PHYSICS

1. The wall of a room is covered with perfect plane mirror. Two movie films are made, one recording the movement of a man and the other of his mirror image. From viewing the films later, can an outsider tell which is which?

2. A concave mirror is held in water. What would be the change in the focal length of the mirror?

3. Why a concave mirror of small aperture forms a sharper image?

4. What do you understand by the term 'parallax'?

5. Prove that the radius of curvature of a spherical mirror is equal to twice the focal length of the mirror.

CHEMISTRY

1. Why is respiration considered an exothermic process?

2. (a) Explain, with example, how the physical states of the reactants and products can be shown in a chemical equation.
   (b) Balance the following equation and add state symbols:
   $$Zn + HCl \rightarrow ZnCl_2 + H_2$$
   (c) Convey the following information in the form of a balanced chemical equation:
   "An aqueous solution of ferrous sulphate reacts with an aqueous solution of sodium hydroxide to form a precipitate of ferrous hydroxide and sodium sulphate remains in solution".

3. Ammonia reacts with oxygen to form nitrogen and water. Write a balanced chemical equation for this reaction. Add the state symbols for all the reactants and products.

4. Translate the following statement into chemical equation and then balance it:
   Barium chloride solution reacts with aluminium sulphate solution to form a precipitate of barium sulphate and aluminium chloride solution.

5. (a) State the various characteristics of chemical reactions.
   (b) State one characteristic each of the chemical reaction which takes place when:
   (i) dilute hydrochloric acid is added to sodium carbonate
   (ii) lemon juice is added gradually to potassium permanganate solution
   (iii) dilute sulphuric acid is added to barium chloride solution
   (iv) quicklime is treated with water
   (v) wax is burned in the form of a candle

BIOLOGY

1. ln which type of respiration, aerobic or anaerobic, more energy is released?

2. State whether the following statements are true or false.
   (A) During respiration, the plants take CO_2 and release O_2.
   (B) Energy can be produced in cells without oxygen.
   (C) Fish and earthworm exchange gases during respiration in the same way.

3. Fill in the following blanks with suitable words.
   (A) The organs of respiration in man are the...........
   (B) The actual exchange of gases takes place in the..........of the lungs.
   (C)........... in the lungs provide a very large surface area for gaseous exchange.
   (D) Yeast undergoes..............respiration whereas *Amoeba* undergoes..............respiration.
   (e) Gills are the breathing organs in

4. Name the two types of transport systems in the human beings.

5. **(A)** What is transpiration?
   (B) What do you mean by 'translocation' with respect to transport in plants? **(C)** Which plant tissue is involved in translocation: xylem or phloem?

MATHS

1. What are the roots of the equation
$$\left(a+b+x\right)^{-1} = a^{-1}+b^{-1}+x^{-1} \ ?$$

2. If one of the roots of the equation
$x^2 + ax + 3 = 0$ is 3 and one of the roots of the
equation $x^2 + ax + b = 0$ is three times the
other root, then what is the value of b ?

3. If the difference in the roots of the
equation $x^2 - px + q = 0$ is unity, then
which one of the following is correct?

(a) $p^2 + 4q = 1$ (b) $p^2 - 4q = 1$ (c)
$p^2 + 4q = -1$ (d) $p^2 - 4q = -1$.

4. If a, β, y are the roots of the equation
$x^3 + ax^2 + bx + c = 0$, then what is
$\alpha^{-1} + \beta^{-1} + \gamma^{-1}$ is equal to?

5. Find the values of k for which the equations
$x^2 - kx - 21 = 0$ and $x^2 - 3kx + 35 = 0$ w m have
a common root?

6. Solve the following quadratic equation for x:
$9x^2 - 6b^2x - \left(a^4 - b^4\right) = 0$ [CBSE 2015]

7. Solve for $x : \sqrt{2x+9} + x = 13$. [CBSE 2016]

8. Solve for $x : \dfrac{x+1}{x-1} + \dfrac{x-2}{x+2} = 4 - \dfrac{2x+3}{x-2},$
$x \neq -2, 2$

9. Determine the positive value of k for which the
equation $x^2 + kx + 64 = 0$ and $x^2 - 8x + k = 0$
will both have real and equal roots.

10. A motor boat whose speed in still water is 18
km/hr, takes 1 hour more to go 24 km upstream
than to return downstream to the same spot. find
the speed of the stream.