BLOOM | BSO Bloom School Olympiad

GRADE 9

Bloom Science Olympiad
Sample Paper 1

Maximum Time : 60 Minutes **Maximum Marks : 60**

INSTRUCTIONS

1. There are 50 Multiple Choice Questions in this paper divided into two sections :

   Section A 40 MCQs; 1 Mark each

   Section B 10 MCQs; 2 Marks each

2. Each question has Four Options out of which **ONLY ONE** is correct.
3. All questions are compulsory.
4. There is no negative marking.
5. No electric device capable of storing and displaying visual information such as calculator and mobile is allowed during the course of the exam.

Roll No.

Student's Name

Section-A (1 Mark each)

1. Which of the following do not have the same number of valence electrons?

(a) H, Li, Na, K (b) He, Mg, Be, Ca (c) B, Al, N, P (d) O, S, Se

2. Select the pair which shows the same relationship as the animal in the box given below.

Amoeba : Paramecium

(a) *Rhizopus : Chlamydomonas* (b) *Candida : Saccharomyces*

(c) *Pteridium : Fasciola* (d) All of these

3. Which of the following organism causes peptic ulcers?

(a) *Staphylococcus aureus* (b) *Helicobacter pylori*

(c) *Neisseria gonorrhoeae* (d) *Streptococcus pueumoniae*

4. 7.5 g of a solute are dissolved in 15 g of water to form a saturated solution at 298 K. Find out the solubility of the solute at this temperature.

(a) 10% (b) 25% (c) 50% (d) 150%

5. Accumulation of non-biodegradable pesticides in the food chain, in increasing amount, at each higher trophic level is known as

(a) eutrophication (b) pollution

(c) biomagnification (d) accumulation

6. Chlorine occurs in nature in two isotopic forms with atomic masses 35 u and 37 u. The percentage of 35 u is 75%. Find the average atomic mass of chlorine atom.

(a) 37 u (b) 35 u (c) 35.50 u (d) 37.50 u

7. **Statement I** A body is momentarily at rest, when it reverse the direction.

Statement II A body cannot have acceleration if its velocity is zero at a given instant of time.

(a) Only statement I is correct

(b) Only statement II is correct

(c) Both statements I and II are correct

(d) Both statements I and II are incorrect

8. Which of the following pair of disease in caused by virus?

(a) Rabies and mumps (b) Cholera and tuberculosis

(c) Typhoid and tetanus (d) AIDS and syphilis

9. Which of the following are chemical change?

(i) Decaying of wood (ii) Burning of wood

(iii) Sawing of wood (iv) Hammering of a nail into a piece of wood

Choose the correct option.

(a) (i) and (iv) (b) (ii) and (iii) (c) (i) and (ii) (d) (iii) and (iv)

10. A space shuttle is launched into space. During the first 10 min of its launch, the average acceleration of the shuttle is 20 ms^{-2}. Its speed after 10 min is

(a) 84000 m/s (b) 24000 m/s (c) 38000 m/s (d) 15000 m/s

11. Latent heat of vaporisation is used to

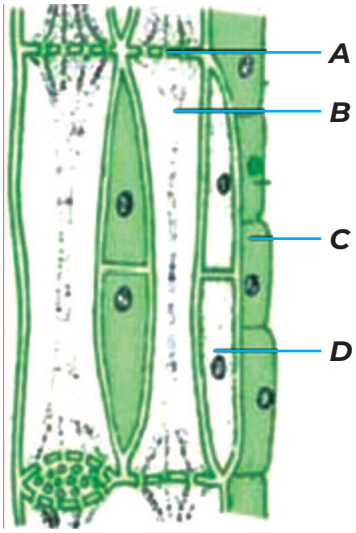
(a) Overcome the forces of attraction between molecules in solid state

(b) Increase the kinetic energy of molecule in liquid state

(c) Overcome the forces of attraction between molecules in liquid state

(d) Increase the kinetic energy of molecules in vapour state

12. Identify *X* and choose the option which correctly labels *A, B, C* and *D*.



(X)

(a) *A*-Xylem, *B*-Companion cells (b) *C*-Sieve tube, *D*-Sieve plate

(c) *B*-Sieve tube, *C*-Phloem parenchyma (d) *A*-Pith, *D*-Cytoplasm

13. Consider the following statements

Statement I Liquid diffuse slowly as compared to gases.

Statement II Intermolecular forces are greater in gases.

(a) Only statement I is correct (b) Only statement II is correct

(c) Both statements I and II are correct (d) Both statements I and II are incorrect

14. When the brakes are applied on a moving bullet train, the directions of velocity and acceleration are

(a) same (b) opposite (c) perpendicular (d) not related

15. What will be the volume of 600 cm^3 of a gas, when it is cooled from 27°C to 7°C ?

(a) 560 cm^3 (b) 660 cm^3 (c) 460 cm^3 (d) 600 cm^3

16. Which of the following is incorrectly matched?

(a) *Apis florae* – Little bee (b) Leghorn – Indigenous breed

(c) *Bos bubalis* – Species of buffaloes (d) *Apis dorsata* – Rock bee

17. Binomial system of nomenclature means that every organisms has

(a) two names one scientific and the other popular

(b) one name given by two scientists

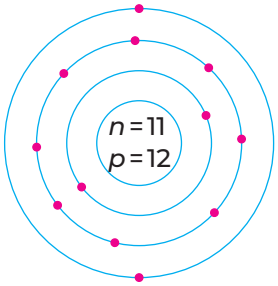
(c) one scientific name consisting of a generic name and a specific name

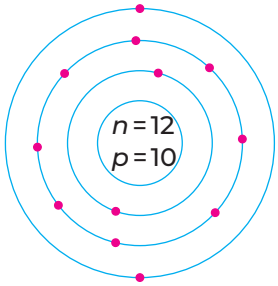
(d) a number in an international catalogue by which it can be identified

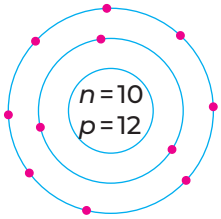
18. A gigantic volcanic explosion on planet mercury takes place. How long will it take for the sound to reach the Earth? (Take, speed of sound in air = 340 m/s and distance between mercury and Earth = 222 million km)

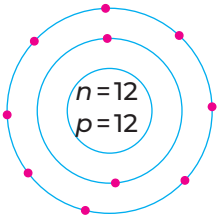
(a) 2 h (b) 1 day (c) 480.54 h (d) cannot reach Earth

19. Which of the following figure correctly represent Mg^{2+} ions? Where, *n* and *p* represent the number of neutrons and protons, respectively.

(a) 

(b) 

(c) 

(d) 

20. Given below are some statements, identify which of these are correct?

Statement I Cholera patient is given oral rehydration therapy for rapid replacement of fluid and electrolytes.

Statement II The symptoms of typhoid are high fever, headache, diarrhoea, etc. It is confirmed by widal test.

Statement III AIDS is a syndrome which results from primary immunodeficiency. Choose the correct option.

(a) Statements I and III (b) Statements II and III

(c) Statements I and II (d) All are correct

21. Match the following Column I with Column II.

	Column I		**Column II**
A.	Low pressure	1.	20 Hz-kHz
B.	High pressure	2.	30 kHz
C.	Ultrasonic waves	3.	Compression
D.	Audible range in humans	4.	Rarefaction
		5.	12000 Hz

Codes

	A	B	C	D
(a)	4	2	5	3
(b)	2	1	4	3
(c)	4	3	2	1
(d)	5	4	2	1

22. Find out correct statement(s) about 'manure':

I. It increases the water holding capacity of sandy soil.

II. Its excessive use pollutes environment because it is made up of animal excretory waste.

III. Manure contains large quantities of organic matter and small quantities of nutrient, than fertiliser.

Choose the correct option.

(a) I and II (b) II and III (c) Only III (d) Only I

23. Which of the following tissue is present in kidney?

(a) Squamous epithelium (b) Cuboidal epithelium

(c) Compound epithelium (d) Columnar epithelium

24. **Statement I** Infrasonic waves are longitudinal waves of frequency greater than 20000 Hz.

Statement II The minimum frequency of audible sound waves is 20 Hz.

(a) Only statement I is correct

(b) Only statement II is correct

(c) Both statements I and II are correct

(d) Both statements I and II are incorrect

25. Match the following Column I with Column II.

	Column I		**Column I**
A.	Blood and lymph	1.	Fluid connective tissue
B.	Ciliated and cuboidal	2.	Skeletal connective tissue
C.	Tendon and ligament	3.	Areolar connective tissue
D.	Bone and cartilage	4.	Epithelium tissue

Codes

	A	B	C	D
(a)	1	2	3	4
(c)	1	4	3	2

	A	B	C	D
(b)	4	3	2	1
(d)	4	3	1	2

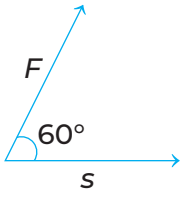
26. Element *A* has 9 protons, 9 electrons and 10 neutrons, element *B* has 12 protons, 12 electrons and 12 neutrons. Formula of the compound is

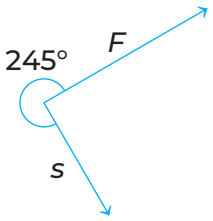
(a) AB_4 (b) AB_2 (c) B_2A_3 (d) BA_2

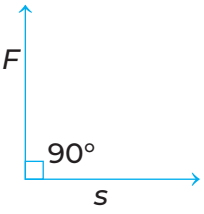
27. Identify the relation. One is done for you.
Gymnosperm : *Pinus* : : ..... : *Rana tigrina*

(a) Annelida
(b) Aves
(c) Reptilia
(d) Chordata

28. In which of the following cases is the work done maximum?

(a) 

(b) 

(c) 

(d) 

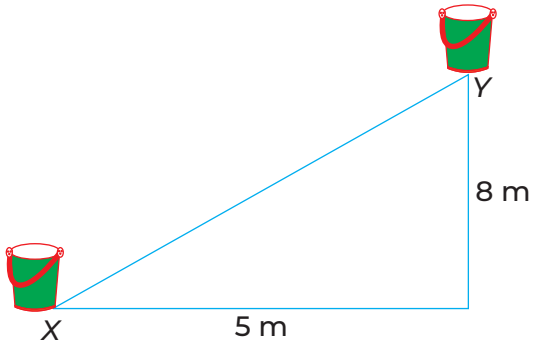
29. Which of the following is true about liver fluke?

(a) The body is cylindrical and triploblastic
(b) There are holes and segments all over their body
(c) There is no segmentation and they live as a parasite
(d) They have water vascular system

30. A small amount of the sample of soil was mixed with water in beaker. After stirring for sometime, the beaker was allowed to stand. The mud settles down in the bottom of the beaker. The liquid above the mud was carefully filtered. The filtrate will be

(a) a true solution
(b) a colloidal solution
(c) can be a true solution or a colloidal solution
(d) a suspension

31. A bucket of mass 7 kg is lifted diagonally from point *X* to point *Y* as shown in the given figure.



Given that, the acceleration due to gravity is 10 ms^{-2}, the gravitational potential energy gained by the bucket is

(a) 450 J
(b) 560 J
(c) 480 J
(d) 980 J

32. Which of the following statements are true for pure substances?

I. Pure substances contain only one kind of particles.
II. Pure substances may be compounds or mixtures.
III. Pure substances have the same composition throughout.
IV. Pure substances can be exemplified by all elements other than nickel.

(a) I and II (b) I and III (c) III and IV (d) II and III

33. What is the function of the chloroplast?

(a) To absorb carbon dioxide during photosynthesis
(b) To break up water into hydrogen and oxygen during photosynthesis
(c) To absorb food
(d) To form proteins and amino acid in the presence of sunlight

34. What is the most favourable condition for liquefaction of ammonia?

(a) High pressure, high temperature (b) High pressure, low temperature
(c) Low pressure, low temperature (d) Low pressure, high temperature

35. Consider the given sentences.

(i) Mode of nutrition is either autotrophic or heterotrophic.
(ii) These are unicellular eukaryotic organism.
(iii) A few examples of the organisms are *Paramecium, Amoeba, Euglena*.

The above statements are in reference to which of the following group?

(a) Monera (b) Protista (c) Fungi (d) Plantae

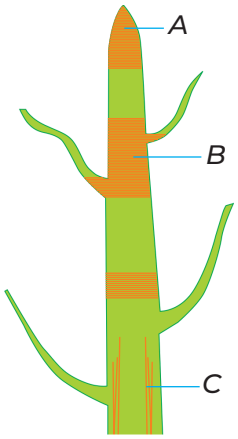
36. How would the value of *g* changes if the Earth were to shrink slightly without any change of mass?

(a) Increases (b) Decreases (c) Remain constant (d) None of these

37. Which separation technique will you apply for the separation of butter from curd?

(a) Chromatography (b) Filtration (c) Sieving (d) Centrifugation

38. Identify the correct names for the meristematic tissue Labelled as *A*, *B* and *C* in the plant body shown below.



	A	*B*	*C*		*A*	*B*	*C*
(a)	Apical	Lateral	Intercalary	(b)	Intercalary	Apical	Lateral
(c)	Lateral	Apical	Intercalary	(d)	Apical	Intercalary	Lateral

39. A solution contains 50 mL of alcohol mixed with 150 mL of water. Calculate the concentration of this solution.

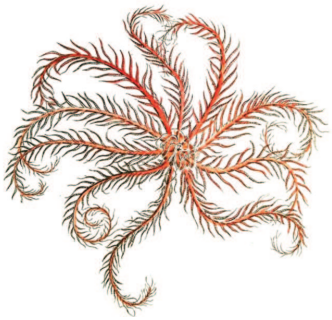
(a) 25% (b) 50% (c) 35% (d) 20%

40. Two stretched membranes of area 3 cm^2 and 4 cm^2 are placed in a liquid at the same depth. Find the ratio of the pressure on them.

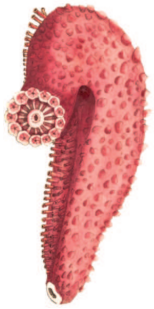
(a) 1 : 1 (b) 5 : 2 (c) 3 : 4 (d) 9 : 16

Section-B (2 Marks each)

41. Two organisms *A* and *B* are given below, identify the correct option regarding them.



A



B

(a) *A-Antedon*, its common name is feather star. B-*Echinus*, its common name is sea cucumber.

(b) *A-Asterias* and *B-Echinus*, both belong to phylum-Echinodermata

(c) *A-Antedon* and *B-Holothuria*, both are free-living marine animal and have water vascular system.

(d) *A-Asterias* and B-*Balanoglossus*, both are triploblastic and have a coelom.

42. A high frequency wave is sent from a expedition ship towards the bottom of pacific ocean. It is found that the time interval between the sending and receiving of wave is 2.8 s. What is the depth of the sea, if the velocity of sound in sea water is 1500 m/s?

(a) 1.1 km (b) 2.1 km (c) 2.8 km (d) 4.2 km

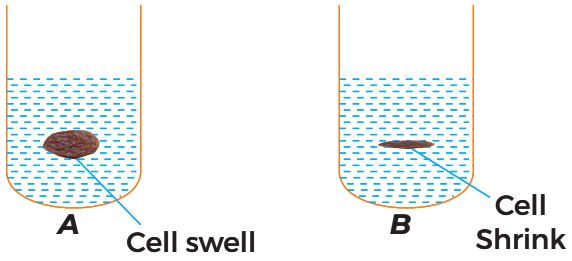
43. A 0.24 g sample of compound of oxygen and boron was found by analysis. It contains 0.096 g of boron and 0.144 g of oxygen. Calculate the percentage composition of the compound of oxygen and boron by weight, respectively

(a) 70%, 80% (b) 60%, 40% (c) 50%, 60% (d) 40%, 60%

44. Work done by a particle moving with a velocity of 800 m/s in empty space free from any force and far away from all matter is

(a) positive (b) negative (c) zero (d) infinite

45. Teacher place two cells in two different solution *A* and *B* on the basis of observation, Anuj and Nayan made same statements.



Nayan – Cell in solution *A* swell up because the solution is hypertonic.
Anuj – Cell in solution *B* gets shrink because the solution is hypotonic solution.
Now find who made the incorrect statement about the cells?

(a) Only Anuj (b) Only Nayan
(c) Both Nayan and Anuj (d) None of these

46. The speed of bus is *u*, the minimum distance over which it can be stopped is *d*. If the speed becomes $\sqrt{2}\,u$, then the minimum distance in which it can be stopped in same time is

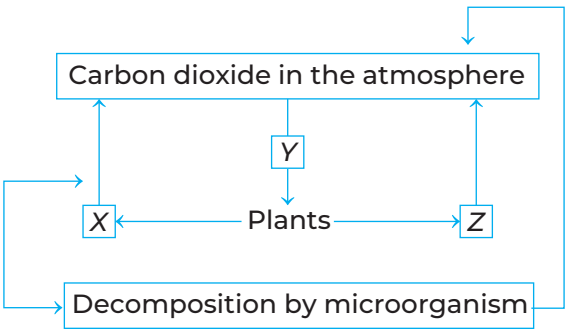
(a) $d/\sqrt{2}$ (b) $\sqrt{2}\,d$ (c) $d/2$ (d) 2

47. Complete the following table.

Element	Atomic number	Protons	Electrons	Neutrons	Mass number
A	17	*P*	17	18	*Q*
B	*R*	14	14	14	*S*
C	9	9	9	*T*	19

	P	*Q*	*R*	*S*	*T*
(a)	17	35	14	28	10
(b)	18	36	15	29	9
(c)	15	33	14	29	9
(d)	17	35	15	35	10

48. Identify the following processes represented as *X*, *Y* and *Z* in the given cycle.



	X	*Y*	*Z*
(a)	Photosynthesis	Respiration	Decomposition
(b)	Respiration	Photosynthesis	Decomposition
(c)	Decomposition	Photosynthesis	Respiration
(d)	Respiration	Decomposition	Photosynthesis

49. The kinetic energy acquired by a car of mass m after travelling a fixed distance from rest under the action of a constant force is

(a) inversely proportional to mass m (b) directly proportional to mass m

(c) inversely proportional to mass $\sqrt{m}$ (d) directly proportional to m^0

50. What will happen when a solute is added to a saturated solution?

(a) The solution will freeze (b) The solution will become less concentrated

(c) A precipitate will form (d) Concentration will increase

OMR SHEET

1	a	b	c	d	***2***	a	b	c	d	***3***	a	b	c	d	***4***	a	b	c	d
5	a	b	c	d	***6***	a	b	c	d	***7***	a	b	c	d	***8***	a	b	c	d
9	a	b	c	d	***10***	a	b	c	d	***11***	a	b	c	d	***12***	a	b	c	d
13	a	b	c	d	***14***	a	b	c	d	***15***	a	b	c	d	***16***	a	b	c	d
17	a	b	c	d	***18***	a	b	c	d	***19***	a	b	c	d	***20***	a	b	c	d
21	a	b	c	d	***22***	a	b	c	d	***23***	a	b	c	d	***24***	a	b	c	d
25	a	b	c	d	***26***	a	b	c	d	***27***	a	b	c	d	***28***	a	b	c	d
29	a	b	c	d	***30***	a	b	c	d	***31***	a	b	c	d	***32***	a	b	c	d
33	a	b	c	d	***34***	a	b	c	d	***35***	a	b	c	d	***36***	a	b	c	d
37	a	b	c	d	***38***	a	b	c	d	***39***	a	b	c	d	***40***	a	b	c	d
41	a	b	c	d	***42***	a	b	c	d	***43***	a	b	c	d	***44***	a	b	c	d
45	a	b	c	d	***46***	a	b	c	d	***47***	a	b	c	d	***48***	a	b	c	d
49	a	b	c	d	***50***	a	b	c	d										

Answers with Hints

1. (c) $_5B = 2, 3$ $_{13}Al = 2, 8, 3$

$_7N = 2, 5$ $_{15}P = 2, 8, 5$

B and Al have 3 valence electrons whereas N and P have 5 valence electrons.

2. (b) Both *Amoeba* and *Paramecium* belong to same kingdom-Protista. Similarly, *Candida* and *Saccharomyces* belong to the same kingdom-Fungi. For other option, *Rhizopus* is a fungus, while *Chlamydomonas* is an alga. *Pteridium* is a pteridophyte, while *fasciola* is a platyhelminth.

3. (b) *Helicobacter pylori* is a bacterium usually found in our stomach. They release the enzyme urease which weakens the mucous lining of stomach and cause peptic ulcers.

4. (c) Given,

$$\text{Mass of the solute} = 7.5 \text{ g}$$

$$\text{Mass of the solvent} = 15 \text{ g}$$

$$\text{Solubility of the solute} = \frac{\text{Weight or mass of the solute}}{\text{Weight or mass of the solvent}} \times 100$$

$$= \frac{7.5}{15} \times 100 = 50\%$$

5. (c) Heavy metals and pesticides like DDT enter the food chain through plants (producers), this concentration goes on increasing at each trophic level, this phenomena is known as biomagnification.

6. (c) Given,

% of 37 u Cl = 100 – 75 = 25%

$$\text{Average atomic mass} = \left(\frac{35 \times 75}{100} + \frac{37 \times 25}{100}\right) = \left(\frac{105}{4} + \frac{37}{4}\right) = \frac{142}{4} = 35.50 \text{ u}$$

7. (a) A body can have instantaneously non-zero acceleration at zero velocity. Consider a case in which a ball is thrown upwards. At the highest point of its trajectory, the instantaneous velocity is zero, while acceleration due to gravity remains non-zero.

Hence, statement I is correct but II is incorrect.

8. (a) Rabies also known as hydrophobia is caused by virus similarly mumps is a disease, which causes fever, difficulty in mouth opening with swelling, it is caused by paramyxovirus.

9. (c) Decaying of wood and burning of wood are chemical changes because in these processes, the chemical composition of wood is changed and new substances are formed, which cannot be converted back into their original form.

10. (b) Given, $t = 20 \text{ min} = 20 \times 60 \text{ s}$, $a = 20 \text{ ms}^{-2}$ and $u = 0$

As, we know that, $v = u + at$

$$\Rightarrow \qquad v = 0 + 20 \times 20 \times 60 = 24000 \text{ m/s}$$

11. (c) Latent heat of vaporisation is the heat used in overcoming the forces of attraction between the particles of a liquid during the change of state from liquid to gas without increasing their kinetic energy.

12. (c) The given figure *X* is of phloem where, *A*-Sieve plate, *B*-Sieve tube, *C*-Phloem parenchyma, *D*-Companion cell. Phloem functions to transport food to all parts of plants.

13. (a) Liquid diffuses slowly as compared to gases and have stronger intermolecular forces as compared to gases. Hence, liquid molecules are less free to move than gases.

14. (b) When brakes are applied to high speed bullet train, the retardation takes place, while train moves in same direction.

Hence, retardation (i.e. negative acceleration) and velocity are in opposite direction to each other.

15. (a) Given,

$$V_1 = 600\ \text{cm}^3,\ V_2 = ?$$
$$T_1 = 273 + 27^\circ\text{C} = 300\ \text{K}$$
$$T_2 = 273 + 7^\circ\text{C} = 280\ \text{K}$$

According to Charle's law,

$$\frac{V_1}{T_1} = \frac{V_2}{T_2} \quad \text{Or} \quad V_2 = \frac{V_1 T_2}{T_1}$$
$$V_2 = \frac{600 \times 280}{300}$$
$$V_2 = 560\ \text{cm}^3$$

16. (b) Leghorn is not an indigenous breed, it is an exotic (foreign) breed of chicken that produces good quality and quantity of eggs. Other options are correct.

17. (c) Carolus Linnaeus introduced the system of scientific naming or nomenclature, which is called binomial nomenclature where the first name denote genus and the second name denote the species. It is written as, the generic name must start with a capital letter and specific name with small letter.

18. (d) Sound is a mechanical wave that needs material medium for its propagation. As there is vacuum between Earth and mercury and sound does not travel through vacuum. So, sound of volcanic explosion on mercury cannot reach on Earth.

19. (d) Electronic configuration of Mg and Mg^{2+} are

$$Mg = 2, 8, 2$$
$$Mg^{2+} = 2, 8$$

Number of protons in Mg atom = 2 + 8 + 2 = 12

Atomic mass of magnesium (Mg) = 24

Number of neutrons = Atomic mass – number of protons

Number of neutrons in Mg atom = 24 – 12 = 12

20. (c) Statements I and II are correct, only statement III is incorrect because AIDS is a secondary immunodeficiency disease. Primary immunodeficiency exists from birth and secondary immunodeficiency occur due to malnutrition, prolong illness, etc.

21. (c) Rarefaction is low pressure region of medium during longitudinal wave motion. Similarly, compression is high pressure region.

Ultrasonic wave has frequency higher than 20 kHz, hence 30 kHz is ultrasonic wave.

Audible range in humans is 20 Hz-20 kHz.

The correct match is as

$$A \rightarrow 4,\quad B \rightarrow 3,\quad C \rightarrow 2,\quad D \rightarrow 1$$

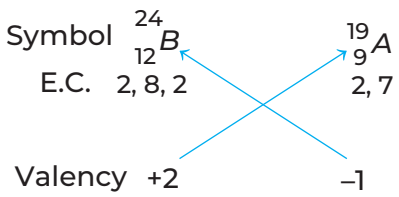
22. (c) Manure is made by decomposing organic matter with the help of worms or bacteria. Manure contains large quantities of organic matter, but has small quantities of nutrients in it as compared to fertilizers.

23. (b) Cuboidal epithelium forms the linning of kidney tubules and ducts of salivary glands where it provides mechanical support.
Hence, statement II is correct.

24. (b) Audible range for humans is 20 Hz to 20000 Hz. Below 20 Hz is called infrasonic waves, while above 20000 Hz is called ultrasonic waves.

25. (c) *A*-(1), *B*-(4), *C*-(3), *D*-(2)
A-Blood and lymph are fluid connective tissue. *B*-Ciliated and cuboidal are the different types of epithelium tissue. *C*-Tendon and ligament are areolar connective tissue, *D*-Bones and cartilage are skeletal connective tissue.

26. (d)



B is a metal and *A* is non-metal. Formula of compound is BA_2.

27. (d) *Pinus* is member of division–Gymnosperm, Similarly *Rana tigrina* (common frog) is a member of phylum–Chordata and class–Amphibia.

28. (d) Work done, $W = F \cdot s \times \cos\theta$

For work to be maximum, the component $\cos\theta$ should be maximum.
Hence, in given cases $\cos\theta$ will be maximum in option (d) because $\cos\theta$ is maximum at $\theta = 0°$.

29. (c) Liver fluke belongs to phylum-Platyhelminthes, they are flatworms with no segmentation and live as a parasite. They are also bilaterally symmetrical and triploblastic in nature.

30. (b) The filtrate will contain some fine mud particles dispersed in water, hence it forms a colloidal solution. Colloidal solution is a mixture in which the substance are regularly suspended in a fluid. It has very tiny and small material that is spread out uniformly all through another substances.

31. (b) Given, mass of bucket, $m = 7$ kg, vertical distance travelled by bucket, $h = 8$ m

Gravitational potential energy $= mgh = 7 \times 10 \times 8 = 560$ J

32. (b) A pure substance is one which is made up of only one kind of atoms or molecules. They have the same composition throughout.

33. (b) Chloroplast contain green pigment called chlorophyll which absorb energy from sunlight and break water molecules into hydrogen and oxygen during photosynthesis.

34. (b) Ammonia can be liquefied at high pressure and low temperature. When high pressure is applied to ammonia gas, it gets compressed and when lower its temperature, it gets liquefied.

35. (b) Protista are unicellular eukaryotic organism, there mode of nutrition are either autotrophic or heterotrophic. *Paramecium, Amoeba* and *Euglena* are some examples.

36. (a) Since, $g = \frac{GM}{r^2} \Rightarrow g \propto \frac{1}{r^2}$

So, g would increase when r decreases.

37. (d) Butter will get separated from curd by centrifugation process. It is a technique used for the separation of particles from a solution according to their size, shape and density.

38. (d) *A*–Apical meristematic is present at the tip of roots and stems, which helps in growth of plant. *B*–Intercalary meristematic is present at the base of leaves or inter-nodes on twings. *C*–Lateral meristematic present beneath the bark in the form of cork cambium and in vascular bundle in the form of vascular cambium.

39. (a) We know that,

$$\text{Concentration of solution} = \frac{\text{Volume of solute}}{\text{Volume of solution}} \times 100 \qquad \text{...(i)}$$

Here, volume of solute (alcohol) = 50 mL

Volume of solvent (water) = 150 mL

So, $\text{volume of solution} = \text{volume of solute} + \text{volume of solvent}$

$$= 50 + 150 = 200 \text{ mL}$$

Now, putting the value in Eq. (i)

$$\text{Concentration of solution} = \frac{50}{200} \times 100 = \frac{50}{2} = 25\%$$

40. (a) As we know, $p = \rho gh \Rightarrow p \propto h$

$\therefore$ Ratio of pressure on two stretched membranes is 1 : 1.

41. (c) *A-Antedon* (feather star) and *B-Holothuria* (sea cucumber) they both belong to phylum–Echinodermata. They are free-living marine animal having water vascular system for their nutrition.

42. (b) Given that, velocity of high frequency sound wave in sea = 1500 m/s

Time interval between sending and receiving of wave = 2.8 s

So, $$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$1500 = \frac{\text{distance}}{2.8}$$

$\Rightarrow$ Distance = 4200 m

Hence, the depth of pacific ocean $= \frac{4200}{2} = 2.1 \text{ km}$

43. (b) Mass of the compound = 0.24 g

Mass of boron = 0.096 g

Mass of oxygen = 0.144 g

$$\text{Percentage of boron} = \frac{\text{Mass of boron}}{\text{Mass of the compound}} \times 100$$

$$= \frac{0.096 \text{ g}}{0.240 \text{ g}} \times 100 = 40\%$$

$$\text{Percentage of oxygen} = \frac{\text{Mass of oxygen}}{\text{Mass of the compound}} \times 100$$

$$= \frac{0.144 \text{ g}}{0.240 \text{ g}} \times 100 = 60\%$$

44. (c) Given, velocity of particle = 800 m/s

Here, no force is acting on particle.

$\Rightarrow$ Force, $F = ma = 0$

$\therefore$ Work done, $W = F \cdot s = 0$

Thus, work done by the particle will be zero.

45. (c) Both Nayan and Anuj made incorrect statements because in hypotonic solution the cell swell up due to higher concentration of water in surrounding, so water moves from higher concentration to lower concentration by osmosis result in swelling of cell. Similarly, in hypertonic solution the cell shrink due to lower concentration of water in surrounding then cell, so water moves out of cell result in shrinking of cell.

46. (b) In first case,

$$\text{Acceleration, } a = \frac{0 - u}{t} = -\frac{u}{t}$$

$\therefore$ $$\text{Distance covered, } d = ut + \frac{1}{2}at^2 = ut + \frac{1}{2}\left(\frac{-u}{t}\right)t^2 = \frac{ut}{2}$$

In second case, $u' = \sqrt{2}u$

$$\text{Acceleration, } a' = \frac{0 - \sqrt{2}u}{t} = -\frac{\sqrt{2}u}{t}$$

$\therefore$ $$\text{Distance covered, } d' = \sqrt{2}ut + \frac{1}{2}\left(\frac{-\sqrt{2}u}{t}\right)t^2 = \frac{\sqrt{2}ut}{2}$$

$\Rightarrow$ $$d' = \sqrt{2}\left(\frac{ut}{2}\right) \qquad \left[\because d = \frac{ut}{2}\right]$$

$$= \sqrt{2}\, d$$

47. (a) Element *A*,

Atomic number = Number of protons = 17 (*P*)

Mass number = Number of protons + Number of neutrons = 17 + 18 = 35(*Q*)

Element *B*,

Atomic number = Number of protons = 14 (*R*)

Mass number = Number of protons + Number of neutrons = 14 + 14 = 28(*S*)

Element *C*,

Number of neutrons = Mass number – Number of protons = 19 – 9 = 10 (*T*)

48. (b) *X*-Respiration $\rightarrow$ Plants release CO_2 in atmosphere during respiration.

Y-Photosynthesis $\rightarrow$ Plants take up CO_2 from the atmosphere for the process of photosynthesis.

Z-Decomposition $\rightarrow$ When an organism die CO_2 returns back to the atmosphere

49. (d) For a constant force (*F*) and a fixed distance (*s*), kinetic energy acquired

$$\text{KE} = \text{work done} = F \cdot s$$

Hence, kinetic energy is independent of mass,

$$\text{i.e. KE} \propto m^0$$

50. (c) If more solute is added to a saturated solution. Then the excess of solute molecules starts settling down and a precipitate will be formed.