ICSE Board
Class VIII Physics
Sample Paper – 3 Solution

Question 1

1. **(c)** Alternating current
   The current which changes its direction at fixed intervals of time is called alternating current or A.C.

2. **(b)** At twice the focal length
   A convex lens forms a real image of the same size as that of the object when the object is placed at a distance of twice the focal length of the lens.

3. **(d)** Saptarishi
   The constellation 'Ursa Major' is known as Saptarishi.

4. **(a)** Position
   Potential energy is the energy possessed by an object due to its position or change in shape.

5. **(c)** No refraction will occur
   Refraction occurs when there is a difference in the refractive indices of the two media. Hence, when the refractive index is equal then there is no refraction.

6. **(b)** Yellow spot
   The elevation in the central part of the retina of a human eye is called the yellow spot. To see an object clearly, the image is to be formed on the yellow spot.

7. **(a)** kilowatt-hour
   The commercial unit of energy is kilowatt-hour.

8. **(b)** Hydrometer
   A hydrometer is used for measuring the density or relative density of liquids.

9. **(c)** Thunder
   Loud sound heard during lightning is called thunder.

10. **(b)** Gradually decreases
    The density of air gradually decreases as one goes higher into the atmosphere.

11. **(a)** Boiling point
    The temperature at which water vapourises to form steam is called its boiling point.

12. (c) Force per unit length
Surface tension has the unit of force per unit length.

13. (b) Parallel equidistant straight lines
In a uniform magnetic field, the field lines are parallel equidistant straight lines.

14. (b) 88
88 constellations are officially recognised by the International Astronomical Union.

15. (a) 65 J
The work done is
$W = QV = 5 \times 10 = 50$ J

Question 2
(A)

	Column A		Column B
1	Constellation	1	Vrischika
2	Prism	2	Dispersion
3	Microscope	3	Refraction
4	Camphor	4	Sublimation
5	Earth	5	Magnet

(B)
1. A virtual image cannot be seen on a screen.
2. Coal, petroleum and natural gas are fossil fuels.
3. The iris controls and regulates the amount of light entering the eye.
4. The effect of force acting vertically downwards on a unit area is called pressure.
5. In a series combination, the current is same across all the resistances.

Question 3
(A)
1. False. Different liquids have different densities, and hence, they exert a different upthrust. Therefore, a rubber cork experiences a different upthrust when immersed in oil and turpentine.
2. False. Myopia is also called near-sightedness.
3. True.
4. False. The layer below the chronosphere is called the photosphere.
5. True.

(B)

1. The stars are much bigger than the Earth, yet they appear to us like point objects because they are millions of kilometres away from the Earth.

2. A current carrying conductor produces a magnetic field around it. Hence, a compass needle placed near the current carrying conductor shows deflection.

3. The snow on mountains does not melt as a whole because of the high specific latent heat of ice. The snow melts gradually with the heat of the Sun. If the specific latent heat of ice was not high, the entire snow would have melted resulting in flooding of the rivers.

4. When we dip an object in water, there is an upward force known as the buoyant force acting on the object, due to the difference in the pressure exerted by the water on the top and bottom of the object. It is this buoyant force which makes the object lighter when placed in water.

5. A pool of water appears to be less deep than it actually is because light rays from the bottom of the pool are bent away from the normal as they pass from water into the air. This makes the pool appear shallower than it really is.

Question 4

(A)

1. Conduction is the process by which heat energy is transferred from one atom to another in the direction of the lower temperature without the actual movement of the atoms from their mean position.
   Conduction of heat energy takes place mainly in solids.
   When a solid is heated from one end, its atoms gain heat energy and this energy increases their kinetic energy such that they vibrate about their mean position with greater amplitude.

2. Ciliary muscles can contract or relax. Because of this, they can change the thickness of the eye lens, thereby changing its focal length. With proper change in the focal length, the eye lens can produce an image of nearby objects and also far away objects. Hence, the power of accommodation of the eye is due to the function of the ciliary muscles.

(B)

1. The energy transformations are as follows:
   (a) Electric motor: Electrical energy is converted to mechanical energy.
   (b) Burning of wood: Chemical energy is converted to heat energy and light energy.

2.
   (a) Valence electrons: The electrons present in the outermost orbit of an atom are known as valence electrons.
   (b) If an atom gains electrons, then the number of negative charges becomes more than the number of positive charges, and hence, the atom is said to be negatively charged.
   (c) If an atom loses electrons, then the number of negative charges becomes less than the number of positive charges, and hence, the atom is said to be positively charged.

Question 5

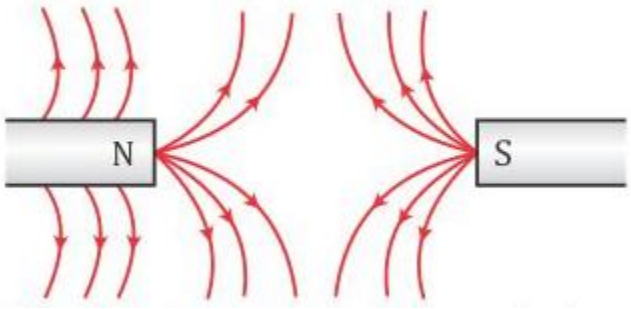
(A)

1.
   (a) Optical centre: It is the geometrical centre of the lens.
   (b) Principal axis: It is the line passing through the optical centre of the lens and perpendicular to both the faces of the lens.

2. We belong to the Milky Way galaxy. It is a spiral galaxy and its Indian name is Akash Ganga.
   When it is viewed from above, the stars seem to be arranged in spiral arms which emerge from the nucleus (centre) of the galaxy. From the Earth, we get a side view of the Milky Way galaxy.
   The Milky Way extends to about 1,00,000 light years.

(B)

1.
   (a) A magnetic field line is the path along which a freely suspended bar magnet tends to move.
   (b) When two like poles are facing each other, the field lines are as shown below:



(c) The properties of magnetic field lines are as follows.

(i) Magnetic field lines originate from the North Pole and terminate at the South Pole.

(ii) Magnetic lines never intersect each other.

2.

(a) When the key is plugged in: The galvanometer will show a momentary deflection as the number of magnetic field lines will change around coil 2 due to an increase in the current through coil 1 from zero to a maximum value.

(b) When the key is taken out: The galvanometer will show a momentary deflection in the opposite direction as the number of magnetic field lines will change around the coil 2 as the current in coil 1 falls from maximum to zero.

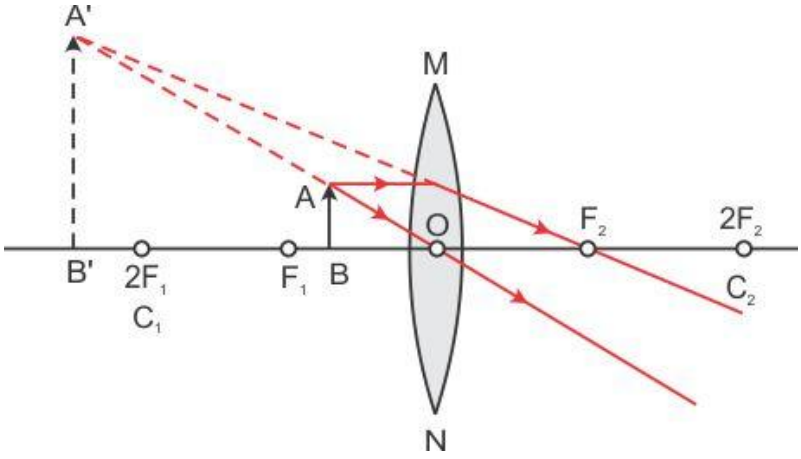
Question 6

(A)

1. Lights of different colours have different wavelengths. Hence, in any transparent medium such as glass or water, different colours of light travel with different speeds.

   Due to this difference in their speeds, different colours of light bend through different angles.

2. When the object is placed between the optical centre and the principal focus of a convex lens, the ray diagram is as follows:



(B)

1. The area of the largest face will be $A = 25 \times 25 = 625\ cm^2 = 0.0625\ m^2$

   Thus, the pressure exerted by that face is

$$P = \frac{F}{A} = \frac{25}{0.0625} = 400\ N/m^2 = 400\ Pa$$

2. The given resistances are $R_1 = 3\ \Omega$; $R_2 = 6\ \Omega$ and $R_3 = 9\ \Omega$

(a) For a series connection:

The equivalent resistance is

$$R_S = R_1 + R_2 + R_3$$
$$= 3 + 6 + 9$$
$$= 18\ \Omega$$

(b) For a parallel connection:

The equivalent resistance is

$$\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$
$$= \frac{1}{3} + \frac{1}{6} + \frac{1}{9}$$
$$= \frac{6+3+2}{18} = \frac{11}{18}$$
$$R_P = \frac{18}{11} = 1.67\ \Omega$$

Question 7

(A)

1.

(a) Heat is a form of energy which brings a sensation of hotness or coldness of a body in us.

(b) Sea breeze: During the day, the Sun rays fall on sand and water. Sand gets heated more rapidly than water as water has nearly five times the specific heat capacity of sand. Hence, the air layers associated with sand become hot and rise up and the cooler sea breeze moves towards the land. This is known as the sea breeze.

2. The heat produced in the resistance is

$$H = I^2Rt$$
$$\therefore H = 2^2 \times 10 \times 8 \times 60$$
$$\therefore H = 19{,}200\ J$$

(B)

1. We know that, 1 parsec = 3.26 light years

Hence, the distance of the star is

$$d = 20\ \text{parsec}$$
$$= 20 \times 3.26$$
$$= 65.2\ \text{light years}$$

2. The relative density of a substance is defined as the ratio of density of the substance to the density of water at 4 °C.

$$\text{R.D} = \frac{\text{Density of the substance}}{\text{Density of water at 4 °C}}$$

Relative density gives an idea about how heavy is the substance with respect to water.

For mercury, the relative density is

$$\text{R.D} = \frac{\text{Density of mercury}}{\text{Density of water at 4 °C}}$$

$$13.6 = \frac{\text{Density of mercury}}{1000}$$

$$\therefore \text{Density of mercury} = 13.6 \times 10^3 \text{ kg/m}^3$$