❮ SOLUTIONS ❯

1. (i) Alcohols

(ii) $C_nH_{2n+1}OH$

2. (a) The element belongs to group 17 and 3rd period of the Modern Periodic Table. (Halogen family)

(b) The element is chlorine (Q). Since it is a non-metal, it forms acidic oxide.

3. Hormones secreted by human female ovaries are:

(i) Estrogen : Responsible for development of secondary sexual characters in females.

(ii) Progesterone : Prepares the uterus for the reception of fertilized ovum.

4. Differences between binary fission and multiple fission are as follows :

(i) Binary fission of the parent cell results in the formation of two small, nearly equal sized daughter individuals whereas multiple fission results in the formation of several daughter individuals.

(ii) In binary fission, the parent nucleus divides only once into two daughter nuclei, while in multiple fission the parent nucleus divides repeatedly into a number of daughter nuclei.

5. Birds have ZW-ZZ type of sex determination mechanism. In this type, male has two homomorphic sex chromosomes (ZZ) and is homogametic while female has two heteromorphic sex chromosome (ZW) and is heterogametic.

OR

Mothers have the combination of XX chromosomes while father have XY chromosomes. So, mother is homogametic and produces only one type of gametes having X chromosomes whereas father is heterogametic and produces two types of gametes X and Y. All children (boy or girl), thus inherit X sex chromosome from mother while boy inherits Y chromosome from the father and girl inherits X chromosome from father. Hence, mother does not play any role in determination of sex of the new born.

6. If we take a magnetic compass slowly away from the current-carrying conductor, the deflection of the compass decreases. This shows that the magnetic field decreases as we move away from the current-carrying conductor.

OR

As we know, magnetic field due to a current carrying loop at the centre is

$B \propto I$, $B \propto n$, $B \propto \dfrac{1}{r}$

$\therefore$ $B \propto \dfrac{nI}{r}$ or $B = \dfrac{knI}{r}$

where k is proportionality constant.

when there is only one turn, $B_1 = \dfrac{kI}{R_1}$;

where $R_1 = \dfrac{l}{2\pi}$, l is the length of wire.

when there are n turns, $B_2 = \dfrac{knI}{R_2}$;

where $R_2 = \dfrac{l}{2\pi n}$

$\therefore$ $\dfrac{B_1}{B_2} = \dfrac{R_2}{nR_1} = \dfrac{\left(\dfrac{I}{2\pi n}\right)}{n\left(\dfrac{I}{2\pi}\right)} = \dfrac{1}{n^2}$

or $B_2 = n^2 B_1$

or $B_2 = n^2 B$ $\quad\quad\quad$ ($\because$ $B_1 = B$)

**7.** (a) Grass will have the maximum available energy as it is a producer *i.e.*, first trophic level.

(b) Eagle will have the minimum available energy as it is a top consumer, *i.e.*, fifth trophic level.

OR

S.No.	Biodegradable wastes	Non-biodegradable wastes
(i)	These are biological in origin.	These are mostly man-made.
(ii)	These are degraded by microorganisms such as bacteria and fungi.	These are not degraded by microorganisms.
(iii)	These cannot be biologically magnified.	Some of these can enter into the food chains and get biologically magnified.
(iv)	These can be converted into resources. Examples : Sewage, cattle dung, household garbage, etc.	Some of these can be recycled. Examples : Plastic objects, synthetic fibres, glass objects, pesticides, heavy metals, etc.

8. (a) Potassium is found is group 1, bromine in group 17 and krypton in group 18.

(b)
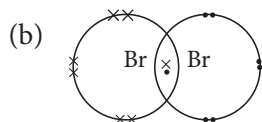
(c) Krypton has a stable electronic configuration, with 8 electrons in its valence shell. Hence, it does not lose, gain or share electron(s) with another atom.

9. (a) Since the maximum angle strain is obtained when the two carbon atoms are linked by three covalent bonds, therefore, two carbon atoms cannot be linked to each other by more than three covalent bonds.

(b) Differences between diamond and graphite :

	Diamond	Graphite
1.	Three dimensional rigid	Two dimensional layered structure
2.	Bad conductor of electricity	Good conductor of electricity
3.	Diamond is hard and used in cutting or drilling	Graphite is soft and greasy. It is used as a lubricant

OR

(a) As C_3H_8 has general formula C_nH_{2n+2} thus it belongs to alkane series.

P, Q, R and S are classified as hydrocarbons because these compounds are made up of carbon and hydrogen only.

(b) C_3H_8, C_4H_{10} and C_5H_{12} all have general formula C_nH_{2n+2} thus, all of these belong to alkanes.

(c) They have general formula C_nH_{2n+2} and their melting points and boiling points increase with increase in molecular mass.

10. In sexual reproduction, greater variations are generated. This is because of exchange of DNA segments during crossing over in gamete formation and union of traits from two different parents during fertilisation generates greater variation. In asexually reproducing organisms, the progenies would be very similar to parents. There would be minor difference between them due to small inaccuracies in copying DNA or mutation or environmental factors.

11. (a) : The slope of *V-I* graph gives the resistance of a conductor at a given temperature. From the graph, it follows that resistance of a conductor at temperature T_1 is greater than at temperature T_2. As the resistance of a conductor is more at higher temperature and less at lower temperature, hence $T_1 > T_2$.
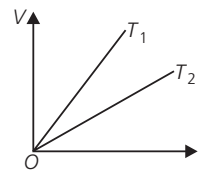
(b) The resistance of wire $(R) = \rho\dfrac{l}{A}$, where ρ is the resistivity of the wire which is material dependent, l is the length of the wire and A is the cross-sectional area of the wire.

It can be seen from the formula, that the resistance of the wire is inversely proportional to the cross-sectional area of the wire. This implies that the thicker the wire the lower the resistance of the wire will be. So,

Resistance with area 1 mm^2 is 16 Ω.
Resistance with area 2 mm^2 is 8 Ω.

12. In each segment of the combination 3 Ω and 2 Ω resistances are connected in series separately.

$\therefore$ $R' = 3 + 3 = 6\ \Omega$ and $R'' = 2 + 2 = 4\ \Omega$

R' and R'' are connected in parallel

$\therefore$ For first segment $\dfrac{1}{R_{eq_1}} = \dfrac{1}{6} + \dfrac{1}{4} = \dfrac{2+3}{12} = \dfrac{5}{12}$

$R_{eq_1} = \dfrac{12}{5}\Omega$ similarly for second and third segment

$R_{eq_2} = \dfrac{12}{5}\ \Omega$ and $R_{eq_3} = \dfrac{12}{5}\ \Omega$

Now segments are connected in series then the total resistance of combination is

$R_{eq} = R_{eq_1} + R_{eq_2} + R_{eq_3} = \dfrac{12}{5} + \dfrac{12}{5} + \dfrac{12}{5} = \dfrac{36}{5}\Omega$

OR

(a) No bulb will glow when plug key is in open position as no current would flow through the circuit.

(b) Power of bulb, $P = I^2 R$

For the same current, $P \propto R$

but for the same voltage, $P \propto \dfrac{1}{R}$ or $R \propto \dfrac{1}{P}$

So, resistance order of all bulb is, $R_{25} > R_{40} > R_{60}$

According to Joule's law of heating, $H \propto R$ (for the same current and time)

Hence, order of heating produced is

$$H_{25} > H_{40} > H_{60}$$

which is order of brightness of the bulb when key is closed.

13. (a) The given figure is of biomagnification of DDT in which parts 'A', 'B' and 'C' are phytoplankton, small fish and fish-eating bird or human being respectively.

(b) Some harmful non-biodegradable chemicals such as pesticides, *e.g.*, DDT and heavy metals *e.g.*, mercury, arsenic, cadmium, etc., enter the bodies of organisms through the food chains and go on concentrating at each trophic level.
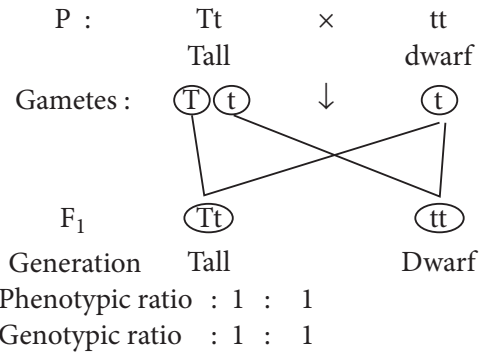
14. (a) The phenotype of F_1 progeny will be tall (Tt) hybrid. They resembled only one parent. In a cross between tall (TT) and dwarf (tt) breeds of pea plants, the F_1 plants will be all tall because alleles for dwarfness (t) is unable to express itself in the presence of allele of tallness (T). The alleles for tallness is dominant over the factor for dwarfness and the allele for dwarfness is recessive.

(b) The phenotypic ratio of F_2 progeny will be 3 (Tall) : 1 (Dwarf).

(c) F_1 progeny resembled only one parent which is dominant in nature but in F_2 progeny phenotypically three plants are tall in which one plant is pure tall (TT), two are hybrid tall (Tt) and one plant is pure dwarf (tt).

OR

P : Tt × tt
     Tall   dwarf

Gametes : (T)(t) ↓ (t)

F_1 (Tt) (tt)

Generation Tall Dwarf
Phenotypic ratio : 1 : 1
Genotypic ratio : 1 : 1

15. (a) Magnetic field inside infinite solenoid is uniform. Hence it is same at all points.

(b) For a long solenoid, magnetic field $B \propto In$; where I is the flowing current and n is number of turns per unit length in the solenoid. Therefore, in the given case magnetic field will remain unchanged.

(c) When the plug of the key is closed, the face B of the iron bar marked as N-pole

OR

According to right hand thumb rule, the magnetic field at Q due to wire P is along negative y-axis.

∴ Magnetic field at Q is antiparallel to current I_2. Hence, there is no force on wire Q due to wire P.

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Self Evaluation Sheet

*Once you complete **SQP-3**, check your answers with the given solutions and fill your marks in the marks obtained column according to the marking scheme. Performance Analysis Table given at the bottom will help you to check your readiness.*

Q.No.	Chapter	Marks Per Question	Marks Obtained
1	Carbon and Its Compounds	2	
2	Periodic Classification of Elements	2	
3	How do Organisms Reproduce?	2	
4	How do Organisms Reproduce?	2	
5	Heredity and Evolution	2	
6	Magnetic Effects of Electric Current	2	
7	Our Environment	2	
8	Periodic Classification of Elements	3	
9	Carbon and Its Compounds	3	
10	How do Organisms Reproduce?	3	
11	Electricity	3	
12	Electricity	3	
13	Our Environment	3	
14	Heredity and Evolution	4	
15	Magnetic Effects of Electric Current	4	
	Total Marks	**40**	....
	Percentage		..............%

Performance Analysis Table

If your marks is

😄	**> 90%**	**TREMENDOUS!**	➢ *You are done! Keep on revising to maintain the position.*
😃	**81-90%**	**EXCELLENT!**	➢ *You have to take only one more step to reach the top of the ladder. Practise more.*
🙂	**71-80%**	**VERY GOOD!**	➢ *A little bit of more effort is required to reach the 'Excellent' bench mark.*
🙂	**61-70%**	**GOOD!**	➢ *Revise thoroughly and strengthen your concepts.*
😐	**51-60%**	**FAIR PERFORMANCE!**	➢ *Need to work hard to get through this stage.*
🙁	**40-50%**	**AVERAGE!**	➢ *Try hard to boost your average score.*