SUMMATIVE ASSESSMENT – II
SCIENCE

Time allowed : 3 hours *Maximum Marks : 90*

10th CBSE Board 2015 Question Paper SET-02

SECTION A

1. Write the number of covalent bonds in the molecule of propane, C_3H_8. 1

2. Where is DNA found in a cell ? 1

3. The first trophic level in a food chain is always a green plant. Why ? 1

4. The absolute refractive indices of glass and water are 4/3 and 3/2 respectively. If the speed of light in glass is 2×10^8 m/s, calculate the speed of light in (i) vacuum, (ii) water. 2

5. We often observe domestic waste decomposing in the bylanes of our homes. List four ways to make the residents aware that the improper disposal of wastes is harmful to the environment and also for their own health. 2

6. List any two advantages associated with water stored in the ground. 2

7. What is meant by homologous series of carbon compounds ? Classify the following carbon compounds into two homologous series and name them. 3

   C_3H_4, C_3H_6, C_4H_6, C_4H_8, C_5H_8, C_5H_{10}

8. List two tests for experimentally distinguishing between an alcohol and a carboxylic acid and describe how these tests are performed. 3

9. The elements $_4Be$, $_{12}Mg$ and $_{20}Ca$, each having two valence electrons in their valence shells, are in periods 2, 3 and 4 respectively of the modern periodic table. Answer the following questions associated with these elements, giving reason in each case : 3

   (a) In which group should they be ?

   (b) Which one of them is least reactive ?

   (c) Which one of them has the largest atomic size ?

10. Taking the example of an element of atomic number 16, explain how the electronic configuration of the atom of an element relates to its position in the modern periodic table and how valency of an element is calculated on the basis of its atomic number. 3

11. List three distinguishing features between sexual and asexual types of reproduction, in tabular form. 3

12. List four points of significance of reproductive health in a society. Name any two areas related to reproductive health which have improved over the past 50 years in our country. 3

13. What are chromosomes ? Explain how in sexually reproducing organisms the number of chromosomes in the progeny is maintained. 3

14. A pea plant with blue colour flower denoted by BB is cross-bred with a pea plant with white flower denoted by ww.

(a) What is the expected colour of the flowers in their F_1 progeny ?

(b) What will be the percentage of plants bearing white flower in F_2 generation, when the flowers of F_1 plants were selfed ? 3

(c) State the expected ratio of the genotype BB and Bw in the F_2 progeny.

15. Explain the following : (a) Speciation (b) Natural Selection 3

16. What is meant by scattering of light ? Use this phenomenon to explain why the clear sky appears blue or the sun appears reddish at sunrise. 3

17. If the image formed by a mirror for all positions of the object placed in front of it is always erect and diminished, what type of mirror is it ? Draw a ray diagram to justify your answer. Where and why do we generally use this type of mirror ? 3

18. What is an ecosystem ? List its two main components. We do not clean natural ponds or lakes but an aquarium needs to be cleaned regularly. Why is it so ? Explain. 3

19. What are fossils ? How are they formed ? Describe in brief two methods of determining the age of fossils. State any one role of fossils in the study of the process of evolution. 5

20. (a) Name the human male reproductive organ that produces sperms and also secretes a hormone. Write the functions of the secreted hormone. 5

(b) Name the parts of the human female reproductive system where

(i) fertilisation takes place,

(ii) implantation of the fertilised egg occurs.

Explain how the embryo gets nourishment inside the mother's body.

21. What is meant by power of a lens ? Define its S.I. unit.

You have two lenses A and B of focal lengths +10 cm and –10 cm respectively. State the nature and power of each lens. Which of the two lenses will form a virtual and magnified image of an object placed 8 cm from the lens ? Draw a ray diagram to justify your answer. *5*

22. Write the importance of ciliary muscles in the human eye. Name the defect of vision that arises due to gradual weakening of the ciliary muscles in old age. What type of lenses are required by the persons suffering from this defect to see the objects clearly ?

Akshay, sitting in the last row in his class, could not see clearly the words written on the blackboard. When the teacher noticed it, he announced if any student sitting in the front row could volunteer to exchange his seat with Akshay. Salman immediately agreed to exchange his seat with Akshay. He could now see the words written on the blackboard clearly. The teacher thought it fit to send the message to Akshay's parents advising them to get his eyesight checked.

In the context of the above event, answer the following questions :

(a) Which defect of vision is Akshay suffering from ? Which type of lens is used to correct this defect ?

(b) State the values displayed by the teacher and Salman.

(c) In your opinion, in what way can Akshay express his gratitude towards the teacher and Salman ? *5*

23. One half of a convex lens of focal length 10 cm is covered with a black paper. Can such a lens produce an image of a complete object placed at a distance of 30 cm from the lens ? Draw a ray diagram to justify your answer.

A 4 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 15 cm. Find the nature, position and size of the image. *5*

24. Both soap and detergent are some type of salts. What is the difference between them ? Describe in brief the cleansing action of soap. Why do soaps not form lather in hard water ? List two problems that arise due to the use of detergents instead of soaps. *5*

SECTION B

25. Given below is the list of vegetables available in the market. Select from these the two vegetables having homologous structures :

Potato, sweet potato, ginger, radish, tomato, carrot, okra (Lady's finger) *1*

(A) Potato and sweet potato
(B) Radish and carrot
(C) Okra and sweet potato
(D) Potato and tomato

26. A student was asked to observe and identify the various parts of an embryo of a red kidney bean seed. He identified the parts and listed them as under :

I. Tegmen
II. Testa
III. Cotyledon
IV. Radicle
V. Plumule

The correctly identified parts among these are

(A) I, II and III
(B) II, III and IV
(C) III, IV and V
(D) I, III, IV and V

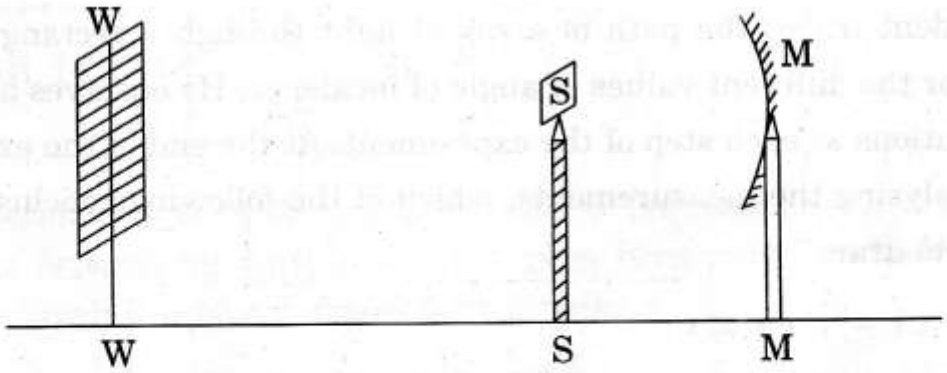
27. A student traces the path of a ray of light through a triangular glass prism for different values of angle of incidence. On analysing the ray diagrams, which one of the following conclusions is he likely to draw ?

(A) The emergent ray is parallel to the incident ray.
(B) The emergent ray bends at an angle to the direction of the incident ray.
(C) The emergent ray and the refracted ray are at right angles to each other.
(D) The emergent ray is perpendicular to the incident ray.

28. A student traces the path of a ray of light through a rectangular glass slab for the different values of angle of incidence. He observes all possible precautions at each step of the experiment. At the end of the experiment, on analysing the measurements, which of the following conclusions is he likely to draw ? *1*

(A) $\angle i = \angle e < \angle r$
(B) $\angle i < \angle e < \angle r$
(C) $\angle i > \angle e > \angle r$
(D) $\angle i = \angle e > \angle r$

29. A student obtains a sharp image of the distant window (W) of the school laboratory on the screen (S) using the given concave mirror (M) to determine its focal length. Which of the following distances should he measure to get the focal length of the mirror ?



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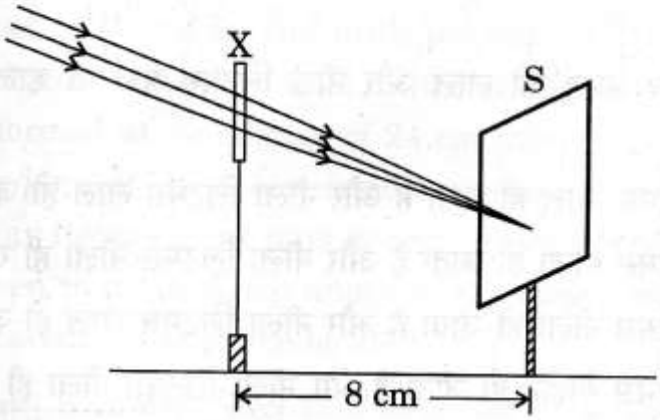
(A) MW
(B) MS
(C) SW
(D) MW – MS

30. A student used a device (X) to obtain/focus the image of a well illuminated distant building on a screen (S) as shown below in the diagram. Select the correct statement about the device (X).



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(A) This device is a concave lens of focal length 8 cm.
(B) This device is a convex mirror of focal length 8 cm.
(C) This device is a convex lens of focal length 4 cm.
(D) This device is a convex lens of focal length 8 cm.

31 A student takes about 4 mL of distilled water in four test tubes marked P, Q, R and S. He then dissolves in each test tube an equal amount of one salt in one test tube, namely sodium sulphate in P, potassium sulphate in Q, calcium sulphate in R and magnesium sulphate in S. After that he adds an equal amount of soap solution in each test tube. On shaking each of these test tubes well, he observes a good amount of lather (foam) in the test tubes marked

(A) P and Q
(B) Q and R
(C) P, Q and S
(D) P, R and S

1

33. While preparing soap a small quantity of common salt is generally added to the reaction mixture of vegetable oil and sodium hydroxide. Which one of the following may be the purpose of adding common salt ? 1

(A) To reduce the basic nature of the soap
(B) To make the soap neutral
(C) To enhance the cleansing power of the soap
(D) To favour the precipitation of the soap

34. A 4 cm tall object is placed on the principal axis of a convex lens. The distance of the object from the optical centre of the lens is 12 cm and its sharp image is formed at a distance of 24 cm from it on a screen on the other side of the lens. If the object is now moved a little away from the lens, in which way (towards the lens or away from the lens) will he have to move the screen to get a sharp image of the object on it again ? How will the magnification of the image be affected ? 2

35. When you add sodium hydrogen carbonate to acetic acid in a test tube, a gas liberates immediately with a brisk effervescence. Name this gas. Describe the method of testing this gas. 2

36. Students were asked to observe the permanent slides showing different stages of budding in yeast under high power of a microscope. 2

(a) Which adjustment screw (coarse/fine) were you asked to move to focus the slides ?

(b) Draw three diagrams in correct sequence showing budding in yeast.

Solution: SET-02 class 10 Science CBSE Board 2015

1. 10

2. DNA is found inside a special area of the cell called the nucleus

3. This is because the green plant is the primary producer by trapping energy from sunlight.

4. Absolute refractive index of glass = 4/3 = c/vg

$\Rightarrow$ 4/3 x vg = c

$\Rightarrow$ 4/3 x 2 x 10^8 = c

The speed of light in vacuum = c = 2.67 x10^8 m/s

Absolute refractive index of water = 3/2 = c/vw ⇒ The speed of light in water vw = 2c/3 = 1.78 x10^8 m/s

5. Improper disposal of domestic waster harmful:

a. It allow mosquito to breed and spread diseases

b. it will release harmful green house gases that pollute air we breadth

c. It will degrade the soil fertility

d. it will pollute water and not only effect marine life but also reduce percolation rate of soil

6. The advantages of water stored in the ground are many. It does not evaporate, but spreads out to recharge wells and provides moisture for vegetation over a wide area. In addition, it does not provide breeding grounds for mosquitoes like stagnant water collected in ponds or artificial lakes. The ground-water is also relatively protected from contamination by human and animal waste.

7. A series of carbon compounds in which the same functional group substitutes for hydrogen in a carbon chain is called a homologous series.

C3H4,C4H6,C5H8- Alkyne

C3H6,C4H8,C5H10 – Alkene

8. Test first: Take two test tubes A and B and place about 1 g of sodium carbonate in them. Pour alcohol in test tube A and carboxylic acid in test tube B. Shake the contents of the test tubes.
The test tube in which a brisk effervescence takes place, with the liberation of a colourless gas (CO2) is carboxylic acid. The test tube in which no reaction takes place is alcohol.

2nd test: , if you add a small piece of Na metal into a test tube containing alcohol, you get to see the formation of bubbles. This is due to the release of a gas which we call as hydrogen. Carboxylic acid remains unsuccessful to show this test.

9. a. Group 2. b. Be c. Ca

10. Atomic no. 16

Electronic configuration = 2,8,6

Period = no of shell = 3 = 3rd period

Group = valance electrone = 6 + 10 = 16th group as 10 element short in 3rd period

Valency = 8 – 6 = 2

11. Distinguish

Asexual reproduction:
1. It involves no formation and fusion of gametes. 2. It is uniparental 3. Reproductive units are somatic cells of parent

Sexual reproduction:

1. It involves formation and fusion of gametes. 2. It is generally biparental. 3. Reproductive units are germ cells of parent.

12. Four point of significance of reproductive health in society

(i) Birth control methods and family planning measures
(ii) Sexually transmitted diseases and their methods of prevention.
(iii) . Importance of breast feeding and post natal care for the mother and baby.
(iv) Equality among sexes and given fair opportunities for male and female children

The reproductive health has tremendously improved in India in the last 50 years. The areas of improvement are as follows

(i) Massive child immunization programme, which has lead to a decrease in the infant mortality rate

(ii) Maternal and infant mortality rate, which has been decreased drastically due to better post natal care

(iii) Family planning, which has motivated people to have smaller families

(iv) Use of contraceptive, which has resulted in a decrease in the rate of sexually transmitted diseases and unwanted pregnancies

13. Chromosomes are thread like structure made up of DNA and proteins. They are present inside the nucleus.

Gamete formation is the first step in sexual reproduction. Number of chromosomes is halved during gamete formation. As a result, the number of chromosomes in gamete is half the number of chromosomes in somatic cells. When male and female gametes fuse during fertilization, the number of chromosomes becomes equal to that in somatic cells. In this way number of chromosomes is maintained in the progeny.

14.

a) The colour of the flower in the F1 generation would be blue as gene for blue colour is dominant over white.
b) The percentage of white flowers in the F2 generation would be 25%.
c) The ratio of BB: Bb would be 1:2 i.e 1 BB and 2 Bb

15. a. Speciation is the process in which one or more species arise from previously existing species. A single species may give rise to a new species or two different species may give rise to a new species.

b. Natural selection: It is a basic mechanism of evolution in which nature selects the characteristics of an organism. If the behavior of a certain organism is approved by nature, the organism will survive or else will die, hence not selected by nature.

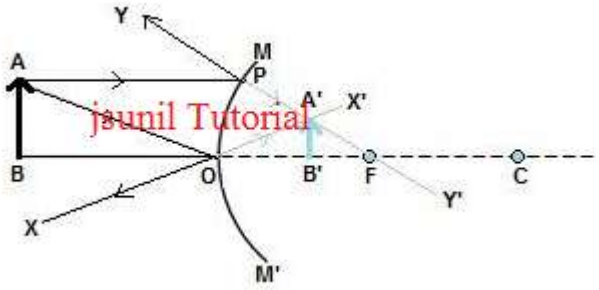
16. When a beam of light strikes fine particles get reflected in different direction by these particles is called the scattering of light .

When sunlight passes through the atmosphere, the fine particles in air scatter the blue colour (shorter wavelengths) more strongly than red. The scattered blue light enters our eyes. thus clear sky appear blue.

Or,

During sunrise and sunset, the rays have to travel a larger part of the atmosphere because they are very close to the horizon. Therefore, light other than red is mostly scattered away. Most of the red light, which is the least scattered, enters our eyes. Hence, the sun and the sky appear red.

17. Convex mirror



Convex mirrors are commonly used as rear-view (wing) mirrors in vehicles. Convex mirrors are preferred because they always give an erect, though diminished, image. Also, they have a wider field of view as they are curved outwards. Thus, convex mirrors enable the driver to view much larger area than would be possible with a plane mirror.

18. All the interacting organisms in an area together with the non-living constituents of the environment form an ecosystem.

Biotic and Non biotic Component.

An aquarium needs to clean regularly due to lack of decomposers that can clean naturally by decomposing organic substance.

19. Fossils may be defined as the remains of the organisms which have been preserved in the form of molds or cast in rocks etc. since prehistoric ages. When a plant or an animals dies, their remains falls on the ground.

Over a period of time their body gets covered by sediments brought by rivers, winds etc. These sediments keeps on getting accumulated for over hundred of years and when that land gets eroded, the fossils can be seen Thus, the process of accumulation of dead remains of plants and animals for over hundreds of years results in the formation of fossils.

The age of the fossils can be determined by the following way:

1) Radiometric dating: In this method, the age of the fossil can be determined by tracing the radioactive elements present in the rocks and examining it chemically.

2) Relative dating: The fossils are found in the sedimentary rocks in the form of layers accumulated over large span of time. So, using this fact, the geologist find the age of fossils in the way that the fossil found at the bottom of those layers are found to be older than that found above those.

Analysis of the organ structure in fossils allows us to make estimates of how far back evolutionary relationships go.

20. (a) The formation of germ-cells or sperms takes place in the testes. The hormone testosterone is secreted by the testes This hormones help in regulating the formation of sperms and brings about changes in appearance seen in boys at the time of puberty.

(b) (i) Fertilization takes place in the oviduct Fallopian tube (ii) fertilized egg gets implanted in the lining of the uterus

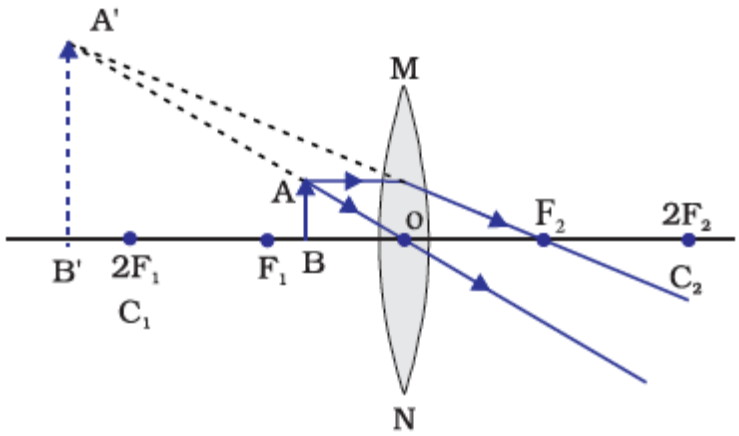
The embryo gets nutrition from the mother's blood with the help of a special tissue called placenta. This is a disc which is embedded in the uterine wall. It contains villi on the embryo's side of the tissue. On the mother's side are blood spaces, which surround the villi. This provides a large surface area for glucose and oxygen to pass from the mother to the embryo.

21. The power of a lens is defined as the reciprocal of its focal length. It is represented by the letter *P*. The power *P* of a lens of focal length *f* is given by p =1/f

The SI unit of power of a lens is 'dioptre'. It is denoted by the letter D.

Lens A is convex and B is concave

Convex lens form virtual and magnified image if object placed between f and O



22. Cilliary muscles change the focal length of eye lens.

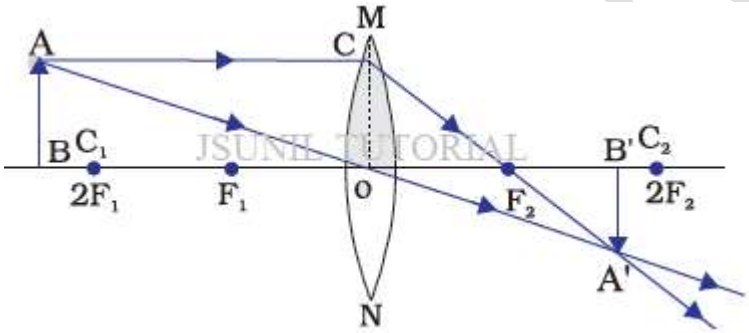
Presbyopia arises due to the gradual weakening of the ciliary muscles and diminishing flexibility of the eye lens.

A common type of bi-focal lenses consists of both concave and convex lens are required to see the object clearly.

a. Hypermetropia, convex lens

b.Kind, careful.c.Gratitude

23.



ho = 4cm , f= 20cm and u=- -15cm

Using the lens formula:

1/v - 1/u = 1/f

1/v - 1/-15 = 1/20

1/v + 1/15 = 1/20

1/v = 1/20 - 1/15

1/v = (3- 4)/60

1/v = - 1/60

v = - 60cm

Negative sign shows that image is virtual

v/u = hi/ho => hi = (v x ho) /u = (-60 x 4)/ - 15 = 16

m = hi/ho = 16/4 = 4 => Positive sign shows that image is erect and magnified.

24.

a) Difference between soap and detergent:

Soap : (i) sodium salt of long chain carboxylic acid. (ii) Soaps are biodegradable (iii) Not suitable with hard water

Detergent (i) Ammonium or sulphate of long chain of carboxylic acid. (ii) Not biodegradable

(iii) Working well in hard water

(b) When dirty clothes are mixed with water and soap, the ionic part of the soap being water attractive, dissolves in water whereas the hydrocarbon part of the soap being water repellent unites with the oil or greese part. When dirty clothes are rinsed with water, the dirt particles attached with the soap molecules, dissolve in water and come out. In this way, clothes become clean.

(c) In hard water, due to the presence of Ca +2 and Mg +2 ions, soaps form insoluble salt. This Precipitate is called scum.

Detergent does not show this property as its charged end does not react with Ca+2 and Mg+2 ions

<u>Two problems that arise due to the use of detergent instead of soap are:</u>

(i) Being non-biodegradable, they accumulate in the environment causing pollution. (ii) In soil this leads to pH changes making soil infertile.

Section B

25. b. carrot and radish

26. (c) II,IV,V

27. B

28.D [<I > <r and < I = <e]

29. B

30.B

31.A

32.A

33.D

34. Towards the lens, Magnification reduces

35.CO2 gas.

On passing CO_2 gas through lime water, the lime water turns milky. The milky appearance of lime water is due to the formation of solid calcium carbonate ($CaCO_3$).

$$\underset{\text{Lime water}}{Ca(OH)_2(aq)} + CO_2(g) \rightarrow \underset{\text{Calcium carbonate}}{CaCO_3(s)} + H_2O(l)$$

36. A fine adjustment screw should always be used to move to focus of the slides while focused at high power