^{2+} ion is 2, 8, 14 and its atomic weight is 56 amu. The number of neutrons in its nucleus are:

- A. 30
- B. 32
- C. 42
- D. 52

50. The quantum numbers $+1/2$ and $-1/2$ for the electron spin represent:

- A. Rotation of the electron in clockwise and anticlockwise direction respectively
- B. Rotation of the electron in anticlockwise and clockwise direction respectively
- C. Magnetic movement of the electron pointing up and down respectively
- D. Two quantum mechanical spin states which have no classical analogue

51. 1 liter of a gas weighs 2 g at 300 K and 1 atm pressure. If the pressure is made 75 atm, at which of the following temperatures will 1 L of the same gas weigh 1 g?

- A. 450 K
- B. 800 K
- C. 600 K
- D. 900 K

52. Which of the following pairs of gases has same rate of diffusion?

- A. CO_2 and N_2O
- B. CO_2 and CO
- C. NO_2 and CO_2
- D. CO_2 and N_2O_4

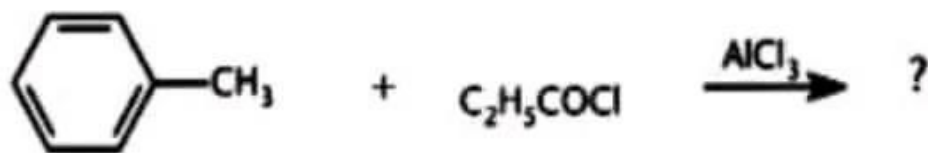
53. For the equilibrium reaction $2\text{NO}_2 \leftrightarrow \text{N}_2\text{O}_4(\text{g}) + 61\text{kJ}$, increase of temperature would:

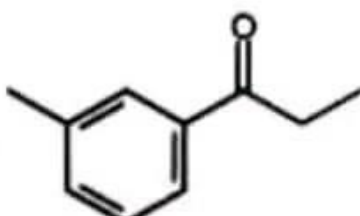
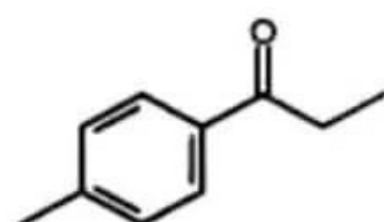
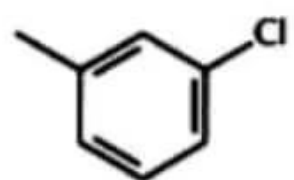
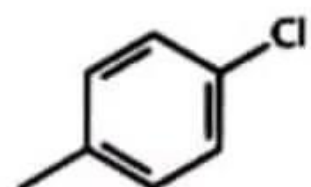
- A. Favour the formation of N_2O_4
- B. Favour the decomposition of N_2O_4
- C. No effect on equilibrium
- D. Stop the reaction

54. The value K for $\text{H}_2(\text{g}) + \text{CO}_2(\text{g}) \leftrightarrow \text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g})$ is 1.80 at 1000°C . If 1.0 mole of each H_2 and CO_2 are placed in 1 litre flask, the final equilibrium concentration of CO at 1000°C will be:

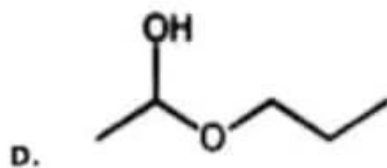
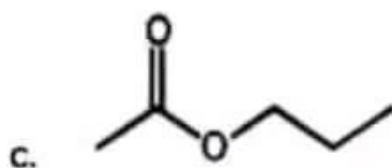
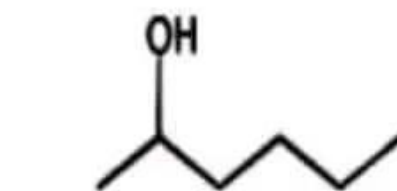
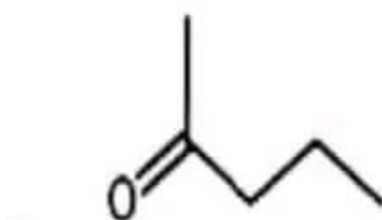
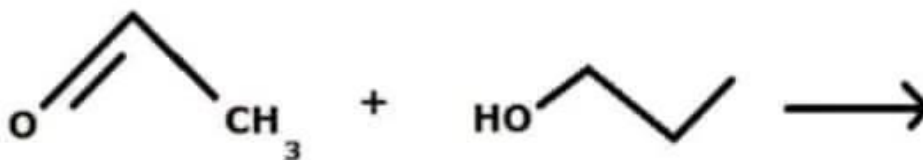
- A. 0.295 M
- B. 0.385 M
- C. 0.531 M
- D. 0.473 M

55. What would be the major product of the following reaction?

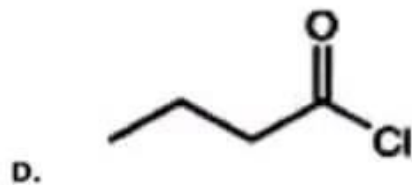
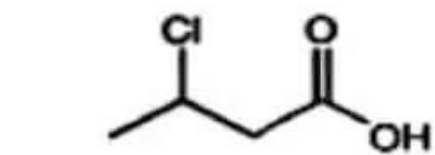
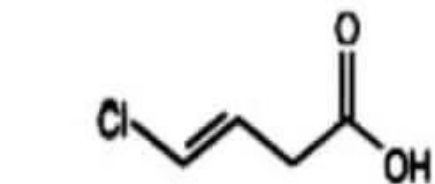
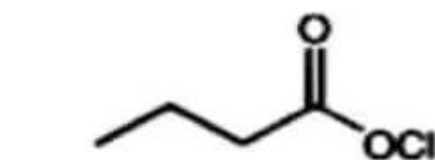
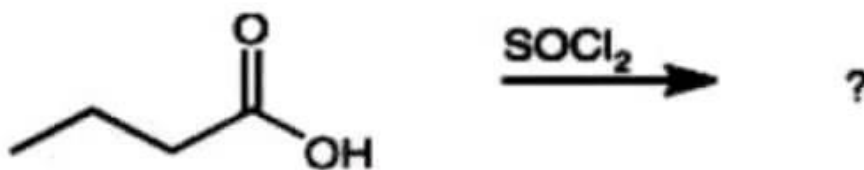


- A. 
- B. 
- C. 
- D. 

56. What is the product of the below reaction?



57. What would be the product of the below reaction?



58. Which of the following values of heat of formation indicates that the product is least stable?

- A. -94 k cal
- B. -231 k cal
- C. +21.4 k cal
- D. +64.8 k cal

59. The enthalpy of certain reaction at 273 K is -20.75 kJ. The enthalpy of same reaction at 373 K (if heat capacities of reactants and products is same) will be:

- A. -20.75 kJ
- B. -2075 kJ
- C. Zero
- D. $-20.75 \times \frac{373}{273}$ kJ

60. Most abundant salt of sodium in nature is:

- A. NaNO_3
- B. Na_2SO_4
- C. NaOH
- D. NaCl

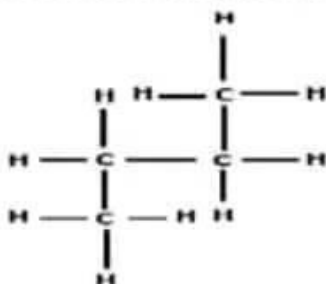
61. A gas that reacts with CaO and not with NaHCO_3 is:

- A. CO_2
- B. Cl_2
- C. O_2
- D. N_2

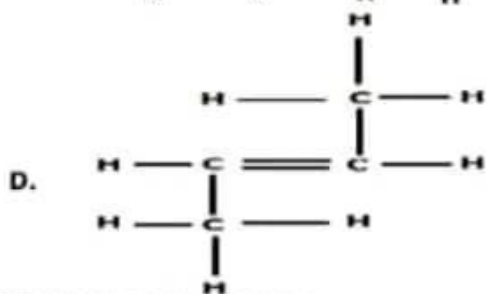
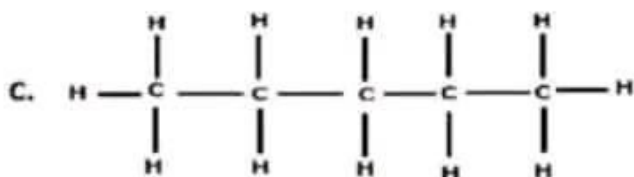
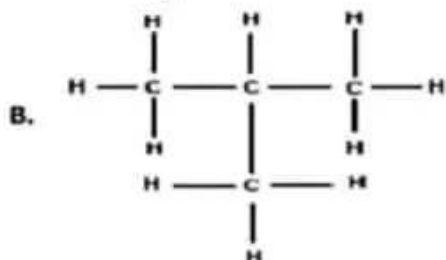
62. Which of the following statements is correct?

- A. H_3PO_3 is dibasic and reducing
- B. H_3PO_3 is tribasic and reducing
- C. H_3PO_3 is tribasic and non-reducing
- D. H_3PO_3 is dibasic and non-reducing

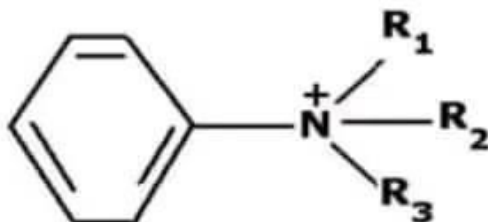
63. The molecular structure of a hydrocarbon is shown below.



Which structure is an isomer of this hydrocarbon?



64. How would an ammonium group affect on benzene ring for subsequent reactions?



- A. deactivate the ring; meta directing
- B. activate the ring, ortho-para directing
- C. deactivate the ring; ortho-para directing
- D. activate the ring; meta directing

65. Which of the following would be the best solvent for an S_N2 reaction?

- A. H_2O
- B. CH_3CH_2OH
- C. CH_3SOCH_3
- D. $CH_3CH_2CH_2CH_2CH_2CH_3$

66. The formula of Plaster of Paris is:

- A. $(CaSO_4) \cdot 1/2H_2O$
- B. $(CaSO_4) \cdot 5H_2O$
- C. $(CaSO_4) \cdot 7H_2O$
- D. $(CaSO_4) \cdot 9H_2O$

67. Ionic, covalent and co-ordinate covalent bonds are simultaneously present in the molecular geometry of:

- A. Ammonia
- B. Ammonium hydroxide
- C. Hydrochloric acid
- D. Water
- E. Methane

68. All amino acids contain the functional group:

- A. NH_2
- B. CO_2H
- C. S^{2-}
- D. Both A and B

69. Alanine, lysine and tryptophane are:

- A. Carbohydrates
- B. Lipids
- C. Enzymes
- D. Amino acids

70. What happens when one mole of ethane is mixed in the dark at room temperature with six moles of chlorine?

- A. There is no reaction.
- B. $\text{CH}_3\text{CH}_2\text{Cl}$ and HCl are formed.
- C. CH_3CCl_3 and HCl are formed.
- D. CCl_3CCl_3 and HCl are formed.
- E. Carbon and HCl are formed.

BIOLOGY

71. When the tuft of flagella are present at both the ends in the structure of bacterial cell, then the condition is known as:

- A. Atrichous
- B. Lophotrichous
- C. Peritrichous
- D. Amphitrichous
- E. Bitrichous

72. Cystic fibrosis patients lack a gene that codes for a transmembrane carrier of:

- A. Na^+ ions
- B. K^+ ions
- C. Cl^- ions
- D. Ca^{2+} ions
- E. Mg^{2+} ions

73. Which features do animal cells share with plant cells?

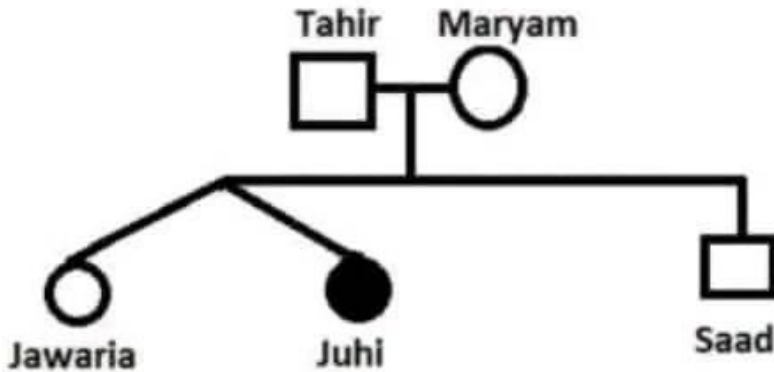
	Chloroplast	Cytoplasm	Nucleus	mitochondria
A	✓	✓	✓	✓
B	✓	x	✓	x
C	x	✓	✓	✓
D	x	x	x	✓



74. Platyhelminthes means:

- A. Flat worms
- B. Round worms
- C. Segmented worms
- D. None of the above

75. All of the following are mammals EXCEPT the:

- A. Porpoise
- B. Shark
- C. Whale
- D. Walrus
- E. Seal



76. In the pedigree of a family shown above, brown eyes are indicated as  and blue eyes as . Jawaria and Juhi are twins. From this chart, it can be determined that:

- A. Tahir and Mary are homozygous for brown eyes
- B. Jawaria and Juhi are identical twins
- C. Juhi is heterozygous for blue eyes
- D. Juhi is homozygous for blue eyes
- E. Jawaria and Saad are homozygous for brown eyes

77. Viruses resemble living things because they:

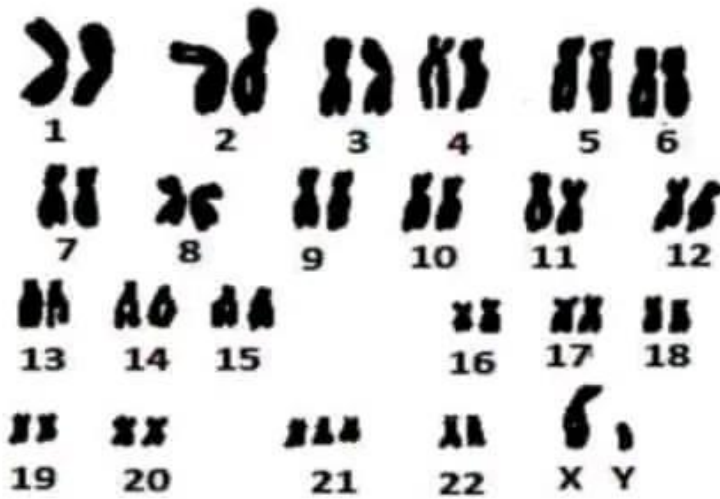
- A. Circulate
- B. Move
- C. Reproduce
- D. Are crystalline
- E. Are able to respond to stimuli in the environment

78. A part of the digestive system that is not in contact with food is the:

- A. Small intestine
- B. Stomach
- C. Liver
- D. Large intestine
- E. Trachea

79. All of the following protect the body against the entrance of germs except:

- A. Tears
- B. Mucous membranes
- C. Ciliated cells
- D. White blood cells
- E. Red blood cells

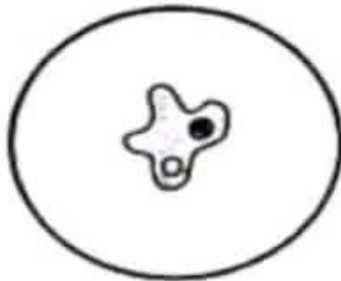


80. The above diagram illustrates:

- A. Hemophilia
- B. Phenylketonuria
- C. Sickle cell anemia
- D. Down's Syndrome

Questions 81-82

A student studied a drop of pondwater with the low power of compound microscope and made the following exact drawing of an organism she observed:



81. In which kingdom is the organism classified?

- A. Protista
- B. Monera
- C. Metazoa
- D. Animal
- E. Bryophyta

82. The organism moves by means of:

- A. Peristalsis
- B. Pinocytosis
- C. Porifera
- D. Protozoa
- E. Pseudopodia

83. In a pyramid of energy, which level represents the greatest amount of energy?

- A. Producers
- B. First-order consumers
- C. Second-order consumers
- D. Third-order consumers
- E. Decomposers

84. The phenomenon known as crossing-over occurs during:

- A. Mitosis
- B. Meiosis
- C. Geographic distribution
- D. Active transport

85. The following sequence of events occurs at the neuromuscular junction.

nerve impulse → release of V → end plate potential → W produced in muscle fibre → X released from sarcoplasmic reticulum → formation of Y → muscle contraction

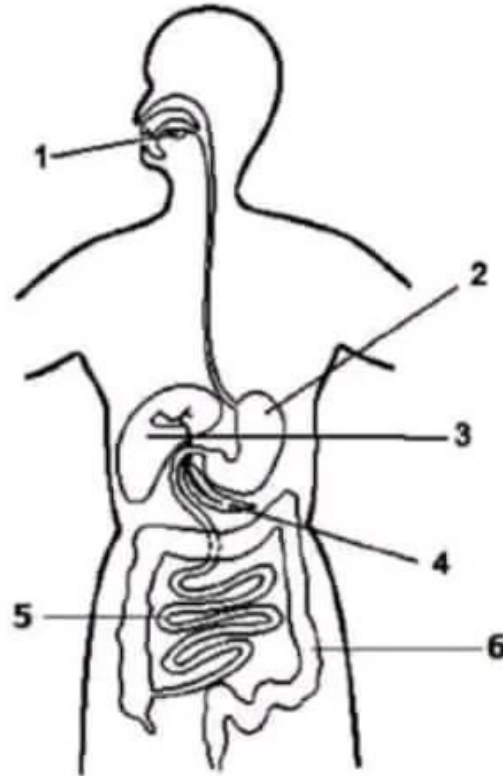
Which one of the following shows the correct sequence from V - Y?

	V	W	X	Y
A	acetylcholine	action potential	calcium ions	actomyosin
B	acetylcholine	action potential	actomyosin	calcium ions
C	actomyosin	acetylcholine	calcium ions	action potential
D	calcium ions	action potential	acetylcholine	actomyosin
E	calcium ions	actomyosin	acetylcholine	action potential

86. Which group of organisms has the following features?

- I. three pairs of jointed legs
 - II. three-part segmented body
 - III. one pair of antennae
- A. arachnids
 - B. crustaceans
 - C. insects
 - D. myriapods

87. The diagram shows some organs of the digestive system.

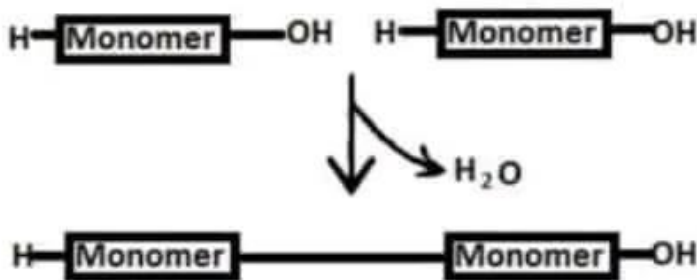


Where is amylase present?

- A. 1, 4 and 5
- B. 1, 2 and 3
- C. 2, 6 and 4
- D. 3, 5 and 4

88. Which bones meet at the elbow joint and what kind of movement do they allow?

	BONES	MOVEMENT
A.	Humerus and scapula	sliding
B.	Humerus and scapula	back and forth
C.	Ulna and humerus	sliding
D.	Ulna and humerus	back and forth



89. The above diagram represents the process of:

- A. Hydrolysis
- B. Condensation
- C. Neutralization
- D. Metabolism

90. Which of the following is correctly matched?

A	Ribosomes	f	Detoxification of alcohol
B	Lysosomes	g	Formation of astral ray
C	Centriole	h	Protein synthesis
D	Peroxisomes	i	Destroyers of foreign particles
E	Smooth ER	j	Converts cholesterol into vitamin D in skin

- A. Af, Bg, Cj, Di, Eh
- B. Ah, Bi, Df, Cg, Ej
- C. Aj, Bi, Ch, Dg, Ef
- D. Ah, Bf, Dg, Ci, Ej

91. Pyruvic acid is the end product of:

- A. Glycolysis
- B. Krebs cycle
- C. Oxidation
- D. Electron transport system

92. Humoral immunity is carried by a special group of cells called:

- A. B-cells
- B. Killer cell
- C. Helper cell
- D. Null cells

93. Identify the correctly matched pair relating to a term and its meaning/function/example:

- A. nitrogen cycle ... Rhizopus
- B. denitrifying bacteria ... change protein to ammonia
- C. biosphere ... where life exists
- D. lithosphere ... water, air and soil on the surface of earth

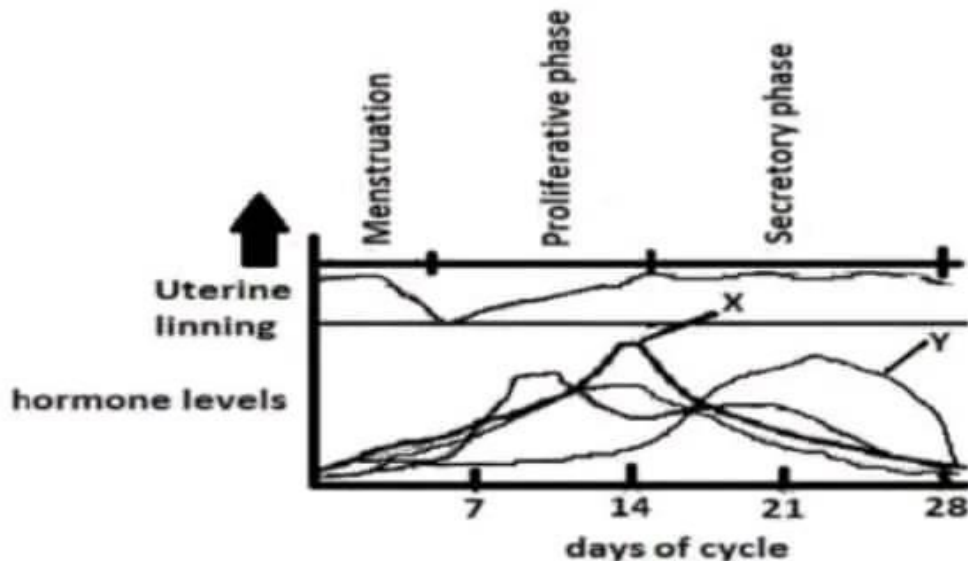
94. Which of the following RNA sequences would be transcribed from the DNA sequence ATGCCTAGGAC?

- A. TACGGATCCTG
- B. UAGCGAUCCUG
- C. AUGCCUAGGAC
- D. UACGGAUCCUG
- E. GCAUUCGAAGU

95. Human cells maintain concentration gradients across their plasma membranes, such that there is a high sodium concentration outside the cell and a high potassium concentration inside the cell. Suppose that within the cell membrane are sodium "leak" channels. These channels would allow sodium to

- A. move out of the cell by simple diffusion
- B. move into the cell by simple diffusion
- C. move out of the cell by facilitated diffusion
- D. move into the cell by facilitated diffusion
- E. move into the cell by active transport

Questions 96-98



96. The hormone labeled X in the diagram is often used in over-the-counter diagnostic tests to determine when ovulation has occurred. This hormone is:

- A. estrogen
- B. progesterone
- C. FSH
- D. LH
- E. Testosterone

97. Based on the peak levels of hormone X, on what day of the cycle is ovulation most likely to occur?

- A. Day 21
- B. Day 14
- C. Day 12
- D. Day 25
- E. Day 28

98. The hormone labeled Y in the diagram is:

- A. progesterone, secreted by the corpus luteum after ovulation has occurred
- B. progesterone, secreted by the ovary after ovulation has occurred
- C. estrogen, secreted by the corpus luteum after ovulation has occurred
- D. estrogen, secreted by the ovary after ovulation has occurred
- E. estrogen, secreted by the follicle before ovulation occurs

99. The table shows some characteristics of four different vertebrates. Which vertebrate is a reptile?

	fins	legs	scales	hair
A	✓	x	✓	x
B	x	✓	✓	x
C	x	✓	x	x
D	x	✓	x	✓

key

✓ = feature present

x = feature absent

- A. A
- B. B
- C. C
- D. D