Strictly Confidential- (For Internal and Restricted Use Only) **Secondary School Examination**
SUMMATIVE ASSESSMENT - II
March 2017

Marking Scheme – Science (Delhi) 31/1/1

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6. Wherever only two/three of a 'given' number of examples/factors/points are expected only the first two/three or expected number should be read. The rest are irrelevant and should not be examined.

7. There should be no effort at 'moderation' of the marks by the evaluating teachers. The actual total marks obtained by the candidate may be of no concern of the evaluators.

8. All the Head Examiners / Examiners are instructed that while evaluating the answer scripts, if the answer is found to be totally incorrect, the (X) should be marked on the incorrect answer and awarded '0' marks.

9. ½ mark may be deducted if a candidate either does not write units or writes wrong units in the final answer of a numerical problem.

10. A full scale of mark 0 to 100 has to be used. Please do not hesitate to award full marks if the answer deserves it.

11. As per orders of the Hon'ble Supreme Court the candidates would now be permitted to obtain photocopy of the Answer Book on request on payment of the prescribed fee. All Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points given in the marking scheme.

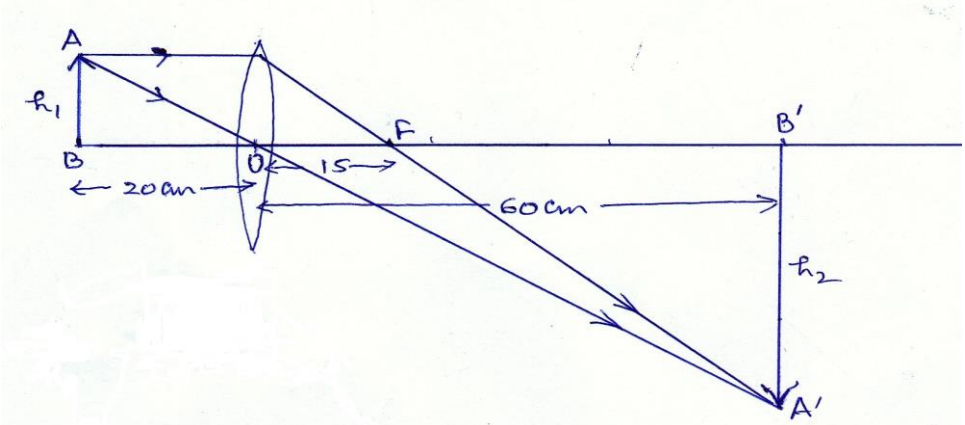
MARKING SCHEME **Code No. 31/1/1**
CLASS X – DELHI

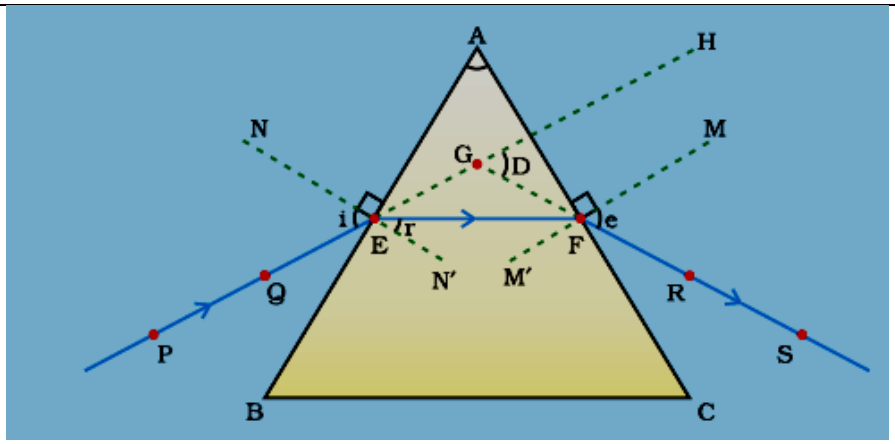
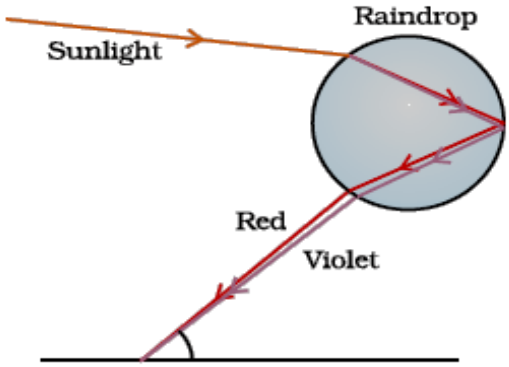
	Expected Answer/ Value point	Marks	Total
	SECTION – A		
Q 1.	CH_3Cl, C_2H_5Cl	½, ½	1
Q2.	Fragmentation Asexual	½ ½	1
Q3.	A unit of biosphere in which biotic and abiotic components interact with each other.	1	1
Q4.	Virtual, erect, diminished, laterally inverted	4 x ½	2
Q5.	Management of resources in a way that present day needs of the population are justified as well as they remain available for future generation.	1	
	Reuse does not consume energy.	1	2
Q6.	Space (Clearing forests) is needed for developmental activities.		
	Our selfish attitude/ No respect for natural resources.		
	(or same explained in any other manner)	1x2	2
Q7.	C_4H_8, it is an unsaturated hydrocarbon due to the presence of a double bond.	1+1	
	$C_4H_8 + H_2 \xrightarrow{Ni//Pd} C_4H_{10}$ ½ Catalyst ½ equation	½+½	
	(or any other)		3
Q8.	i) $CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$		
	ii) $CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$		
	iii) $C_2H_5OH + CH_3COOH \xrightarrow{Conc.H_2SO_4} CH_3COOC_2H_5 + H_2O$	1 x 3	3
Q9.	Vertical Columns – Groups	½	
	Horizontal Rows – Period	½	
	Metallic character increases	½	
	Reason: Ability to lose electrons increases on moving down the group due to increase in distance between the nucleus and the valence electrons /decrease in the attraction between the nucleus and the valence electrons.	½	
	Atomic radius decreases	½	
	Reason: the nuclear charge increases on moving from left to right across a period resulting in increase in the attraction between the nucleus and the valence electrons.	½	3

Q10.	Position of P	Group – 2	Because it has 2 valence electrons/ 2, 8, 8, 2	½	
		Period – 4	Because it has 4 shells/ 2, 8, 8, 2	½	
	Position of Q	Group – 17	Because it has 7 valence electrons/ 2, 8, 7	½	
		Period – 3	Because it has 3 shells/ 2, 8, 7	½	
	Formula	PQ_2	Because valency of P is 2 and that of Q is 1	½, ½	3
Q11.	a) Each piece regenerates into new Planaria			1	
	b) Bud, at its notches develop into new plants.			1	
	c) It releases spores which germinate into new mycelium in moist conditions.			1	3
Q12.	Formation of male and female gametes, fusion of gametes/ syngamy			½, ½	
	Importance – Combination of DNA from two different individuals lead to increase in genetic variation in the organism			1	
	This leads to diversity in the population which helps in natural selection.			1	3
Q13	a) When implantation of embryo has occurred the uterine wall thickens and is richly supplied with blood to nourish the growing embryo.			1 ½	
	b) The thick and spongy lining of the uterus slowly breaks and comes out through the vagina as blood and mucus.			1 ½	3

Q14.	**Acquired Trait**	**Inherited Traits**		
	1. Develop during one's life time	Are inherited from the parents		
	2. Do not bring about changes in the DNA of the germ cells	Result due to existing changes in the DNA of the germ cells		
	3. Cannot be passed on to the progeny	Can be passed on to the progeny		
		(any two)	1 x 2	
	Examples			
	Acquired knowledge, loss of weight	Skin colour, colour of the eye (any one)		
		(or any other)	1	3
Q15.	a) Homologous Organs – The study of these organs suggests that these organisms with organs having same structure but performing different functions have evolved from a common ancestor, e.g. forelimbs of different vertebrates.		½ ½	
	b) Analogous Organs – The study of these apparently similar organs suggests that the organisms with apparently similar organs do not share common ancestory. Similarity in these organs is superficial/ Design and the structure of these organs are very different, e.g. Wings of bird and wings of butterfly.		½ ½	
	c) Fossils – Provide the missing link between the species, e.g. Fossils of dinosaurs with feathers/ fossils of prehistoric horse/ or any other correct example.		½ ½	3

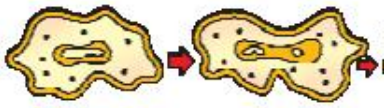
Q16.	$h_1 = +4\text{cm}$ $f = -10\text{cm}$ $u = -15\text{cm}$ $v = ?$ $h_2 = ?$		
	$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$	½	
	$\Rightarrow \frac{1}{v} = \frac{1}{f} - \frac{1}{u}$		
	$\frac{1}{v} = \frac{1}{-10\text{cm}} - \frac{1}{-15\text{cm}}$	½	
	$\therefore\ v = -30\text{cm}$	1	
	$\frac{h_2}{h_1} = -\frac{v}{u}$	½	
	$\therefore\ h_2 = -\frac{v}{u} \times h_1 \quad = -\frac{-30\text{cm}}{-15\text{cm}} \times 4\text{cm} \quad = -8\text{cm}$	½	3
Q17.	• Presbyopia	½	
	• Bifocal lens	½	
	• Upper portion/ part – Concave / Diverging lens	½	
	– To view far off objects	½	
	Lower part – Convex/ converging lens	½	
	– To facilitate/ view nearby objects	½	3
Q18.	a) Because Ozone layer protects/ shields earth from harmful UV radiations of the sun	1	
	b) • Conducting poster making competition highlighting effects of ozone layer depletion.	1	
	• Conducting street plays highlighting the ways of environment protection.	1	3
	(or any other)		
Q19.	• Soaps are the sodium or potassium salts of long chain carboxylic acids while detergents are the ammonium or sulphonate salts of long chain carboxylic acids.	1	
	• The dirt is oily in nature and when soap is added to water, its molecules form structures called micelles in which carbon chain of the molecules dissolves in the oil while the ionic end dissolves in water and faces outside. The micelles thus help in dissolving the dirt in water. (Note: 1 mark to be awarded if only labelled diagram of micelle is given)	2	
	• Ca^{2+} and Mg^{2+} present in hard water form insoluble substance (scum) with soap.	1	
	• Two problems –		
	(i) Non-biodegradable		
	(ii) Water pollution / soil pollution	1	5
	(Note: 1 mark to be awarded for any one of the problems.)		
Q20.	a) • Testes	½	
	• Testosterone	½	
	• Functions of Testosterone – I) Formation of sperms		

	II) Development of secondary sexual characters	½ x 2	
	b) Fallopian Tubes/ Oviduct	½	
	c) Placenta, a special disc–like tissue embedded in the mother's uterine wall and connected to the foetus/ embryo	½, 1	
	Placenta provides a large surface area for glucose and oxygen/ nutrient to pass from the mother's blood to the developing embryo/ foetus.	1	5
Q21.	a) Mendel conducted a Monohybrid cross/ (crossed pure tall pea plants with pure dwarf pea plants), observed only tall pea plants in the F_1 generation, but on selfing the F_1 progeny both tall and dwarf pea plants were observed in F_2 generation in the ratio 3:1. Appearance of tall character in F_1 and F_2 generations shows tallness to be a dominant character. But absence of dwarf character in F_1 and its reappearance in F_2 confirms that dwarfness is a recessive character.	2 ½	
	b) Mendel conducted a dihybrid cross and observed that though he started with two types of parents, he obtained four types of individuals in F_2. The appearance of new recombination in F_2 generations along with parental type characters show that traits are inherited independently of each other.	½ 1 1	5
Q22.	a) $f = +15\,\text{cm}$	½	
	Reason: Objects at S. No. (3) indicates $u = -30\,\text{cm}$, $v = +30\,\text{cm}$		
	Thus, object is at 2F $(2f = 30\ \text{cm})$		
	$\therefore\ f = 15\ \text{cm}$	1	
	b) Observation at S. No. (6)	½	
	The value, $u = -10\ \text{cm}$, indicates that the object is in between the optical centre and the focus (i.e., less than the focal length) of the lens and hence the image should be on the same side as the object. Thus the image distance cannot be positive.	1	
	c) $u = -20\,\text{cm};\ v = +60\,\text{cm};\ f = +15\ \text{cm}$ 	1 ½	
	$m = \dfrac{h_2}{h_1} = \dfrac{-4.5\,\text{cm}}{+1.5\,\text{cm}} = -3$	½	5
Q23.	a) • Listing of any two (out of four) rays and stating their path after reflection from a concave mirror.	1, 1	
	• Ray diagram		
	Using these two rays for the ray diagram when the object is in between the pole	1	

	and the focus of the mirror.		
	b) $u = -20\,\text{cm}$ $m = -3$		
	$m = \frac{v}{-u}$	½	
	$\therefore\ v = -m \times u$	½	
	$= -(-3)(-20\ \text{cm}) = -60\ \text{cm}$	½	
	Distance between the object and the screen is 40 cm		
	$= -60\ \text{cm} - (-20\ \text{cm}) = -40\ \text{cm}$	½	5
Q24.	a) 		
	Diagram	1	
	Direction of rays	½	
	Marking $\angle$ D	½	
	b) Different colour of white light bend through different angles with respect to the incident light, as they pass through the glass prism. Thus, each colour emerges along a different path, forming a spectrum.	1	
	c) 		
	Diagram	1	
	Labelling	1	5
	SECTION – B		

	25) d	26) d	27) a		
	28) b	29) c	30) a		
	31) c	32) a	33) b	9 x 1	9

Q34.	Carbon-dioxide/ CO_2	1	

	Lime water turns milky on passing CO_2 through it.	1	2
Q35.	Binary Fission	½	
	Elongation of cell and its nucleus	½	
	 Correct diagram showing progressive elongation of the nucleus and cytoplasm.	1	2
Q36.	• Away from the lens		
	• Size increases		
	• Intensity decreases		
	• About 20 cm	4 x ½	2

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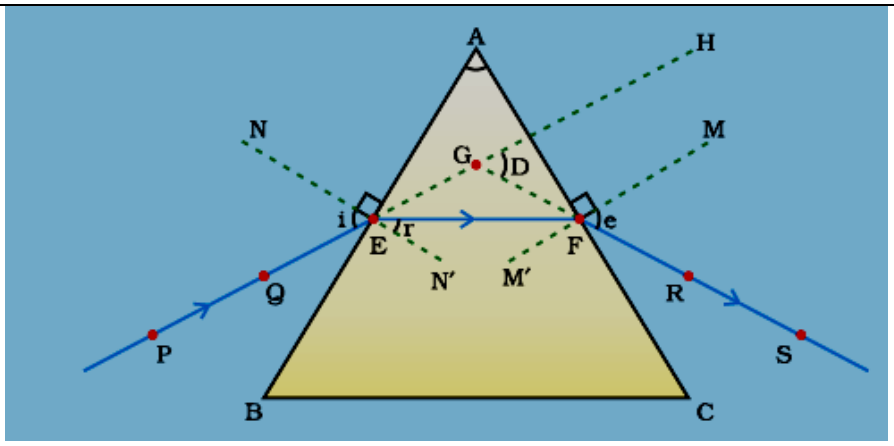
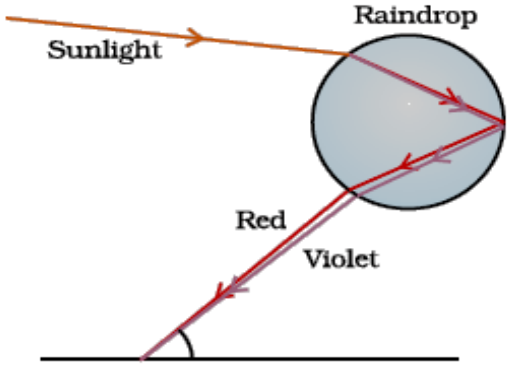
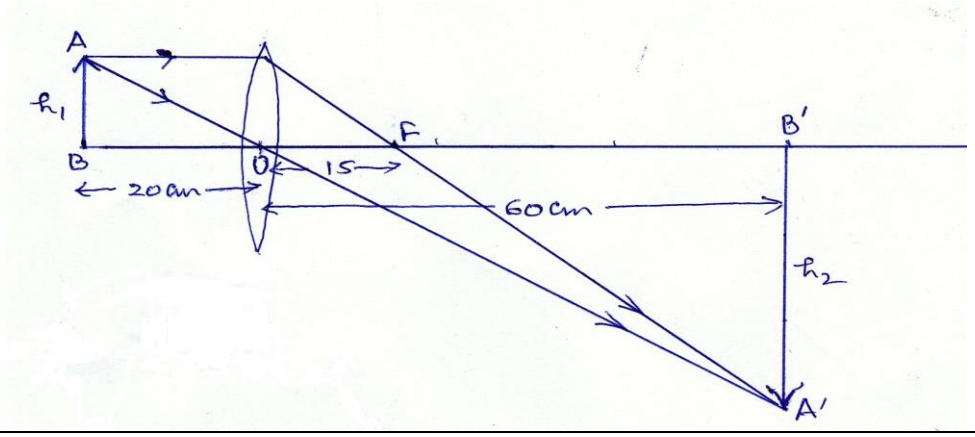
	Expected Answer/ Value point	Marks	Total
	SECTION – A		
Q 1.	CH_3Br, C_2H_5Br	½, ½	1
Q2.	Regeneration; Asexual	½, ½	1
Q3.	Because a forest is a self-sustaining system	1	1
Q4.	Virtual, erect, diminished, laterally inverted	4 x ½	2
Q5.	Since natural resources are limited, if they are over exploited for short term gains, future generation will suffer heavily.	1	
	Reuse does not consume energy.	1	2
Q6.	Local people are dependent on forest produce for various aspects of their life, therefore they develop practices to ensure that the resources are used in sustainable manner.	1 1	2
Q7.	i) $2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + H_2O + CO_2$	1	
	ii) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$	1	
	iii) $2C_2H_5OH + 2Na \rightarrow 2\ C_2H_5ONa + H_2$	1	3
Q8.	• C_3H_6 / X	1	
	• It is an unsaturated compound / due to the presence of a double bond.	1	
	• $C_3H_6 + H_2 \xrightarrow{Ni\ /\ Pd} C_3H_8$	1	3
	(or any other)		
Q9.	Position of P Group – 2 — Because it has 2 valence electrons/ 2, 8, 8, 2	½	
	Period – 4 — Because it has 4 shells/ 2, 8, 8, 2	½	
	Position of Q Group – 17 — Because it has 7 valence electrons/ 2, 8, 7	½	
	Period – 3 — Because it has 3 shells/ 2, 8, 7	½	
	Formula PQ_2 — Because valency of P is 2 and that of Q is 1	½, ½	3
Q10.	Vertical Columns – Groups	½	
	Horizontal Rows – Period	½	
	Metallic character increases	½	
	Reason: Ability to lose electrons increases on moving down the group due to increase in distance between the nucleus and the valence electrons /decrease in the attraction between the nucleus and the valence electrons.	½	
	Atomic radius decreases	½	

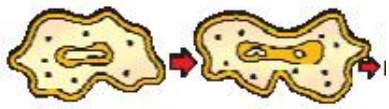
	Reason: the nuclear charge increases on moving from left to right across a period resulting in increase in the attraction between the nucleus and the valence electrons.	½	3
Q11.	Human male – 22 pairs of chromosomes along with XY sex chromosome.	½	
	Human female – 22 pairs of chromosomes along with XX sex chromosomes	½	
	The original number of chromosomes (the amount of DNA) becomes half during gamete formation. When the gametes fuse, the original number of chromosomes (the amount of DNA) is restored in the progeny.	2	3
Q12	a) When implantation of embryo has occurred the uterine wall thickens and is richly supplied with blood to nourish the growing embryo.	1 ½	
	b) The thick and spongy lining of the uterus slowly breaks and comes out through the vagina as blood and mucus.	1 ½	3
Q13.	a) Each piece regenerates into new Planaria	1	
	b) Bud, at its notches develop into new plants.	1	
	c) It releases spores which germinate into new mycelium in moist conditions.	1	3
Q14.	• Natural selection is defined as the change in frequency of some genes in a population, which gives survival advantage to a species. • Whereas speciation is the development of a new species from pre-existing ones. • This leads to a sequence of gradual change in the primitive organisms over millions of years, to form newer species which are very different from older ones. This is called evolution.	1 1 1	3

Q15.	**Acquired Trait**	**Inherited Traits**		
	1. Develop during one's life time	Are inherited from the parents		
	2. Do not bring about changes in the DNA of the germ cells	Result due to existing changes in the DNA of the germ cells		
	3. Cannot be passed on to the progeny	Can be passed on to the progeny		
		(any two)	1 x 2	
	Examples			
	Acquired knowledge, loss of weight	Skin colour, colour of the eye (any one)		
		(or any other)	1	3
Q16.	$h_1 = +3$ cm $\quad f = -12$cm $\quad u = -18$cm $\quad v = ?$ $\quad h_2 = ?$			

	$\frac{1}{f}=\frac{1}{v}+\frac{1}{u}$	½	
	$\Rightarrow \frac{1}{v}=\frac{1}{f}-\frac{1}{u} \quad = \frac{1}{-12\,\text{cm}}-\frac{1}{-18\,\text{cm}}$	½	
	$\therefore\ v=-36\,\text{cm}$	1	
	$m=\frac{h_2}{h_1}=-\frac{v}{u}$	½	
	$\therefore\ h_2=-h_1\times\frac{v}{u} \quad = -3\,\text{cm}\times\frac{-36\,\text{cm}}{-18\,\text{cm}}=-6\ \text{cm}.$	½	3
Q17.	• a) Lens becomes thin	½	
	Curvature – decreases	½	
	Focal length – increases		
	b) Curvature – increases	½	
	Focal length – decreases	½	
	• Focal length of the lens of a normal human eye cannot be decreased below a certain limit.	1	3
	(Note: In the Hindi version instead of change in curvature, change in radius of curvature has been asked. So, for Hindi medium the correct answer is a) Radius of curvature – increases; focal length – increases b) Radius of curvature – decreases; focal length – decreases		
Q18.	a) Because Ozone layer protects/ shields earth from harmful UV radiations of the sun	1	
	b) • Conducting poster making competition highlighting effects of ozone layer depletion.	1	
	• Conducting street plays highlighting the ways of environment protection.	1	3
	(or any other)		
Q19.	a) 		
	Diagram	1	
	Direction of rays	½	
	Marking ∠ D	½	
	b) Different colour of white light bend through different angles with respect to the incident light, as they pass through the glass prism. Thus, each colour	1	

	emerges along a different path, forming a spectrum.		
	c)  Diagram Labelling	1 1	5
Q20.	a) $f = +15\,\text{cm}$	½	
	Reason: Objects at S. No. (3) indicates $u = -30\,\text{cm}$, $v = +30\,\text{cm}$		
	Thus, object is at 2F $(2f = 30\ \text{cm})$		
	$\therefore\ f = 15\ \text{cm}$	1	
	b) Observation at S. No. (6)	½	
	The value, $u = -10\ \text{cm}$, indicates that the object is in between the optical centre and the focus (i.e., less than the focal length) of the lens and hence the image should be on the same side as the object. Thus the image distance cannot be positive.	1	
	c) $u = -20\,\text{cm};\ v = +60\,\text{cm};\ f = +15\ \text{cm}$ 	1 ½	
	$m = \dfrac{h_2}{h_1} = \dfrac{-4.5\,\text{cm}}{+1.5\,\text{cm}} = -3$	½	5
Q21.	a) • Listing of any two (out of four) rays and stating their path after reflection from a concave mirror.	1, 1	
	• Ray diagram		
	Using these two rays for the ray diagram when the object is in between the pole and the focus of the mirror.	1	
	b) $u = -20\,\text{cm}$ $m = -3$		

	$m = \frac{v}{-u}$	½	
	$\therefore\ v = -m \times u$	½	
	= – (– 3) (– 20 cm) = – 60 cm	½	
	Distance between the object and the screen is 40 cm		
	= – 60 cm – (– 20 cm) = – 40 cm	½	5
Q22.	• Soaps are the sodium or potassium salts of long chain carboxylic acids while detergents are the ammonium or sulphonate salts of long chain carboxylic acids.	1	
	• The dirt is oily in nature and when soap is added to water, its molecules form structures called micelles in which carbon chain of the molecules dissolves in the oil while the ionic end dissolves in water and faces outside. The micelles thus help in dissolving the dirt in water. (Note: 1 mark to be awarded if only labelled diagram of micelle is given)	2	
	• Ca^{2+} and Mg^{2+} present in hard water form insoluble substance (scum) with soap.	1	
	• Two problems –		
	(i) Non-biodegradable		
	(ii) Water pollution / soil pollution	1	5
	(Note: 1 mark to be awarded for any one of the problems.)		
Q23.	a) Mendel conducted a Monohybrid cross/ (crossed pure tall pea plants with pure dwarf pea plants), observed only tall pea plants in the F_1 generation, but on selfing the F_1 progeny both tall and dwarf pea plants were observed in F_2 generation in the ratio 3:1. Appearance of tall character in F_1 and F_2 generations shows tallness to be a dominant character. But absence of dwarf character in F_1 and its reappearance in F_2 confirms that dwarfness is a recessive character.	2 ½	
	b) Mendel conducted a dihybrid cross and observed that though he started with two types of parents, he obtained four types of individuals in F_2. The appearance of new recombination in F_2 generations along with parental type characters show that traits are inherited independently of each other.	½ 1 1	5
Q24.	a) • Testes	½	
	• Testosterone	½	
	• Functions of Testosterone – I) Formation of sperms		
	II) Development of secondary sexual characters	½ x 2	
	b) Fallopian Tubes/ Oviduct	½	
	c) Placenta, a special disc–like tissue embedded in the mother's uterine wall and connected to the foetus/ embryo	½, 1	
	Placenta provides a large surface area for glucose and oxygen/ nutrient to pass from the mother's blood to the developing embryo/ foetus.	1	5
	SECTION – B		

	25) c	26) b	27) b		
	28) a	29) c	30) a		
	31) d	32) a	33) d	1 X 9	9
Q34.	• Away from the lens				
	• Size increases				
	• Intensity decreases				
	• About 20 cm			4 x ½	2
Q35.	Carbon-dioxide/ CO_2			1	
	Lime water turns milky on passing CO_2 through it.			1	2
Q36.	Binary Fission			½	
	Elongation of cell and its nucleus			½	
	 Correct diagram showing progressive elongation of the nucleus and cytoplasm.			1	2

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6. Wherever only two/three of a 'given' number of examples/factors/points are expected only the first two/three or expected number should be read. The rest are irrelevant and should not be examined.

7. There should be no effort at 'moderation' of the marks by the evaluating teachers. The actual total marks obtained by the candidate may be of no concern of the evaluators.

8. All the Head Examiners / Examiners are instructed that while evaluating the answer scripts, if the answer is found to be totally incorrect, the (X) should be marked on the incorrect answer and awarded '0' marks.

9. ½ mark may be deducted if a candidate either does not write units or writes wrong units in the final answer of a numerical problem.

10. A full scale of mark 0 to 100 has to be used. Please do not hesitate to award full marks if the answer deserves it.

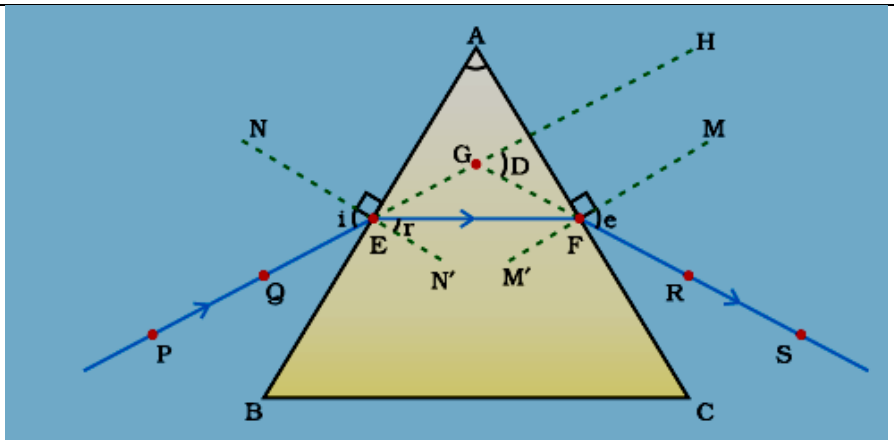
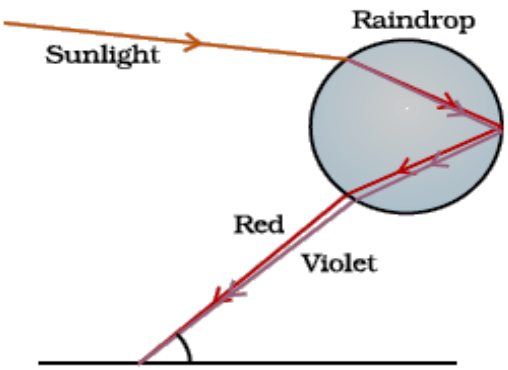
11. As per orders of the Hon'ble Supreme Court the candidates would now be permitted to obtain photocopy of the Answer Book on request on payment of the prescribed fee. All Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points given in the marking scheme.

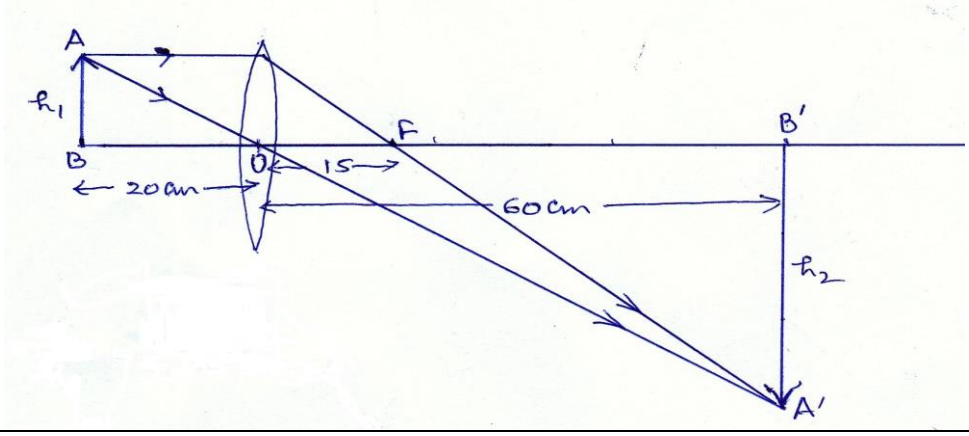
MARKING SCHEME **Code No. 31/1/3**
CLASS X – DELHI

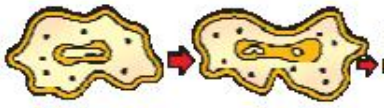
	Expected Answer/ Value point	Marks	Total
	SECTION – A		
Q 1.	CH_3OH, C_2H_5OH	½, ½	1
Q2.	Multiple fission; Asexual	½, ½	1
Q3.	Because a lake is a self-sustaining system.	1	1
Q4.	Virtual, erect, diminished, laterally inverted	4 x ½	2
Q5.	Former leads to huge immediate profits / selfish gains while latter leads to sustainable approach so that the resource may last for future generations too.	1 1	2
Q6.	Wildlife – All naturally occurring plants, animals and their species which are not cultivated / domesticated / trained	1	
	Importance – i. Help in maintaining ecological balance ii. Provide great aesthetic value for human beings iii. They have economical importance also		
	(any two)	½ x 2	2
Q7.	i. $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$	1	
	ii. $C_2H_5OH \xrightarrow[443K]{\text{Conc. } H_2SO_4} C_2H_4 + H_2O$	1	
	iii. $CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O + CO_2$	1	3
Q8.	• C_4H_8	1	
	• It is an unsaturated compound / due to the presence of a double bond.	1	
	• $C_4H_8 + H_2 \xrightarrow{Ni\ /\ Pd} C_4H_{10}$ (or any other example)	1	3
Q9.	Vertical Columns – Groups	½	
	Horizontal Rows – Period	½	
	Metallic character increases	½	
	Reason: Ability to lose electrons increases on moving down the group due to increase in distance between the nucleus and the valence electrons /decrease in the attraction between the nucleus and the valence electrons.	½	
	Atomic radius decreases	½	
	Reason: the nuclear charge increases on moving from left to right across a period resulting in increase in the attraction between the nucleus and the valence electrons.	½	3

Q10.	Position of P	Group – 2	Because it has 2 valence electrons/ 2, 8, 8, 2	½	
		Period – 4	Because it has 4 shells/ 2, 8, 8, 2	½	
	Position of Q	Group – 17	Because it has 7 valence electrons/ 2, 8, 7	½	
		Period – 3	Because it has 3 shells/ 2, 8, 7	½	
	Formula	PQ_2	Because valency of P is 2 and that of Q is 1	½, ½	3
Q11.	Mendel conducted a dihybrid cross; and observed that though he started with two types of parents, he obtained four types of individuals in F_2; The appearance of new recombination in F_2 generations along with parental type characters show that traits are inherited independently of each other.			1+1+1	3
Q12.	a) Homologous Organs – The study of these organs suggests that these organisms with organs having same structure but performing different functions have evolved from a common ancestor, e.g. forelimbs of different vertebrates.			½ ½	
	b) Analogous Organs – The study of these apparently similar organs suggests that the organisms with apparently similar organs do not share common ancestory. Similarity in these organs is superficial/ Design and the structure of these organs are very different, e.g. Wings of bird and wings of butterfly.			½+½	
	c) Fossils – Provide the missing link between the species, e.g. Fossils of dinosaurs with feathers/ fossils of prehistoric horse/ or any other correct example.			½ ½	3
Q13.	a) Each piece regenerates into new Planaria			1	
	b) Bud, at its notches develop into new plants.			1	
	c) It releases spores which germinate into new mycelium in moist conditions.			1	3
Q14.	**<u>Steps of Sexual Reproduction:</u>** • Formation of male and female gametes • Transfer of male gamete to female gamete • Fusion of gametes resulting in zygote formation • Zygote grows into an embryo forming a new individual			½ x 4	
	<u>Advantages:</u> • Increases genetic variation • Plays an important role in the origin of new species			½ x 2	3
Q15	a) When implantation of embryo has occurred the uterine wall thickens and is richly supplied with blood to nourish the growing embryo.			1 ½	
	b) The thick and spongy lining of the uterus slowly breaks and comes out through the vagina as blood and mucus.			1 ½	3

Q16.	$h_1 = +\ 2.4\text{cm}$ $u = -\ 30\text{cm}$ $v = -\ 60\text{cm}$ $f = ?$		
	$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$	½	
	$= \frac{1}{-\ 60\text{cm}} + \frac{1}{-\ 30\text{cm}}$	½	
	$\therefore\ f = -\ 20\text{cm}$	1	
	$m = \frac{h_2}{h_1} = -\frac{v}{u}$	½	
	$\therefore\ h_2 = -\ h_1 \times \frac{v}{u}$ $= -\ 2.4\ \text{cm} \times \frac{-\ 60\text{cm}}{-30\text{cm}}$ $= -\ 4.8\ \text{cm}$	½	3
	(–ve sign of h_2 (image size) indicates that the image is inverted)		
Q17.	• Ability of the eye lens to focus nearby as well as distant objects on the retina by changing the curvature / focal length of the eye lens.	1	
	• Image distance in the eye is the distance between the eye lens and the retina and it is fixed.	1	
	• As the object approaches from infinity towards the eye, the focal length of the eye lens decreases (or vice a versa) so as to maintain the same image distance.	1	3
Q18.	a) Because Ozone layer protects/ shields earth from harmful UV radiations of the sun	1	
	b) • Conducting poster making competition highlighting effects of ozone layer depletion.	1	
	• Conducting street plays highlighting the ways of environment protection.	1	3
	(or any other)		
Q19.	a) Mendel conducted a Monohybrid cross/ (crossed pure tall pea plants with pure dwarf pea plants), observed only tall pea plants in the F_1 generation, but on selfing the F_1 progeny both tall and dwarf pea plants were observed in F_2 generation in the ratio 3:1. Appearance of tall character in F_1 and F_2 generations shows tallness to be a dominant character. But absence of dwarf character in F_1 and its reappearance in F_2 confirms that dwarfness is a recessive character.	2 ½	
	b) Mendel conducted a dihybrid cross and observed that though he started with two types of parents, he obtained four types of individuals in F_2. The appearance of new recombination in F_2 generations along with parental type characters show that traits are inherited independently of each other.	½ 1 1	5
Q20.	a) • Testes	½	
	• Testosterone	½	
	• Functions of Testosterone – I) Formation of sperms		
	II) Development of secondary sexual characters	½ x 2	
	b) Fallopian Tubes/ Oviduct	½	
	c) Placenta, a special disc–like tissue embedded in the mother's uterine wall and connected to the foetus/ embryo	½, 1	

		Placenta provides a large surface area for glucose and oxygen/ nutrient to pass from the mother's blood to the developing embryo/ foetus.	1	5
Q21.	a)			
		Diagram	1	
		Direction of rays	½	
		Marking ∠ D	½	
	b)	Different colour of white light bend through different angles with respect to the incident light, as they pass through the glass prism. Thus, each colour emerges along a different path, forming a spectrum.	1	
	c)			
		Diagram	1	
		Labelling	1	5
Q22.	a)	• Listing of any two (out of four) rays and stating their path after reflection from a concave mirror.	1, 1	
		• Ray diagram		
		Using these two rays for the ray diagram when the object is in between the pole and the focus of the mirror.	1	
	b)	$u = -20\,\text{cm}$ $\quad m = -3$		
		$m = \dfrac{v}{-u}$	½	
		$\therefore\ v = -m \times u$	½	
		$= -(-3)(-20\ \text{cm}) = -60\ \text{cm}$	½	
		Distance between the object and the screen is 40 cm		
		$= -60\ \text{cm} - (-20\ \text{cm}) = -40\ \text{cm}$	½	5

Q23.	a) $f = +15\,\text{cm}$			½	
	Reason: Objects at S. No. (3) indicates $u = -30\,\text{cm}$, $v = +30\,\text{cm}$				
	Thus, object is at 2F $(2f = 30\ \text{cm})$				
	$\therefore\ f = 15\ \text{cm}$			1	
	b) Observation at S. No. (6)			½	
	The value, $u = -10\ \text{cm}$, indicates that the object is in between the optical centre and the focus (i.e., less than the focal length) of the lens and hence the image should be on the same side as the object. Thus the image distance cannot be positive.			1	
	c) $u = -20\,\text{cm};\ v = +60\,\text{cm};\ f = +15\ \text{cm}$ 			1 ½	
	$m = \dfrac{h_2}{h_1} = \dfrac{-4.5\,\text{cm}}{+1.5\,\text{cm}} = -3$			½	5
Q24.	• Soaps are the sodium or potassium salts of long chain carboxylic acids while detergents are the ammonium or sulphonate salts of long chain carboxylic acids.			1	
	• The dirt is oily in nature and when soap is added to water, its molecules form structures called micelles in which carbon chain of the molecules dissolves in the oil while the ionic end dissolves in water and faces outside. The micelles thus help in dissolving the dirt in water. (Note: 1 mark to be awarded if only labelled diagram of micelle is given)			2	
	• Ca^{2+} and Mg^{2+} present in hard water form insoluble substance (scum) with soap.			1	
	• Two problems –				
	(i) Non-biodegradable				
	(ii) Water pollution / soil pollution			1	5
	(Note: 1 mark to be awarded for any one of the problems.)				
	SECTION – B				
	25) b	26) a	27) c		
	28) a	29) d	30) d		
	31) a	32) c	33) b	1 X 9	9

Q34.	Binary Fission	½	
	Elongation of cell and its nucleus	½	
	 Correct diagram showing progressive elongation of the nucleus and cytoplasm.	1	2
Q35.	• Away from the lens		
	• Size increases		
	• Intensity decreases		
	• About 20 cm	4 x ½	2
Q36.	Carbon-dioxide/ CO_2	1	
	Lime water turns milky on passing CO_2 through it.	1	2