# NEW STANDARD ACADEMY

## PHYSICS

1. A ray of light travelling in air falls on the surface of a glass slab at an angle of incidence 45°. Find the angle made by the refracted ray with the normal within the slab where refractive index for glass is 3/2.

2. A ray of light travelling in air is incident on the surface of a transparent material of refractive index $\sqrt{3}$ . If the angle of refraction is 30°, calculate the angle of incidence.

3. A beam of light incident parallel to the principal axis of a concave lens appears to diverge from a point 20 cm behind the lens after refraction through the lens. Calculate the power of the lens.

4. A pin 2 cm long is placed at a distance of 16 cm from a convex lens of focal length 12 cm perpendicular to the principal axis. Find the position, nature and size of the image

5. A point object is placed at a distance of 12 cm from a convex lens on its principal axis. Its image is formed 18 cm from the lens on the other side. Calculate the focal length of the lens.

6. A pin 2 cm long is placed at a distance of 16 cm from a convex lens of focal length 12 cm perpendicular to the principal axis. Find the position, nature and size of the image.

7. A convex lens of focal length 20 cm and a concave lens of focal length 12.5 cm are placed in contact having the same principal axis. Calculate the power of the combined lens.

## CHEMISTRY

1. When hydrogen is passed over copper oxide, copper and steam are formed. Write a balanced equation for this reaction and state which of the chemicals are:
   (i) elements
   (ii) compounds
   (iii) reactants
   (iv) products
   (v) metals
   (vi) non-metals

2. (a) Aluminium hydroxide reacts with sulphuric acid to form aluminium sulphate and water. Write a balanced equation for this reaction.
   (b) Balance the following chemical equation:
   $MnO_2 + HCl \rightarrow MnCl_2 + Cl_2 + H_2O$

3. When a solution is added to vanilla extract, then the characteristic smell of vanilla cannot be detected. State whether the given solution is an acid or a base.

4. Give the names and formulae of two strong acids and two weak acids.

5. Name one metal and one non-metal which exist in liquid state at room temperature.

6. What changes in the colour of iron nails and copper sulphate solution do you observe after keeping the iron nails dipped in copper sulphate solution for about30 minutes?

## BIOLOGY

1. **(A)** what is chlorophyll? What part does chlorophyll play in photosynthesis?
   **(B)** (i) Which simple food is prepared first in the process of photosynthesis?
   (ii) Name the food which gets stored in plant leaves.

2. What substances are contained in gastricjuice? What are their functions?

3. **(A)** Which part of the body secretes bile? Where is bile stored? What is the function of bile?
   **(B)** What is trypsin? What is its function?

4. What are the differences between aerobic and anaerobic respiration? Name some organisms that use anaerobic mode of respiration.

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?

6. Give the scientific terms used to represent the following:
   **(A)** Bending of a shoot towards light.
   **(B)** Growing of roots towards the earth.

**(C)** Growth of a pollen tube towards ovule.

**(D)** Bending of roots towards water.

**(E)** Winding of tendril around a support.

7. What is a plant hormone? Name four plant hormones. State one function of each.

## MATHS

1. For what value of p is the coefficient of $x^2$ in the product $(2x-1)(x-k)(px+1)$ equal to $0$ and the constant term equal to $2$?

2. For What value of $m$ will the expression $3x^3 + mx^2 + 4x - 4m$ be divisible by $x+2$ ?

3. The graph of $y = f(x)$ is given in the adjoining fgure. What is the number of zeroes of $(x)$ ?
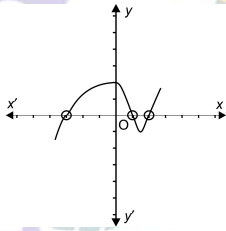


4. Write the polynomial, the product and sum of whose zeroes are $\frac{-9}{2}$ and $-\frac{3}{2}$ respectively.

5. Find the number of solutions of the following pair of linear equations:$x + 2y - 8 = 0$ $2x + 4y = 16$

6. If the system of equations $6x + 2y = 3$ and $kx + y = 2$ has a unique solution, find the value of $k$.

7. Solve the following pair of equations:$\frac{4}{x} + 3y = 8; \frac{6}{x} - 4y = -5$

8. The HCF of 45 and 105 is 15. Find the $LCM$ .

9. Explain why $(17 \times 5 \times 11 \times 3 \times 2 + 2 \times 11)$ is a composite number?

10. Find the largest number that divides 31 and 99 leaving remainder 5 and 8 respectively.