MDCAT PAST PAPER

SINDH MDCAT

ORIGINAL PAPER 2013

(DMC & SMC)

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ENGLISH

Questions 1-2 are based on the following passage.

However, it must be recognized that science has its limitations. Its methods apply only to those things which can be observed, measured, and treated mathematically. It has nothing to do with values - save those of truth and accuracy. It has nothing to do with happiness, goodness, beauty, courage, adventure, justice, altruism, friendship, love of family, love of country. Yet all these values enter into a man's conception of what is the good personal life within a good society. It is possible for honest and intelligent men to differ profoundly on the nature of these values and their respective degrees of importance. Hence the contrast between the modern world's command of material things and its tragic failure to organize a harmonious world society.

1. It can be inferred from the passage that the author thinks:

   A. science to be the necessary element of a good personal life
   B. science brings happiness, goodness, beauty, courage, adventure, justice, altruism, friendship, love of family and love of country to a man's life
   C. science has successfully brought a balance between modern world's command of material things and a harmonious world society
   D. a good personal life can be achieved by recognizing the nature of values and their degree of importance
   E. the limitations of science are negligible

2. According to the paragraph science applies certain values, which of the following describes these values?

   A. truth and justice
   B. love of country and accuracy
   C. truth and accuracy
   D. justice and accuracy
   E. truth and love of country

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

3. He says he is a _____, but he can't play the piano or any other instrument and he can't sing.

   A. musician
   B. magician
   C. physician
   D. dietician
   E. technician

PHYSICS

11. A nucleus consists of 19 protons and 20 neutrons. The conventional symbol of this nucleus is:

A. $_{11}Na^{12}$
B. $_{19}K^{19}$
C. $_{19}K^{39}$
D. $_{19}K^{20}$
E. $_{12}Na^{12}$

12. The linear magnification produced by a lens is defined as the ratio of the:

I. Size of the image to the size of object
II. Size of the lens to the size of object
III. Size of the lens to the size of the image

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

13. Gamma (γ) ray can produce ionization in which of the following way/s?

I. It may lose all its energy in a single encounter with electron of an atom (Photoelectric effect).
II. It may lose only a part of its energy in an encounter (Compton effect).
III. Very few of very high energy γ ray photons may impinge directly on heavy nuclei, be stopped and annihilated giving rise to electron-positron pairs (The materialization of energy).

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

14. The half life of C^{14} is approximately 5,730 years, while the half life of C^{12} is essentially infinite. If the ratio of C^{14} to C^{12} in a certain sample is 25% less than the normal ratio in nature, how old is the sample?

A. Less than 5, 730 years
B. Approximately 5, 730 years
C. Significantly greater than 5, 730 years, but less than 11, 460 years
D. Approximately 11, 460 years
E. Approximately 15, 730 years

15. Which of the following statements is not consistent with Bohr's set of postulates regarding the hydrogen atom model with regard to the emission and absorption of light?

A. Energy levels of the electrons are stable and discrete.
B. An electron emits or absorbs radiation only when making a transition from one energy level to another.
C. To jump from a lower energy to a higher energy, an electron must absorb a photon of precisely the right frequency such that the photon's energy equals the energy difference between the two orbits.
D. To jump from a higher energy to a lower energy, an electron absorbs a photon of a frequency such that photon's energy is exactly the energy difference between the two orbits.
E. None of the above

16. Candela is the luminous intensity, in the perpendicular direction of a surface _____ square meter of a black body at the temperature of freezing platinum under a pressure of 101325 newton per square meter.

A. 1/300000
B. 1/600000
C. 1/900000
D. 1/1200000
E. 1/1500000

17. The work done in moving an object along a straight line from (3, 2, -1) to (2, -1, 4) in a force field which is given by $\vec{F} = 4i - 3j + 2k$, is:

A. 45
B. 35
C. 25
D. 15
E. 5

18. A constant force acting on a body of mass 5 kg changes its speed from 2 m/s to 7 m/s in 10 s, the direction of motion of the body remains unchanged. Find the magnitude of the force. (Take g = 10 m/s^2)

A. 0.5 N
B. 1.5 N
C. 2.5 N
D. 3.5 N
E. 4.5 N

19. What force should be applied on a 10 kg body so that it moves down in vacuum with an acceleration of 3 m/s^2 ? (Take g=9.8 m/s^2)

A. 42 N
B. 46 N
C. 48 N
D. 53 N
E. 58 N

20. In an astronomical telescope, the distance between objective and eye piece is called:

A. Magnifying Power of the telescope
B. Width of the telescope
C. Length of the telescope
D. Height of the telescope
E. Diameter of the lens of the telescope

21. A special class of waves which do not need a material medium for their propagation are called:

A. Electric waves
B. Magnetic waves
C. Electromagnetic waves
D. Sound waves
E. Earthquake's shock waves

22. Two blocks, X and Y, of masses m and 2m respectively, are accelerated along a smooth horizontal surface by a force F applied to block X, as shown in the diagram.

What is the magnitude of the force exerted by block Y on block X during this acceleration?

A. 0
B. F/3
C. F/2
D. 2F/3
E. F

23. A box of mass m = 6 kg slides with speed v = 4 m/s across a frictionless floor. It suddenly explodes into two pieces. One piece, with mass $m_1 = 2\,kg$ moves in the same direction with speed $v_1 = 8\,m/s$. Find the velocity of the second piece.

A. 2 m/s
B. 4 m/s
C. 8 m/s
D. 9 m/s
E. 11 m/s

24. A generator of e.m.f. 80 V has an internal resistance of 0.04 Ω. If its terminal voltage is 75 V, determine the current.

A. 125 A
B. 135 A
C. 145 A
D. 155 A
E. 165 A

25. A rotating wheel of radius 0.5 m has an angular velocity of 5 rad/s at some instant and 10 rad/s after 5 s. Find the angular acceleration of a point on its rim.

A. 1 rad/s^2
B. 3 rad/s^2
C. 5 rad/s^2
D. 7 rad/s^2
E. 9 rad/s^2

26. A shot leaves a gun at the rate of 160 m/s. Calculate the greatest distance to which it could be projected. (Take g = 10 m/s^2)

A. 2460 m
B. 2560 m
C. 2680 m
D. 2760 m
E. 2860 m

27. A block of mass 50 kg is pulled on a frictionless floor by a force of 210 N directed at 30° to the horizontal. If the block moves 3.0 m, what is the work done on it by the applied force?

A. $115\sqrt{2}J$
B. $215\sqrt{2}J$
C. $315\sqrt{3}J$
D. $415\sqrt{2}J$
E. $515\sqrt{3}J$

28. A 4 cm high object is located 10 cm from the converging lens, whose focal length is 20 cm. The image so formed will be:

A. Virtual
B. Erect
C. Real
D. Inverted
E. Both A and B

29. On the ground, the gravitational force on a satellite is W. What is the gravitational force on the satellite when at a heignt R/50, where R is the radius of the Earth?

A. 1.04 W
B. 1.02 W
C. 0.98 N
D. 0.96 W
E. 2.13 W

30. When the aircraft Concorde is moving in a horizontal plane at a constant speed of 650 ms^{-1}, its turning circle has a radius of 80 km. What is the ratio of the centripetal force to the weight of the aircraft? (g = 9.8 m/s^2)

A. 8.3×10^4
B. 0.54
C. 1.9
D. 52
E. 540

31. The amount of heat at constant volume is called as:

A. Internal energy
B. Enthalpy
C. Entropy
D. Temperature
E. Pressure

32. A parallel beam of white light is incident normally on a diffraction grating. It is noted that the second-order and third-order spectra partially overlap. Which wavelength in the third-order spectrum appears at the same angle as the wavelength of 600 nm in the second-order spectrum?

A. 300 nm
B. 400 nm
C. 600 nm
D. 900 nm
E. 950 nm

33. If the frequency of a pendulum is four times greater on an unknown planet than it is on earth, then the gravitational constant on that planet is:

A. 16 times greater
B. 4 times greater
C. 4 times lower
D. 16 times lower
E. 24 times lower

34. A submarine sends out a sonar signal (sound wave) in a direction directly downward. It takes 2.3 s for the sound wave to travel from the submarine to the ocean bottom and back to the submarine. How high (approx) up from the ocean floor is the submarine? (The speed of sound in water is 1,490 m/s.)

A. 1,700 m
B. 3,000 m
C. 5,000 m
D. 9,000 m
E. It cannot be determined from the information given

35. A 40 kg block is resting at a height of 5 m off the ground. If the block is released and falls to the ground, what is its total energy at a height of 2 m? ($g = 10\ m/s^2$)

A. 0 J
B. 400 J
C. 2 kJ
D. 6 kJ
E. It cannot be determined from the information given

UAK

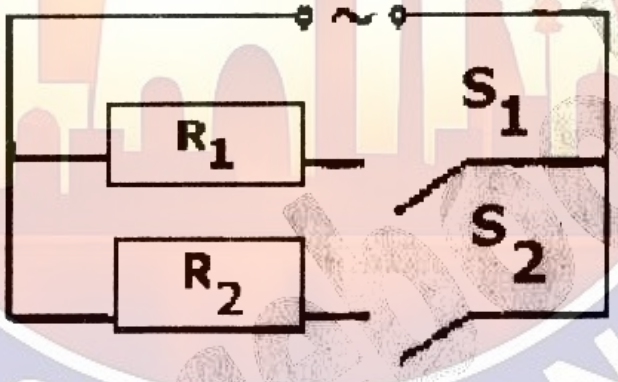
36. The internal energy of an object increases in an adiabatic process. Which of the following must be true regarding this process?

A. The kinetic energy of the system is changing
B. The potential energy of the system is changing
C. Work is done on the system
D. Heat flows into the system
E. No work is done on the system

37. An electric rod of 2000 watts rating boils a certain quantity of water in 10 minutes, the heat which is generated for boiling this water is:

A. 8×10^4 Joules
B. 12×10^5 Joules
C. 19×10^5 Joules
D. 23×10^5 Joules
E. 37×10^5 Joules

38. An electric heater can be represented as two resistors of resistances R_1 and R_2 and two switches S_1 and S_2. The resistance R_2 is greater than that of R_1.



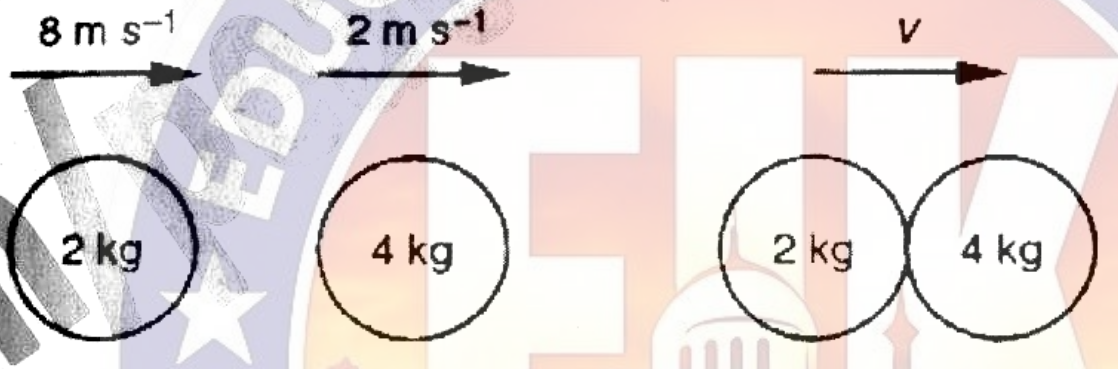
Which switches must be closed so that the heater produces the maximum possible power and minimum non-zero power?

	MAXIMUM POSSIBLE POWER	MINIMUM NON-ZERO POWER
A.	S_1 and S_2	S_2
B.	S_1 and S_2	S_1
C.	S_1	S_2
D.	S_2	S_1
E.	S_1	S_1

39. The temperature of a body at 100 °C is increased by $\Delta\theta$ as measured on the Celsius scale. How is this temperature change expressed on the Kelvin scale?

A. $\Delta\theta + 373$
B. $\Delta\theta + 273$
C. $\Delta\theta + 100$
D. $\Delta\theta$
E. $\Delta\theta + 212$

40. A ball of mass 2 kg traveling at 8 ms^{-1} strikes a ball of mass 4 kg traveling at 2 ms^{-1}. Both balls are moving along the same straight line as shown.



After collision, both balls move at the same velocity v. What is the magnitude of the velocity v?

A. 4 ms^{-1}
B. 5 ms^{-1}
C. 6 ms^{-1}
D. 8 ms^{-1}
E. 10 ms^{-1}

CHEMISTRY

41. Outer transition elements belong to:

A. s-block
B. p-block
C. d-block
D. f-block
E. None of the above

42. Transition elements have coloured compounds because:

A. Their bond energy is low
B. they easily absorb energy
C. splitting of the five degenerated d-orbitals take place
D. d-orbitals are very close to p-orbitals
E. degenerate p-orbitals are present

43. In a double-bonded carbon atom (C=C):

A. hybridization occurs between the s-orbital and one p-orbital
B. hybridization occurs between the s-orbital and two p-orbitals
C. hybridization occurs between the s-orbital and three p-orbitals
D. no hybridization occurs between the s-and p-orbitals
E. hybridization occurs between two s-orbitals and one p-orbital

44. The radii of the second orbit of the hydrogen atom calculated from Bohr's model is:

A. 0.529 Å
B. 4.8 Å
C. 2.41 Å
D. 3.4 Å
E. 1 Å

45. The amount of energy released by absorbing an electron in the valence shell is:

A. Ionisation Energy
B. Electron Affinity
C. Electronegativity
D. Atomic Radius
E. Atomisation Energy

46. Rate = K $[N_2O_5]$ has _____ of reaction.

A. First order
B. Pseudo first order
C. Second order
D. Third order
E. Pseudo order

47. Which one of the following molecules has shortest distance of carbon atoms?

A. CH_3-CH_3
B. $CH_2=CH_2$
C. $CH \equiv CH$
D. $CH_3-CH_2-CH_3$
E. $CH_2=CH_2-CH_3$

48. The most dense element is:

A. Li
B. K
C. Ca
D. Ba
E. Rb

49. The isomers must have the same:

A. Physical properties
B. Molecular Formula
C. Structural Formula
D. Chemical properties
E. Both B and C

50. For a reaction $2A + B \rightleftharpoons C + D$ the active mass of B is kept constant and that of A is tripled. It is observed that the rate of reaction

A. decreases three times
B. decreases nine times
C. increases six times
D. increases nine times

CAK

51. In the final answer of the expression: $\frac{(29 - 20.2)(1.79 \times 10^5)}{1.37}$

the number of significant figures is:

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

52. If we take 2.2 grams of CO_2, 6.02×10^{21} atoms of nitrogen and 0.03gram atoms of sulphur, then the molar ratio of C,N and O atoms will be:

A. 1:2:5
B. 5:1:2
C. 2:5:3
D. 5:1:3

53. A system at equilibrium can be disturbed by:

A. Concentration change
B. Pressure change
C. Temperature
D. All of the above

54. Among the following electrons, which has highest energy?

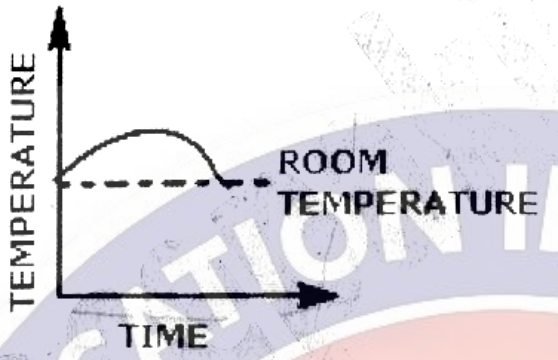
A. n = 3, l = 2, m = 0, s = + 1/2
B. n = 4, l = 0, m = 0, s = - 1/2
C. n = 3, l = 1, m = 1, s = - 1/2
D. n = 3, l = 0, m = 0, s = - 1/2

55. Equal weights of methane and hydrogen are mixed in an empty container at 25°C. The fraction of total pressure exerted by hydrogen is:

A. 1/2
B. 8/9
C. 1/9
D. 16/17

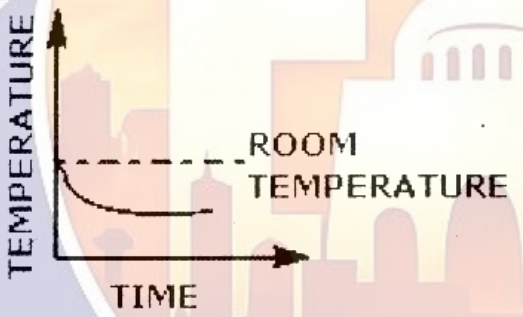
56. Dissolution of ammonium nitrate in water is an endothermic process. Which of the following graph shows how the temperature alters as the ammonium nitrate is added to water and then the solution is left at room temperature?

A.

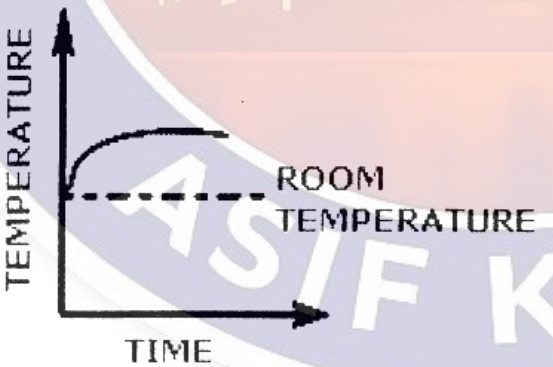


B.

C.



D.



57. From a mixture of CO_2 and H_2 gases, CO_2 can be separated by passing the mixture through:

A. water at high temperature
B. water under high pressure
C. cold water
D. acidified water

58. Alkanes having five to seventeen carbon atoms per molecule are:

A. liquids
B. solids
C. gases
D. semi solid wax

59. Which type of isomerism depends on distribution of carbon atoms on each side of functional group?

A. Structural isomerism
B. Functional isomerism
C. Chain isomerism
D. Metamerism

60. Non-stoichiometric compounds are formed by:

A. only alkali metals
B. only transition elements
C. only noble gases
D. none of the above

61. Which statement is correct about Nobel gases?

A. Their oxidation state is zero
B. They react easily with alkali metals
C. They exist in form of molecules
D. They are also known as halogens
E. None of the above

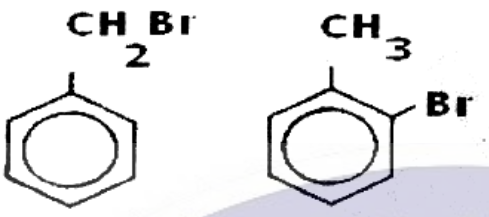
62. Magnesium oxide is used in the making of the lining of blast furnaces. It is extracted from sea water as follows.
Aqueous calcium hydroxide is added to seawater.

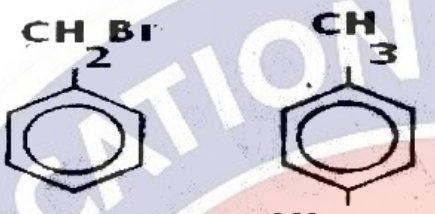
$$Ca(OH)_2\ (aq) + MgCl_2\ (aq) \longrightarrow Mg(OH)_2\ (s) + CaCl_2\ (aq)$$

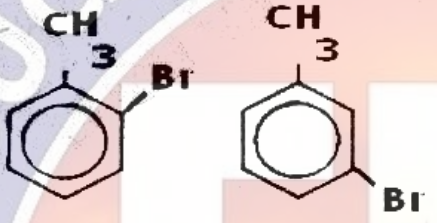
The magnesium hydroxide is then filtered off and roasted.
Which of the following comparisons between calcium and magnesium explains why magnesium hydroxide forms?

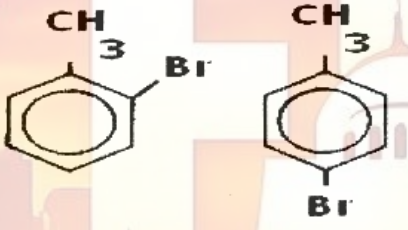
A. Magnesium is less electropositive than calcium.
B. Magnesium is lower than calcium in the reactivity series.
C. The enthalpy change of hydration for Mg^{2+} is less exothermic than for Ca^{2+}.
D. The solubility product for $Mg(OH)_2$ is lower than that for $Ca(OH)_2$.
E. The magnitude of the lattice energy of $Mg(OH)_2$ is less than that of $Ca(OH)_2$.

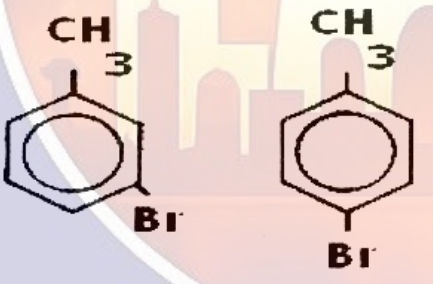
63. When methylbenzene is treated with bromine in the presence of a catalyst, a mixture of two monobromo isomers is formed. What are the structures of these two isomers?

A. 

B. 

C. 

D. 

E. 

64. The series limit for the Balmer series of hydrogen spectrum occurs at 3664 Å. Calculate Ionization energy of hydrogen atom.

A. $21.7 \times 10^{-19}\ J$

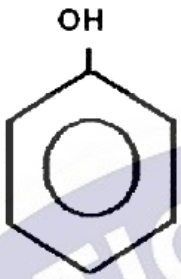
B. $6.626 \times 10^{-34}\ J$

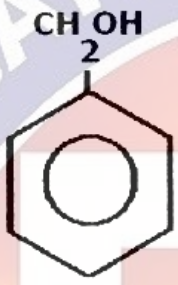
C. $5.425 \times 10^{-19}\ J$

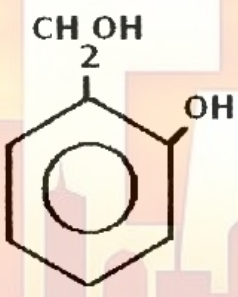
D. $3664 \times 10^{-10}\ J$

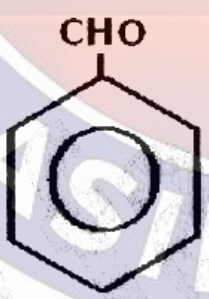
E. $3 \times 10^{8}\ J$

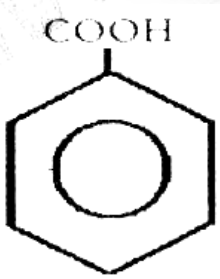
65. Which one of the following formulae represents the organic compound formed when methylbenzene is heated under reflux with alkaline potassium manganate(VII) solution and the mixture then acidified?

A. 

B. 

C. 

D. 

E. 

66.  $+ HI \longrightarrow A + B$, A and B are

A. 

B. 

C. 

D. 

67. The false statement about lithium is:

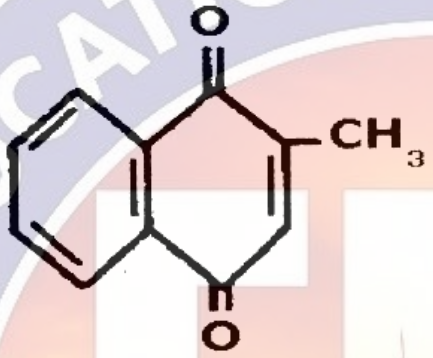
A. It is softer than other alkali metals
B. It is least reactive
C. It possesses higher melting and boiling points
D. It forms chloride which is soluble in alcohol

68. Diamond and Graphite:

A. are isotopes
B. are isomers
C. are allotropes
D. have the same structure
E. are equally hard

69.Borax exists in nature as:

A. $Na_2B_4O_7 \cdot 10H_2O$
B. $Na_2B_4O_7 \cdot 7H_2O$
C. $Na_2B_4O_7 \cdot 5H_2O$
D. $Na_2B_4O_7 \cdot 3H_2O$
E. $Na_2B_4O_7 \cdot H_2O$

70. 

is a structure of:

A. Menadione
B. α – *Tocopherol*
C. Calciferol
D. Thiamine
E. Pyridoxine

UAR

BIOLOGY

71. In the Krebs cycle, substrate–level phosphorylation accompanies the formation of:

A. Citrate
B. Alpha-ketoglutarate
C. Succinate
D. Fumarate
E. Oxaloacetate

72. When a physician elicits the knee-jerk reflex by tapping deep tendons in the knee, the normal response is for the lower leg to swing forward. When this happens:

A. Muscles in the front of the thigh are contracting and muscles in the back of the thigh are relaxing
B. Muscles in the front of the lower leg are contracting and muscles in the back of the lower leg are relaxing
C. Muscles in the back of the thigh are contracting and muscles in the front of the thigh are relaxing
D. Muscles in the back of the lower leg are contracting and muscles in the front of the lower leg are relaxing
E. None of the above

73. Of the following, which is the incorrectly paired one?

A. Robert Hooke ... cell wall
B. Schleiden and schwann ... cell theory
C. Robert Brown ... nucleus
D. Watson and Crick ... DNA model
E. Virchow ... mosaic model of plasma membrane

74. Identify the phylum in which the larva is bilaterally symmetrical but the adult is radially symmetrical:

A. Ctenophora
B. Coelentreta
C. Echinodermata
D. Sipunculoidea

75. The botanical name of gum tree is:

A. *Acacia nilotica*
B. *Mimosa pudica*
C. *Acacia catechu*
D. *Prosopis glandulosa*
E. *Albizzia Lebbek*

76. A pure-breeding plant with the dominant phenotype of character P and the recessive phenotype of character Q was crossed with another pure-breeding plant with the recessive phenotype of character P and the dominant phenotype of Q. The offspring of this cross were crossed with a double homozygous recessive for P and Q and the following results obtained:
22 were phenotypically dominant for P and recessive for Q.
5 were phenotypically dominant for both P and Q.
4 were phenotypically recessive for both P and Q.
24 were phenotypically recessive for P and dominant for Q.
Which one of the following types of inheritance is illustrated by these results?

A. gene linkage of P and Q
B. independent segregation of P and Q
C. Mendelian dihybrid inheritance
D. multiple alleles
E. polygenic inheritance

77. How many metacarpals are present in the hand?

A. 4
B. 3
C. 6
D. 5
E. 8

78. Which of the following is NOT a difference that would allow one to distinguish between a prokaryotic and a eukaryotic cell?

I. Presence or absence of the nucleus
II. Presence or absence of the cell wall
III. Membrane-bound versus no membrane-bound organelles

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

79. Some enzymes require the presence of a nonprotein molecule to behave catalytically. An enzyme devoid of this molecule is called a(n)

A. holoenzyme
B. apoenzyme
C. coenzyme
D. zymoenzyme

80. The events shown below occur during different phases of mitosis:

I. spiralization of DNA
II. hydration of DNA
III. centromeres split
IV. centromeres attach to spindle fibres
V. DNA replicates

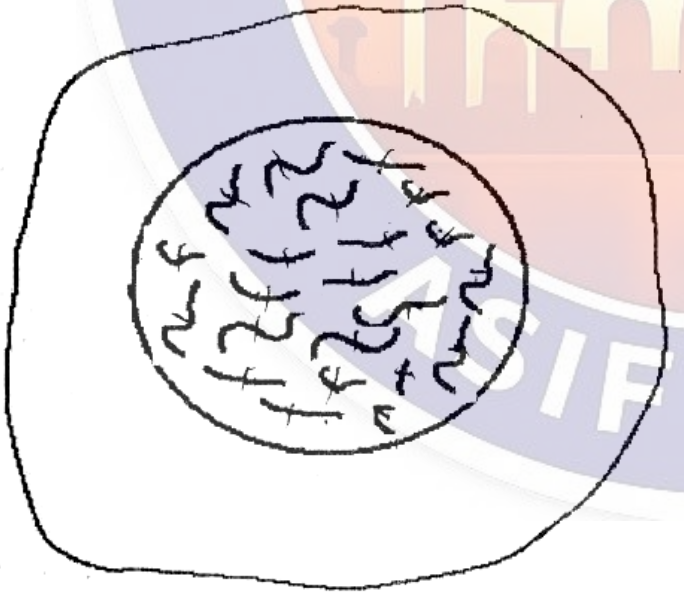
Which one of the following correctly identifies each of the phases described?

	interphase	prophase	metaphase	anaphase	telophase
A.	I	II	III	IV	V
B.	I	V	IV	II	III
C.	V	I	IV	III	II
D.	II	IV	I	III	V
E.	V	IV	I	II	III

81. When a fetus is in the uterus, what carries oxygen away from the placenta?

A. The amniotic fluid
B. The amniotic sac
C. The lining of the uterus
D. The umbilical cord

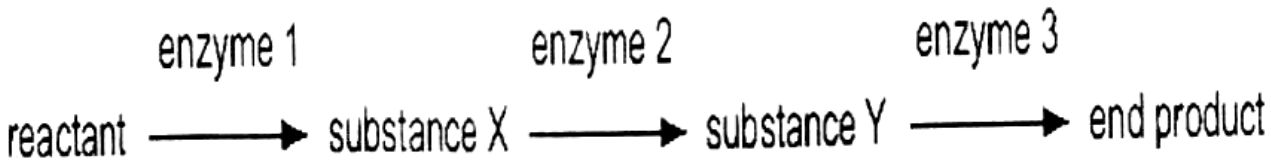
82. The diagram shows a cell of an organism formed by reduction division.



What is the diploid number for this organism?

A. 10
B. 20
C. 30
D. 40
E. 44

83. The diagram shows a metabolic pathway.



What would be the effect of adding a small amount of a non-competitive inhibitor of enzyme 2?

A. Enzyme 2 would be partially denatured.
B. Substance X would increase in concentration.
C. Substance Y would no longer be formed.
D. The initial reactant would no longer be metabolized.
E. The effect would be negligible.

84. Which type of protein structure contains the three dimensional structure?

A. primary
B. secondary
C. tertiary
D. quaternary

85. Which processes are essential in making nitrogen in dead plant material available to growing plants?

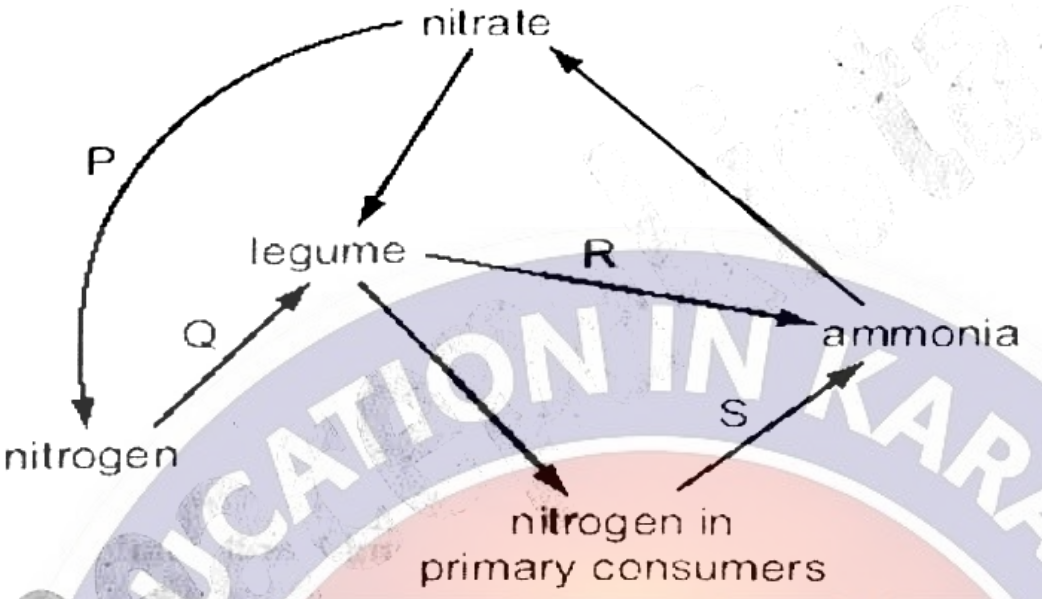
I. ammonification
II. deamination
III. nitrification
IV. nitrogen fixation

A. I, II and III only
B. I, II and IV only
C. I, III and IV only
D. II, III and IV only

86. Which of the following describes the movements involved in breathing out?

	movements of ribs	movements of diaphragm
A.	down and in	downwards
B.	down and in	upwards
C.	up and out	downwards
D.	up and out	upwards

87. The diagram shows a simplified nitrogen cycle.



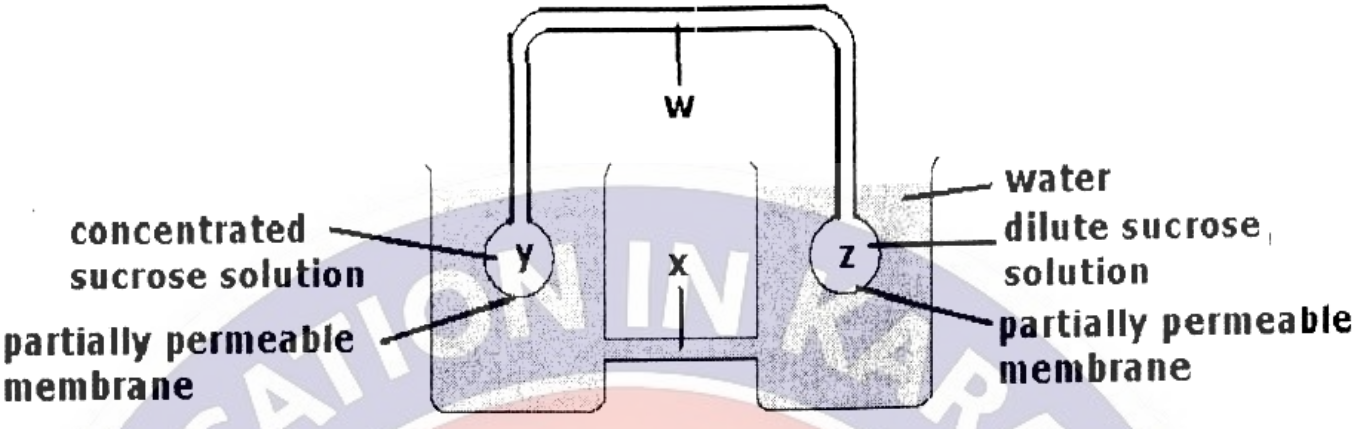
Which row shows the correct labels for P, Q, R and S?

	P	Q	R	S
A.	*Denitrification by anaerobic bacteria*	*Nitrogen fixation by nitrifying bacteria*	Decay of leaf tissue by saprotrophic fungi	*Ammonification by saprotrophic fungi*
B.	*Lightening action on soil nitrates*	*Nitrogen fixation by nitrogen fixing bacteria*	*Decomposition using nitrogenase enzyme*	*Decomposition by root nodule bacteria*
C.	*nitrification by anaerobic bacteria*	Nitrification using nitrogenase enzyme	Decay of leaf tissue by saprotrophic fungi	Assimilation of organic nitrogen
D.	*reduction by anaerobic bacteria*	*Nitrogen fixation by root nodule bacteria*	Decomposition of organic nitrogen	Decay of urea by saprotrophic bacteria

88. In the commercial manufacture of insulin, a human gene is inserted into which of these?

A. a chromosome of a human cell
B. a protein molecule in a yeast cell
C. the DNA of a bacterium
D. the nucleic acid in a virus

89. The diagram shows a model to demonstrate the mass flow hypothesis of translocation.



In a plant, what are the structures W, X, Y and Z and what is the direction of flow of solution along W?

	Phloem	Xylem	Roots	Leaves	Direction of flow along W
A.	W	X	Y	Z	from Z to Y
B.	W	X	Z	Y	from Y to Z
C.	X	W	Y	Z	from Y to Z
D.	X	W	Z	Y	from Z to Y

90. Many scientists believe that one of the following is/are evolutionary origin(s) of animals, plants and fungi?

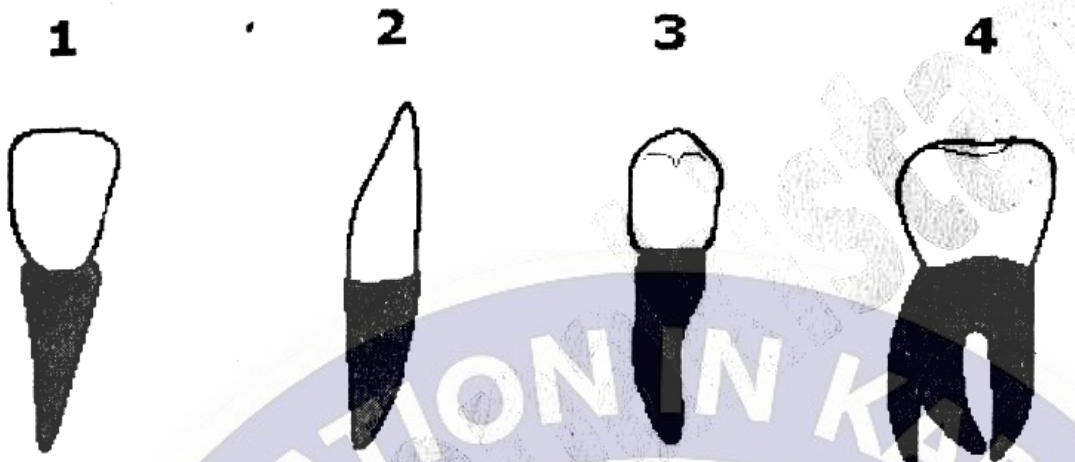
A. Protists
B. Algae
C. Bacteria
D. Protozoans

91. In the human body, blood circulating from the gut to the heart passes through the:

A. aorta
B. kidneys
C. liver
D. lungs
E. spleen

LAR

92. The diagram shows the four types of human tooth.



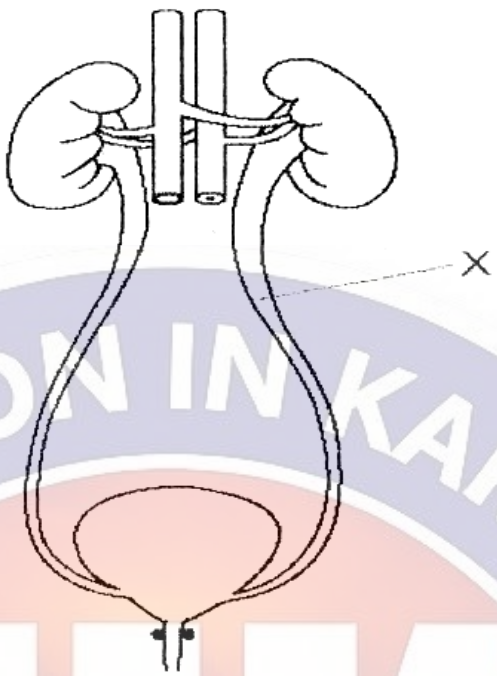
Which teeth are used for cutting rather than grinding food?

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

93. What are the functions of the inter, motor and sensory neurons in a reflex response?

	INTER NEURON	MOTOR NEURON	SENSORY NEURON
A.	to connect neurons within the central nervous system	to conduct impulses to the effector from the central nervous system	to conduct impulses from the receptor to the central nervous system
B.	to conduct impulses to the effector	to connect neurons within the central nervous system	to receive the stimulus
C.	to conduct impulses from the central nervous system to the effector	to conduct impulses from the receptor to the central nervous system	to connect neurons within the central nervous system
D.	to conduct impulses from the receptor to the central nervous system	to conduct impulses from the receptor to the central nervous system	to conduct impulses to the effector

94. The diagram shows the human urinary system.



Which substance is not found in the liquid at X in a healthy person?

A. glucose
B. salt
C. toxins
D. water

95. Male and female sea urchins release their sperm and eggs into the water where fertilization takes place. How can their reproduction be described?

A. asexual reproduction which results in genetically dissimilar offspring
B. asexual reproduction which results in genetically identical offspring
C. sexual reproduction which results in genetically dissimilar offspring
D. sexual reproduction which results in genetically identical offspring

96. Which vertebrate groups have scaly skin?

A. amphibians and fish
B. amphibians and mammals
C. fish and mammals
D. fish and reptiles

97. The following reaction occurs in the human alimentary canal.

$$\text{starch} \xrightarrow{\text{enzyme}} \text{products}$$

What is the enzyme and the product?

	ENZYME	PRODUCT
A.	acid	glucose
B.	alkali	energy
C.	amylase	maltose
D.	bile	amino acid

98. Archaeopteryx is a transitional stage between the members of which one of the following pairs?

A. amphibian ... bird
B. fish ... amphibian
C. reptile ... mammal
D. reptile ... bird
E. mammal ... man

99. The floral formula of family mimosaceae is:

A. $\oplus, ♂, ♀, K_{(5)}, C_{(5)}, A_5, \underline{G}_{(2)}$

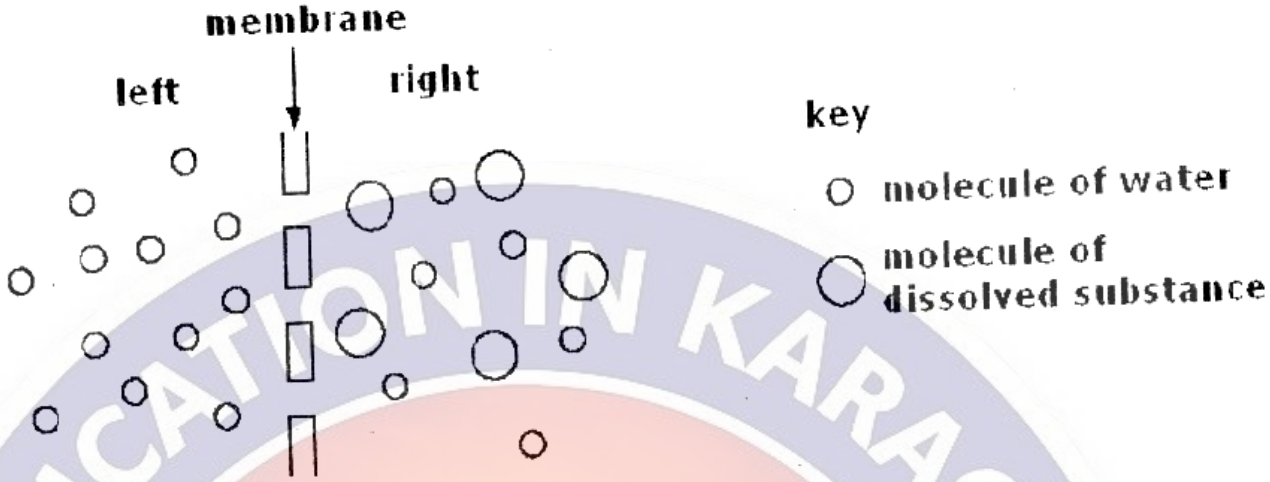
B. $+, ♂, ♀, K_{(5)}, C_{1+2+(2)}, A_{(9)+1}, \underline{G}_1$

C. $+, ♂, ♀, K_{(5) \text{ or } 5}, C_5, A_{10}, \underline{G}_1$

D. $\oplus, ♂, ♀, K_{(5)}, C_{5 \text{ or } (5)}, A_{\alpha \text{ or } (10)}, \underline{G}_1$

E. None of the above

100. The diagram represents two liquids, separated by a membrane through which osmosis can occur.



What movement of molecules will occur?

A. Molecules of dissolved substance move from left to right.
B. Molecules of dissolved substance move from right to left.
C. Overall, water molecules move from left to right.
D. Overall, water molecules move from right to left.
E. None of the above