## NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

### Solutions for Class : 10

### MATHEMATICS

1. **(A)** $2y^2 + 9y = 0$

   $\Rightarrow y(2y + 9) = 0$

   $\Rightarrow y = 0$ or $2y + 9 = 0$

   $\Rightarrow y = \dfrac{-9}{2}$

2. **(B)** $14 + 11 - 19 = 25 - 19 = 6$

3. **(B)** In $\triangle$ MNG $\angle$ M = 90 $\Rightarrow$ MG$^2$ = NG$^2$ − MN$^2$

   $\therefore$ MG = 4cm

   $\therefore$ EG = 2 GM = 8cm

   $GF = \sqrt{GE^2 + EF^2} = 10\,cm$

   $\therefore COS\theta = \dfrac{GE}{GF} = \dfrac{8\,cm}{10\,cm} = 0.8$

4. **(A)** The perpendicular from A to BC bisects BC at D.

   $\therefore$ The length of

   $AD = \sqrt{AB^2 - BD^2} = \sqrt{6^2 - (2.5)^2}$

   $= \sqrt{36 - 6.25}$

   $= \sqrt{29.75} = 5.45$

5. **(B)** Base side of triangle part = 6cm − 3cm = 3cm.

   Height of triangle part = 5cm − 2cm = 3cm

   Volume of the solide = volume of cuboid + volume of triangular prism

   = 6 × 4 × 2 cm3 + $\dfrac{1}{2}$ × 3 × 3 × 4 cm$^3$

   = 48 cm$^3$ + 18 cm$^3$

   = 66 cm$^3$

### PHYSICS

6. **(D)** Radioactive wastes remain radioactive for thousands of years which is a major disadvantage of nuclear power

   Option (A) : Nuclear power stations have very good safety records. There is no high risk of explosion as they are extremely safety conscious.

   Option (B) : It is an advantage that nuclear power stations produce vast amounts of energy.

   Option (C) : It is an advantage that nuclear power stations are sustainable.

7. **(C)** $n_i$ sin i = $n_r$ sin r

   (where $n_i$ is the refractive index of the incident medium, $n_r$ is the refractive index of the refracted medium, 'i' is the angle of incidence and 'r' is the angle of refraction)

   (1) sin 60° = (1.5) sin(r)

   sin r = 0.0577

   r = 35.3°

8. **(D)** For a concave lens, the image distance is always negative as all images formed are virtual and on the same side as the object.

9. **(B)** Velocity of light in water = 2.25×10$^8$ m/s

   Velocity of light in glass = 2 × 10$^8$ m/s

   Velocity of light in vacuum = 3×10$^8$ m/s

   So, velocity of light in water is greater

than glass but velocity of light in water is less than the velocity of light in vacuum.

10. **(A)** The light coming from the object, enters our eye through the cornea (X). The lens (Y) lies behind the pupil (Y). X is cornea and Y is lens.

## CHEMISTRY

11. **(C)** Highly reactive metals (like potassium, sodium, calcium, magnesium and aluminium) are very stable and cannot be reduced by the most common reducing agent 'carbon' to obtain free metals. This is because these metals have more affinity (more attraction) for oxygen than carbon. So, carbon is unable to remove oxygen from these metal oxides and hence cannot convert them into free metals. Thus, the highly reactive metals cannot be extracted by reducing their oxides with carbon. Magnesium metal is extracted by electrolysis. In this method the metal compound is melted and then broken down by electricity to obtain pure metal.

12. **(C)** As ethanoic acid is a weak acid and is only partially dissociated, more acid molecules need to undergo dissociation in order to form the hydrogen ions for complete neutralisation. The dissociation process is endothermic and requires energy. Hence, a less exothermic reaction results.

13. **(C)** Sodium sulfate and water are the products of the neutralisation of sodium hydroxide and sulfuric acid.

Options (A) and (D) : Sodium sulfate and water (not hydrogen) are the products of neutralisation of sodium hydroxide and sulfuric acid.

Option (B): Sodium sulfate (not chloride) and water would be the products of neutralisation of sodium hydroxide and sulfuric acid.

14. **(D)** An unbalanced chemical equation has an unequal number of atoms of one or more elements in the reactants and products.

15. **(D)** Elements like calcium, strontium and barium form a triad based on the given characteristics.

## BIOLOGY

16. **(D)** When we see an object that is near or far, an image is formed on the retina of the eye. It plays an important role in sensing the images of various objects in the surroundings.

17. **(D)** Plants take in carbon dioxide during photo-synthesis to synthesis their food and give out oxygen. Animals take in oxygen and give out carbon dioxide during respiration.

18. **(B)** Pollen grains germinate on stigma by absorbing water and nutrients.

19. **(A)** 'R' represents Medulla oblongata. Medulla oblongata controls heart beating, respiration swallowing, coughing and sneezing.

20. **(C)** The digested food in the small intestine passes through the walls of the small intestine and blood vessels to get into the bloodstream. The blood in the blood vessels carries the digested food to different parts of the body.

## CRITICAL THINKING

21. **(D)**
22. **(B)**
23. **(C)**
24. **(A)**
25. **(A)**