

**A**

**1 Industrial fermenters have a wide range of uses from wine making to using transgenic micro-organisms in the production of medicines. An industrial fermenter is designed to provide the best conditions for the micro-organisms used so that the yield is high. Before using the fermenter, a jet of very hot steam is passed through it under high pressure. Which of the following is the best explanation for this?**

- A) Hot steam removes any residue from the previous use of the fermenter.
- B) Hot steam facilitates the dissolving of nutrients for the micro-organisms.
- C) Hot steam prevents the corrosion of the container.
- D) Hot steam provides the ideal temperature for the micro-organisms.
- E) Hot steam kills any unwanted micro-organisms that may infect the fermenter.

**2 Before all the experiments which investigate the conditions necessary for photosynthesis to take place, plants that are going to be used must be destarched. Why is it necessary to destarch the plants before such experiments?**

- A) To make the plant use up all its starch and start the experiment with none.
- B) To make the plant produce starch to be used during the experiment.
- C) To allow the plant to store starch for later use.
- D) To start the experiment with plants containing different amounts of starch.
- E) To make the plant photosynthesise much faster.

**A**

**3 Haemophilia is a sex-linked hereditary disease which may be fatal. It is caused by a recessive gene carried on the X chromosome. If a woman who is a carrier of the disease marries a healthy man, what is the probability of having a haemophiliac son?**

- A) 1/4
- B) 1/8
- C) 1/2
- D) 3/4
- E) 3/8

**4 Deficiency of which of the following food substances leads to the disease called kwashiorkor?**

- A) Protein
- B) Lipid
- C) Calcium
- D) Vitamin C
- E) Vitamin A

**5 Which of the following is true for the structure of DNA molecule?**

- A) The bond between the sugar and the base is an ester bond.
- B) The basic units of DNA are nucleosides.
- C) The bond between the sugar and the phosphate is a hydrogen bond.
- D) Each basic unit consists of three molecules: a phosphate, a ribose sugar and a nitrogen containing organic base.
- E) When a basic unit is bonded to the next in a chain, the sugar of one is bonded to the phosphate of the second.

**A**

- 6 Alice buys the new detergent that has been advertised everywhere for its excellent performance in removing the stains. After several uses, she was satisfied with the results, having blood, grass and gravy stains removed completely, but she was devastated to find out that her silk blouse disappeared in the laundry leaving the metal buttons behind. Which of the following CANNOT be true about Alice's new detergent?
- A) It dissolves all the stains at low temperatures such as 30<sup>0</sup> C.
- B) It is a biological detergent containing enzymes.
- C) Silk garments dissolve in this detergent because its pH is too low.
- D) It is more economical.
- E) Silk is a protein so protease enzymes in the detergent dissolve the garment.

7 Which of the following is NOT a function of placenta?

- A) It acts as a barrier preventing the passage of any harmful chemicals from maternal to fetal blood.
- B) It allows gaseous exchange between mother and fetus.
- C) It allows the passage of soluble food substances from maternal to fetal blood.
- D) It separates fetal blood from maternal blood.
- E) It allows the passage of toxic metabolic waste from fetal to maternal blood.

**A**

- 8 Proteins are organic molecules with highly complex structures. They make up about 18% of the body mass and they have a vital importance in the body. Which of the following statements is/are NOT true about the structure of proteins?

- I. All proteins have a primary structure.
- II. The secondary structure is formed by hydrogen bonds between amino acids.
- III. Globular proteins all have a tertiary structure.
- IV.  $\alpha$  helix and  $\beta$  pleated sheets are different forms of tertiary structure.
- V. Structural proteins such as keratin and collagen have tertiary structures.
- VI. Haemoglobin is a protein with a quaternary structure.

- A) III, IV and V
- B) II, IV and VI
- C) I, II and III
- D) III, V and VI
- E) All of the above

- 9 I. A diet rich in unsaturated lipids.  
II. Regular exercise.  
III. Cigarette smoking.  
IV. A BMI value above 40 kg/m<sup>2</sup>  
V. A relaxed life-style.  
VI. Having parents with hypertension problems.

Which of the above factors are considered to increase the risk of cardiovascular disease?

- A) III, IV and V
- B) I, III and VI
- C) III and VI
- D) I, III and IV
- E) III, IV and VI

**A**

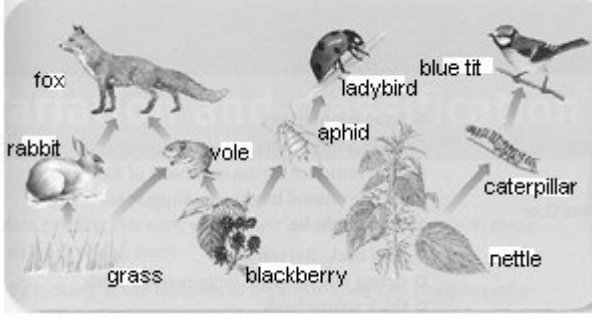
- 10 Which of the following cell structures contains digestive enzymes?**
- A) Leucoplast  
B) Ribosome  
C) Lysosome  
D) Vacuole  
E) Mitochondrion
- 11 In an experiment to investigate the conditions that affect the rate of transpiration in a plant, which of the following conditions would increase the rate of transpiration?**
- A) Carrying out the experiment in an air-conditioned room.  
B) Increasing the amount of moisture in the room.  
C) Carrying out the experiment in a dark room.  
D) Placing a fan near the potometer.  
E) Covering the leaves of the plant with vaseline.
- 12 Which of the following diseases is NOT caused by a virus?**
- A) German measles  
B) Mumps  
C) Malaria  
D) Rabies  
E) Swine flu

**A**

- 13 When a woman with blood group genotype ABRr marries a man with blood group genotype AOrr, what percentage of their children will be of blood group A Rh(+)?**
- A) 25%  
B) 50%  
C) 0%  
D) 75%  
E) 100%
- 14 Photosynthesis involves a biochemical pathway, some stages requiring light directly, others not. Some stages of photosynthesis are given below:**  
**I. CO<sub>2</sub> combines with ribulose diphosphate.**  
**II. Chlorophyll loses high energy electrons.**  
**III. Water is split by light and oxygen is released.**  
**IV. ATP is used.**  
**V. NADP is reduced.**
- Which of the above stages require light directly?**
- A) I and V  
B) II, III and V  
C) II, IV and V  
D) I, II and III  
E) IV and V

A

15



Which of the following organisms is NOT a primary consumer?

- A) Ladybird
- B) Aphid
- C) Caterpillar
- D) Rabbit
- E) Vole

16 Which mineral's deficiency in a plant results in poor root growth and younger leaves turning purple?

- A) Magnesium
- B) Nitrate
- C) Phosphate
- D) Potassium
- E) Iron

A

17 Insulin is the hormone which lowers blood glucose level. Diabetics either cannot produce enough insulin, or their cells do not respond to the hormone. Therefore, large amounts of insulin is produced in drug industry in order to meet the demands of many diabetes patients. However, insulin is always produced in the form of injections, and is never produced to be taken orally. Which of the following is the best explanation for this?

- A) Insulin can only work in blood.
- B) Insulin is a protein so it is digested in the stomach.
- C) Insulin is a steroid hormone so cannot be swallowed.
- D) Insulin cannot be absorbed in ileum.
- E) Giving an injection of insulin works much faster than taking it orally.

18 Which of the following is/are true for enzymes?

- I. They are protein in nature.
- II. They only work at about pH 7.
- III. They are all globular in structure.
- IV. They are denatured at temperatures above 30°C.
- V. The induced-fit hypothesis explains the mechanism by which enzymes work.

- A) I and III
- B) I, III and V
- C) I, II and IV
- D) Only I
- E) I, II and V

**A**

**19 Warm blooded animals living in colder regions of the earth, have smaller noses, ears and tails than those living in warmer areas. Which of the following is the most important reason for this difference among the same species of organisms?**

- A) To facilitate evaporation of water.
- B) To be able to change the body temperature more easily.
- C) To minimise loss of heat from the body.
- D) To reduce loss of water vapour from the body.
- E) To increase the surface area/volume ratio.

**20 Three plant cells A, B, and C were placed in three different solutions of different sucrose concentration. After several hours, osmotic pressure of cell A was observed to increase, osmotic pressure of cell B remained the same and osmotic pressure of cell C decreased. Which of the following statements is correct?**

- A) The solution in which cell C was placed was isotonic.
- B) The solution in which cell B was placed was hypertonic.
- C) The solution in which cell A was placed was isotonic.
- D) The solution in which cell B was placed was hypotonic.
- E) The solution in which cell A was placed was hypertonic.

**A**

**21 Which of the following digestive enzymes is present in the stomach of mammalian babies in order to coagulate milk protein?**

- A) Peptidase
- B) Rennin
- C) Trypsin
- D) Pepsin
- E) Erepsin

**22 Which of the following is NOT true about digestion in humans?**

- A) Starch digestion takes place in the mouth and in small intestine.
- B) Bile helps in both physical and chemical digestion of food.
- C) Protein digestion starts in the stomach.
- D) Lipid digestion does not start until the food reaches duodenum.
- E) Mucus secreted by the gut wall helps the movement of food down the gut.

**23 The nucleotide sequence of several tRNA anti-codons used during the synthesis of a protein are given below.**

**U A C G C U A A C G C C A U G**

**Which of the following represents the sequence of triplet codes on the coding strand of DNA?**

- A) TACGCTAACGCCATG
- B) AUGCGAUUGCGGUAC
- C) ATGCGATTGCGGTAC
- D) AUGGCCAACGCUUAC
- E) GUACCGCAAUCGCAU

**A**

**24 Which of the following cells play a role in the development of thrombosis?**

- A) Lymphocytes
- B) Platelets
- C) Osteocytes
- D) Erythrocytes
- E) Phagocytes

**25 Which of the following is NOT a difference between arteries and veins?**

- A) Presence of smooth muscle in the walls.
- B) The amount of elastic tissue present in the walls.
- C) The thickness of the walls.
- D) The size of the lumen.
- E) Presence of valves inside.

**26 Which of the following vertebrates has a single circulation?**

- A) Owl
- B) Monkey
- C) Crocodile
- D) Trout
- E) Turtle

**27 Which of the following is NOT a function of the nucleus?**

- A) It contains deoxyribonucleic acid.
- B) It contains genetic information.
- C) It is the site of transcription and translation.
- D) It controls cell division.
- E) It is where replication takes place.

**A**

**28 Stem cell cloning is a technique that is aimed to be used to treat diseases that result from faulty cells such as type I diabetes and Alzheimer's. However, this technique cannot be used as a therapy for patients yet. Which of the following is NOT a reason why it is not used for therapeutic reasons?**

- A) Scientists are still working on the triggers that control cell differentiation.
- B) The tissues cultured may be rejected by the patients' immune systems.
- C) The nucleus from the adult stem cell may still contain the mutations that led to the disease in the first place.
- D) There are concerns that stem cells may cause the development of cancers.
- E) Scientists are still not sure about which genes are switched on or off to form particular types of tissue.

**A**

**29 The theory of evolution by natural selection is the most widely accepted scientific explanation of how millions of species present on earth have been formed. This theory has been developed by Darwin based on many observations made over the years.**

**Which of the following statements on evolution does NOT belong to Darwin?**

- A) When the natural environment of an organism changes, the new conditions favour the survival of only some individuals.
- B) There is genetic variation among the organisms that results from sexual reproduction and random neutral mutations.
- C) Evolution is based on the 'survival of the fittest'.
- D) The organisms with selective advantage increase their chance of survival and reproduction under new conditions.
- E) During the course of evolution, the organs and tissues that are used, grow and develop whereas the ones which are not used become smaller and are lost through time.

**30 People with cardiovascular problems are asked to change their life-styles, but they are also given medication according to the health problems they have. Paul had a heart surgery and has been suffering from thrombosis. His doctor prescribed him a medicine to help prevent his blood clotting too easily. Which of the following is the best medicine to be prescribed for Paul?**

- A) Statin
- B) Plant stanol
- C) Diuretic
- D) Warfarin
- E) Beta blocker

**A**

**31 Four groups of 20 bean seeds A, B, C and D were placed under different conditions after being soaked for 24 hours. The average length of young shoots for each group was then calculated for several days.**

**Group A: Placed on a moist cotton wool and placed at a temperature of 15<sup>0</sup> C.**

**Group B: Placed on a dry cotton wool and placed at a temperature of 25<sup>0</sup> C.**

**Group C: Placed on a moist cotton wool and placed at a temperature of 20<sup>0</sup> C.**

**Group D: Boiled, covered with water and placed at a temperature of 25<sup>0</sup> C.**

**Under which of the above conditions would an increase in the average lengths of young shoots be observed after several days?**

- A) Only group C
- B) Group D
- C) Groups A and C
- D) Only group B
- E) Groups B and D

**32 A potted plant was watered and placed horizontally in a dark room. After several days, the shoot of the plant was observed to bend and grow upwards. This is an example of:**

- A) Positive phototropism
- B) Positive geotropism
- C) Negative geotropism
- D) Negative phototropism
- E) Positive hydrotropism

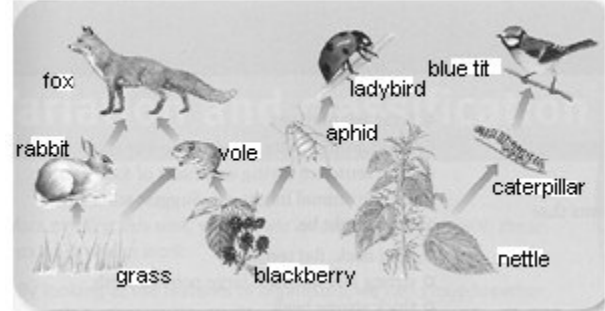
**A**

- 33 Absorption of digested food takes place in ileum which is adapted to carry out its function most effectively. Which of the following is NOT an adaptation of ileum for absorption?
- A) Its inner surface is covered with millions of villi.  
B) Its inner surface is folded.  
C) Its walls are surrounded by longitudinal and circular muscles.  
D) Each villus on its inner surface has an epithelium covered with many microvilli.  
E) It has a rich supply of blood capillaries.
- 34 Some characteristics of organisms are hereditary, some develop under the influence of environmental conditions and some are affected by both. Which of the characteristics given below are under the influence of both genes and environmental factors?
- I. Height  
II. Blood group  
III. Albinism  
IV. Intelligence  
V. Obesity  
VI. Eye colour
- A) I and IV  
B) I, IV and V  
C) I, III and V  
D) III, IV and V  
E) III, V and VI

**A**

- 35 Which of the following does not lead to global warming?
- A) Deforestation  
B) Car exhausts  
C) Sustainable felling  
D) Burning fossil fuels  
E) Use of aerosol containing CFC's
- 36 One of the functions of the mammalian skin is to regulate the body temperature. Which of the following does NOT take place in case of overcooling?
- A) The arterioles in the dermis constrict.  
B) Sweat glands reduce their secretion.  
C) The erector muscle relaxes.  
D) Less blood flows under the skin.  
E) Hairs are raised.

37



**When a pathogen causes a disease on voles and reduces their number, which of the following is expected to happen?**

- A) The number of aphids will increase.  
B) There will be less grass.  
C) The number of foxes will increase.  
D) There will be less blackberries.  
E) The number of ladybirds will decrease.



**A**

**38** Neurones make up the nervous system and they are adapted to transmit nerve impulses. Which of the following statements is **TRUE** about the transmission of nerve impulses along neurones?

- A) When at rest, a neurone is polarized.
- B) During the transmission of a nerve impulse, the outside of the membrane is positively charged and the inside is negatively charged.
- C) A nerve impulse is received by the axon and is transmitted towards the dendrites.
- D) The fatty layer called myeline sheath found around the axon of all neurones speed up the transmission of nerve impulses.
- E) The transmission of a nerve impulse from one neurone to another is electrochemical.

**39** A chromosomal mutation in ova results in two copies of chromosome 21 instead of one. When this is fertilised by a normal sperm, the zygote contains three copies of chromosome 21. This condition produces an individual with mental retardation, and heart and lung defects. Which of the following is the name given to the condition described above?

- A) Turner's syndrome
- B) Thalassaemia
- C) Down's syndrome
- D) Phenylketonuria
- E) Huntington's disease

**A**

**40** Which of the following is true for the mammalian heart?

- A) Its two atria receive blood from two veins: Vena cava and Coronary vein.
- B) It is surrounded by cardiac muscle which is a kind of smooth muscle.
- C) Semi-lunar valves present between atria and ventricles prevent the backflow of blood.
- D) Atrio-ventricular valves are closed during ventricular systole.
- E) Right ventricle is separated from right atrium by septum.

**41** Substances X and Y;

**I. contain the same number of protons.**

**II. have different boiling and freezing points.**

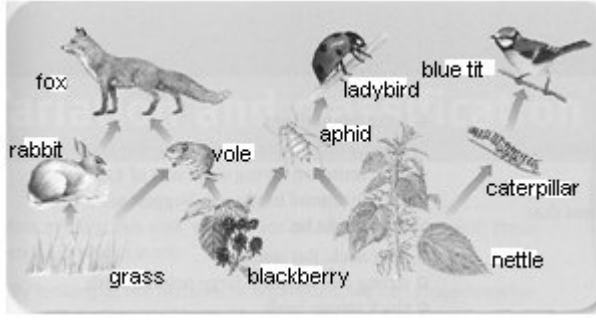
**III. both form compounds that have the same properties.**

**What sort of substances are X and Y?**

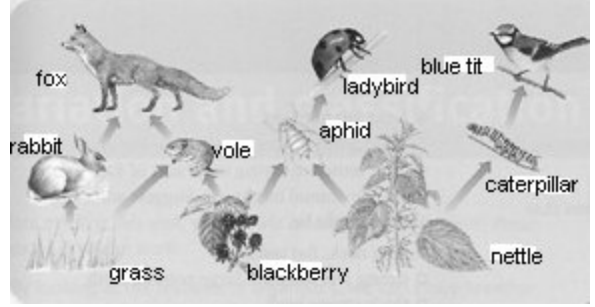
- A) Compounds
- B) Ionic
- C) Mixtures
- D) Allotropes
- E) Isomers

**A**

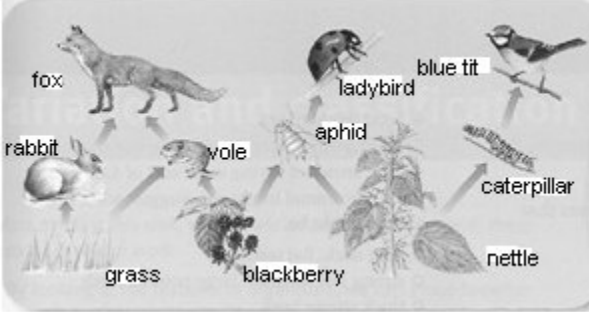
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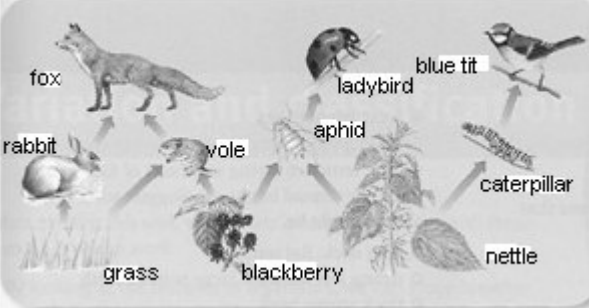
**A**



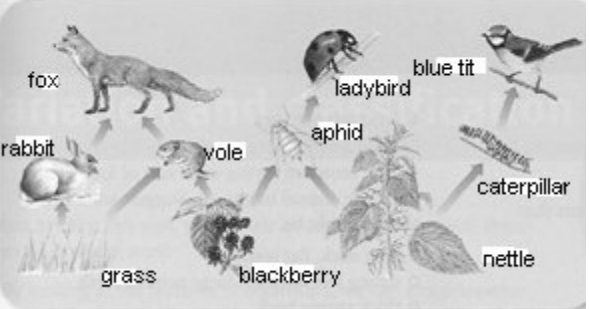
A)



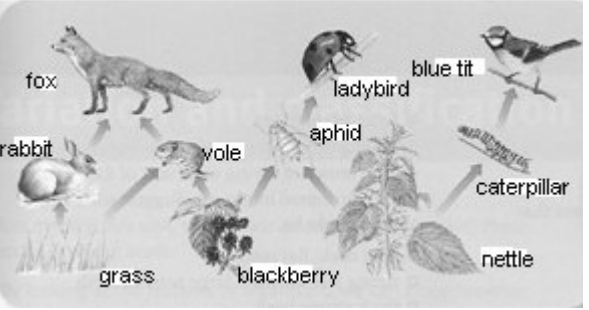
B)



C)



D)



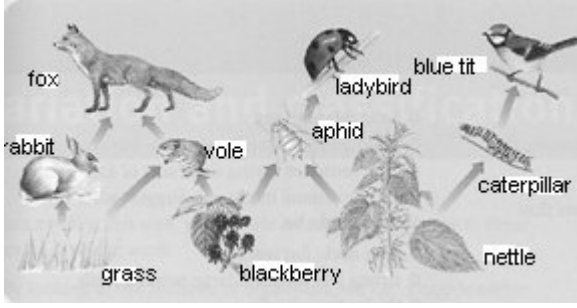
E)

43 Which of the following does NOT contain a pi ( $\Pi$ ) bond?

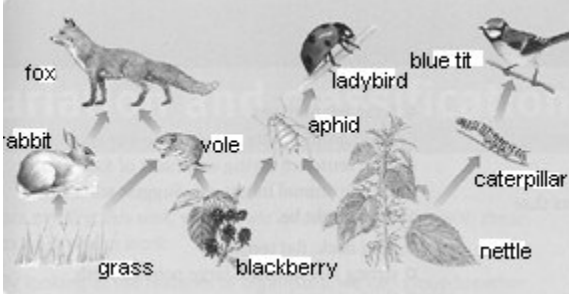
- A)  $O_2$
- B)  $C_2H_4$
- C)  $C_3H_7Br$
- D)  $C_2Cl_2$
- E)  $N_2$

**A**

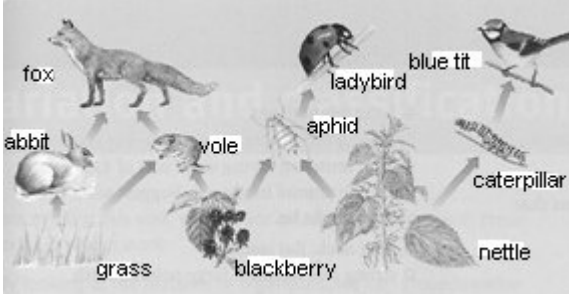
**44**



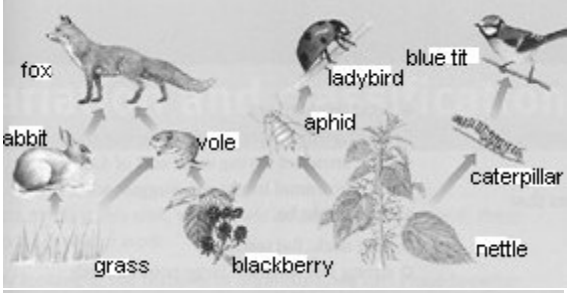
**A)**



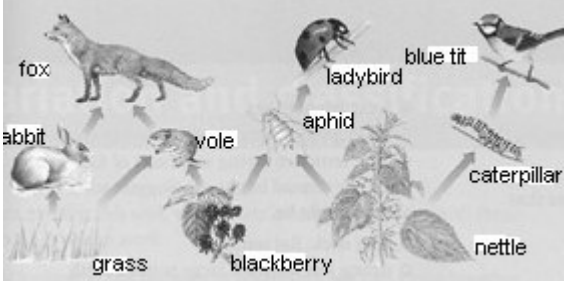
**B)**



**C)**

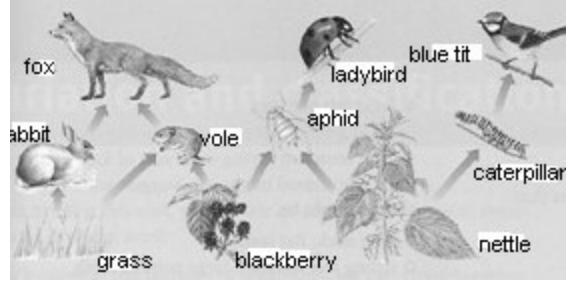


**D)**



**E)**

**A**



- 45** I. Reacts with SO<sub>3</sub> gas.  
II. Conducts electricity  
III. [H<sup>+</sup>] < 10<sup>-7</sup>  
IV. pH < 7

**Which of the above is WRONG for a basic solution?**

- A) Only III  
B) I and IV  
C) I and III  
D) I and II  
E) Only IV

- 46** Which of the following is a good conductor of electricity but does NOT react with water or HCl.

- A) F<sub>2</sub>  
B) Cu  
C) Na<sub>2</sub>CO<sub>3</sub>  
D) Mg  
E) Al

**A**

47 **I. Pressure**

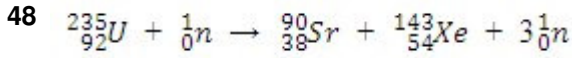
**II. Density**

**III. Mass**

**IV. Average KE of the molecules**

**Which of the above properties remain constant if a sample of a gas in a closed steel container is heated?**

- A) I and IV
- B) I and III
- C) II and III
- D) I and II
- E) III and IV



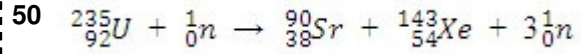
**Which of the following is correct for the above nuclear reaction?**

- A) This is a fusion process.
- B) Number of atoms is conserved.
- C) Number of free neutrons has decreased.
- D) Some protons transformed into neutrons.
- E) Large amount of energy is released.

49 **Which of the following indicates the ability of an element to form a compound?**

- A) The mass of a single molecule.
- B) The number of neutrons in the nucleus.
- C) The mass number of the element.
- D) The number of valence electrons.
- E) The number of isotopes of the element.

**A**



- A) 
$${}^{235}_{92}\text{U} + {}^1_0\text{n} \rightarrow {}^{90}_{38}\text{Sr} + {}^{143}_{54}\text{Xe} + 3{}^1_0\text{n}$$
- B) 
$${}^{235}_{92}\text{U} + {}^1_0\text{n} \rightarrow {}^{90}_{38}\text{Sr} + {}^{143}_{54}\text{Xe} + 3{}^1_0\text{n}$$
- C) 
$${}^{235}_{92}\text{U} + {}^1_0\text{n} \rightarrow {}^{90}_{38}\text{Sr} + {}^{143}_{54}\text{Xe} + 3{}^1_0\text{n}$$
- D) 
$${}^{235}_{92}\text{U} + {}^1_0\text{n} \rightarrow {}^{90}_{38}\text{Sr} + {}^{143}_{54}\text{Xe} + 3{}^1_0\text{n}$$
- E) 
$${}^{235}_{92}\text{U} + {}^1_0\text{n} \rightarrow {}^{90}_{38}\text{Sr} + {}^{143}_{54}\text{Xe} + 3{}^1_0\text{n}$$

51 **A pot removed from a stove gradually cools.**

**I. Conduction**

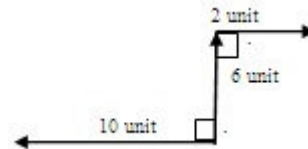
**II. Convection**

**III. Radiation**

**Which is the method of heat loss that causes the pot to cool?**

- A) Only I
- B) I and III
- C) I and II
- D) II and III
- E) I, II and III

52



**What is the addition of the three vectors above?**

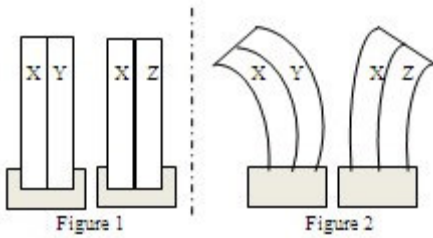
- A) 12 West
- B) 16 North West
- C) 18 North
- D) 18 West
- E) 10 North West

**A**

53 Which of the following can NOT be the resultant of 3 unit and 8 unit vectors?

- A) 7
- B) 6
- C) 4
- D) 5
- E) 11

54



Initial temperatures and lengths of metals X, Y and Z are the same as shown in figure 1. After heating to a certain temperature they appear as in figure 2.

What is the relationship between their coefficient of expansion?

- A)  $\alpha_z > \alpha_y > \alpha_x$
- B)  $\alpha_y > \alpha_x > \alpha_z$
- C)  $\alpha_x > \alpha_z > \alpha_y$
- D)  $\alpha_x > \alpha_y > \alpha_z$
- E)  $\alpha_x = \alpha_z > \alpha_y$

**A**

- 55
- |      |           |   |       |
|------|-----------|---|-------|
| I.   | Alcohol   | – | Water |
| II.  | Water     | – | Sand  |
| III. | Olive oil | – | Water |

Which physical property is used to separate each of the above mixtures?

- A) I. Solubility  
II. Electrical Conductivity  
III. Density
- B) I. Density  
II. Solubility  
III. Boiling Point
- C) I. Electrical Conductivity  
II. Boiling Point  
III. Solubility
- D) I. Boiling Point  
II. Solubility  
III. Density
- E) I. Boiling Point  
II. Density  
III. Electrical Conductivity

56 During an experiment a rod makes contact with a positively charged electroscope. It is observed that the leaf of the electroscope closes slightly.

Which of the following is true for the charge of the rod.

- I. It is positively charged
- II. It is negatively charged
- III. It is neutral

- A) Only I
- B) I and II
- C) II and III
- D) I and III
- E) I, II and III

**A**

**57 Which of the following is NOT used during an experiment to investigate Brownian Motion?**

- A) Light source
- B) Smoke particles
- C) Steam
- D) Microscope
- E) Air molecules

58	I.	Alcohol	–	Water
	II.	Water	–	Sand
	III.	Olive oil	–	Water

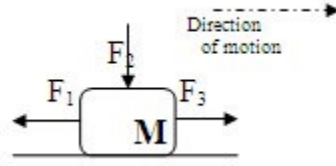
- A) I. Alcohol – Water  
II. Water – Sand  
III. Olive oil – Water
- B) I. Alcohol – Water  
II. Water – Sand  
III. Olive oil – Water
- C) I. Alcohol – Water  
II. Water – Sand  
III. Olive oil – Water
- D) I. Alcohol – Water  
II. Water – Sand  
III. Olive oil – Water
- E) I. Alcohol – Water  
II. Water – Sand  
III. Olive oil – Water

**59 The driver applies a force of 500N to the car's brake pedal which has an area of 5cm<sup>2</sup>. What is the force exerted in the hydraulic system if the area of the wheel disc is 20cm<sup>2</sup>?**

- A) 2500
- B) 100
- C) 2000
- D) 500
- E) 50

**A**

**60**



**Considering the presence of friction on the diagram above which of the forces  $F_1 - F_2 - F_3$  contribute to the stopping of the object M?**

- A) Only  $F_2$
- B)  $F_1$  and  $F_2$
- C) Only  $F_1$
- D) Only  $F_3$
- E)  $F_1, F_2$  and  $F_3$

**TEST BİTTİ**  
**CEVAPLARINIZI KONTROL EDİNİZ**