

Strictly Confidential: (For Internal and Restricted use only)
Secondary School Examination
March 2019
Marking Scheme – SCIENCE (SUBJECT CODE 086)
(PAPER CODE – 31/2/3)

General Instructions: -

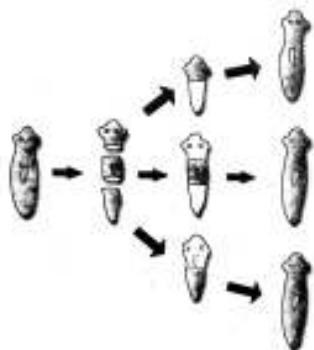
1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully. **Evaluation is a 10-12 days mission for all of us. Hence, it is necessary that you put in your best efforts in this process.**
2. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them.**
3. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
4. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled.
5. If a question does not have any parts, marks must be awarded in the left hand margin and encircled.
6. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
7. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
8. A full scale of marks 1 to 80 has to be used. Please do not hesitate to award full marks if the answer deserves it.
9. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 25 answer books per day.
10. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
 - Leaving answer or part thereof unassessed in an answer book.
 - Giving more marks for an answer than assigned to it.
 - Wrong transfer of marks from the inside pages of the answer book to the title page.
 - Wrong question wise totaling on the title page.
 - Wrong totaling of marks of the two columns on the title page.
 - Wrong grand total.
 - Marks in words and figures not tallying.
 - Wrong transfer of marks from the answer book to online award list.
 - Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
 - Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
11. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as (X) and awarded zero (0) Marks.
12. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
13. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.
14. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
15. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

SET 31 / 2 / 3

Q.No	Value Point/Expected Answer	Value	Total Mark
SECTION A			
A 1	Cord is made up of copper wire whereas heating element is made up of alloy.	1	1
A 2	They are non renewable / their formation takes millions of years / exhausted in the future (any one point)	1	1
SECTION B			
A 3	Refraction of light due to variation in optical density of earth.	1	
	Two phenomenon:- (i) Twinkling of stars (ii) Advance sunrise & delayed sunset	$\frac{1}{2} \times 2$	2
A 4	(i) Iron / Zinc / Lead (any one) (ii) Concentration of ore Enrichment/ of ore ↓ (iii) Roasting / conversion of sulphide into oxide on heating in air ↓ (iv) Reduction of metallic oxide to metal	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2
A 5	(i) Ethanoic acid reacts with NaOH to give sodium salt and water but C_2H_5OH does not show this reaction. (ii) Ethanoic acid reacts with $NaHCO_3$ (Sodium Bicarbonate) or Na_2CO_3 (Sodium Carbonate) and given sodium salt of ethanoic acid, water and carbon dioxide. OR Unsaturated compounds are more reactive. Test: Bayer's reagent test / Bromine water test given by ethene not by ethane / Ethane gives clear flame while ethene gives a yellow flame with lots of black smoke. (any one test)	1 1 1 1	2
SECTION C			
A 6	The white light splits into seven colours when it gets refracted through the glass prism (VIBGYOR) The colour deviates most – Violet The colour deviates least – Red Colours disappear and again white light obtained. OR (i) Myopia	1 $\frac{1}{2}$ $\frac{1}{2}$ 1 1 1	

	(ii) Concave / diverging lens and focal Length = 200cm (iii) (a) excessive curvature of the eye lens (b) elongation of eye ball	½ ½	3
A 7	Chain of organisms formed as a result of eating or being eaten by organisms is called food chain / A series of organisms feeding on one another, is called food chain. Grass → Insect (grasshopper) → Frog → Snake (Producer) (Herbivore) (Carnivore) (Top Carnivore) (Any other example of food chain) - Tertiary trophic level / snake - Biological magnification / Biomagnification	1 1 ½ ½	3
A 8	A device that converts solar energy directly into electrical energy. A large no. of solar cells are combined in an arrangement called Solar Cell Panel. Principal Advantages – (i) They have no moving parts (ii) require little maintenance & work quite satisfactorily without the use of any focusing device. (iii) These cells can be set up in remote & inaccessible areas where laying of a power transmission may be expensive. (any two)	1 1 1+1	3
A 9	(a) Silver is placed below Hydrogen in reactivity series / among least reactive metal / Silver does not react with dil. Hydrochloric acid. (b) Rate of reaction is slow / bubbles of Hydrogen gas are formed / lead lies above hydrogen in reactivity series. (c) Sodium is highly reactive / reaction is highly exothermic, evolving Hydrogen gas, which catches fire. (d) Reaction is exothermic	½ 1 1 ½	3
A 10	(i) $2 \text{Cu}_2\text{S} + 3\text{O}_2 \xrightarrow{\text{Heat}} 2 \text{Cu}_2\text{O} + 2\text{SO}_2$ (ii) $2\text{Cu}_2\text{O} + \text{Cu}_2\text{S} \xrightarrow{\text{Heat}} 6 \text{Cu} + \text{SO}_2$ (iii) At anode $\rightarrow \text{Cu} \rightarrow \text{Cu}^{2+} + 2\bar{e}$ At Cathode $\rightarrow \text{Cu}^{2+} + 2\bar{e} \rightarrow \text{Cu}$	1 1 ½ ½	3
A 11	(a) The process of diluting an acid is highly exothermic , and on the addition of acid to the water the excess heat is absorbed by water. (b) Because HCl does not form $\text{H}^+/\text{H}_3\text{O}^+$ ions in dry condition. OR • When electricity is passed through an aqueous solution of sodium chloride (brine) • Chlor – alkali process	1 1 1 ½ ½	

	<ul style="list-style-type: none"> X - Cl₂ Y = CaOCl₂ 2NaCl_(aq) + 2H₂O_(l) → 2NaOH_(aq) + Cl_{2(g)} + H_{2(g)} Ca(OH)₂ + Cl₂ → CaOCl₂ + H₂O 	½ ½ ½ ½	3																
A 12	<p>(i) A series of compounds in which the same functional group substitutes for hydrogen in a carbon chain is called a homologous series.</p> <p>(ii) Example – Alkane / Alkene / Alkyne / Alcohol or any other one correct example.</p> <p>(iii) Characteristics:-</p> <p>(i) They have same general formula</p> <p>(ii) They have same functional group</p> <p>(iii) The difference in the molecular mass of two successive member in 14μ</p> <p>(iv) The difference in the molecular formula of two successive member is of CH₂ unit.</p> <p>(v) They have similar chemical properties.</p> <p style="text-align: right;">(Any three points)</p>	1 ½ ½ x3	3																
A 13	<ul style="list-style-type: none"> The loss of water in the form of vapour from the aerial parts/leaves/stems is known as transpiration. Functions:- <ul style="list-style-type: none"> (i) It helps in the absorption and upward movement of water (ii) movement of dissolved minerals from root to leaves. (iii) It helps in the temperature regulation or cooling of the plant. <p style="text-align: center;">OR</p> <p>(a) The transport of soluble products of photosynthesis (food or glucose) from one part to the other parts of the plant. To provide food to all parts of the plant.</p> <p>(b) Root, fruits, seeds and other growing organs/parts of the plant. (any two)</p> <p style="text-align: right;">(Any two points)</p>	1 1+1 1 1 ½ + ½	3																
A 14	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Autotrophic Nutrition</th> <th colspan="2">Heterotrophic Nutrition</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>They can prepare their own food</td> <td style="text-align: center;">1</td> <td>They cannot prepare their own food.</td> </tr> <tr> <td style="text-align: center;">2</td> <td>They require raw materials like CO₂, H₂O in the presence of sunlight and chlorophyll to prepare their food.</td> <td style="text-align: center;">2</td> <td>They depend on other plants & animals for their food.</td> </tr> <tr> <td style="text-align: center;">3</td> <td>They store the food in the form of starch.</td> <td style="text-align: center;">3</td> <td>They store the food in the form of glycogen.</td> </tr> </tbody> </table> <p style="text-align: right;">Any other point</p>	Autotrophic Nutrition		Heterotrophic Nutrition		1	They can prepare their own food	1	They cannot prepare their own food.	2	They require raw materials like CO ₂ , H ₂ O in the presence of sunlight and chlorophyll to prepare their food.	2	They depend on other plants & animals for their food.	3	They store the food in the form of starch.	3	They store the food in the form of glycogen.	1 x 3	3
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A 15	<p>(a) Because these methods involve only one parent / organisms are formed as a result of mitotic division / progeny (organisms) are similar in their genetic makeup and no variations. (any one)</p> <p>(b)</p>	1																	



(i) Planaria can be cut into any number of pieces and each piece grows through specialized cells into a complete organism.

1

1

3

A 16

SECTION D

Given –

$$h = 6 \text{ cm}$$

$$f = -30 \text{ cm}$$

$$v = -45 \text{ cm}$$

mirror formula

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

$$\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$$

$$= -\frac{1}{30} - \frac{1}{(-45)}$$

$$= -\frac{1}{30} + \frac{1}{45} = -\frac{1}{90}$$

$f = -90 \text{ cm}$ from the pole of mirror

Size of the image

$$m = \frac{-v}{u}$$

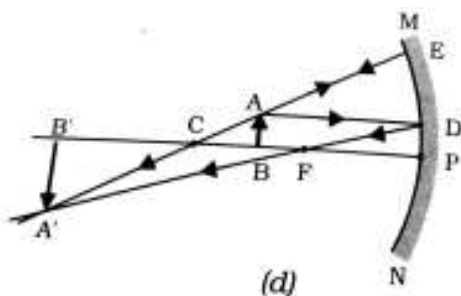
$$= -\frac{90}{45} = -2$$

$$h^1 = -2 \times 6 \text{ cm}$$

$$= -12 \text{ cm}$$

 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

Image formed will be real, inverted and enlarged.



Well labelled diagram

Or

Given –

$$f = +30 \text{ cm}$$

$$u = -50 \text{ cm}$$

$$h = 6.0 \text{ cm}$$

lens formula

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\frac{1}{v} = \frac{1}{f} + \frac{1}{u}$$

$$= \frac{1}{30} - \frac{1}{50}$$

$$\frac{5 - 3}{150} = \frac{2}{150} = \frac{1}{75}$$

$$\therefore v = +75 \text{ cm}$$

$$m = \frac{v}{u} = \frac{h_1}{h}$$

$$= \frac{75}{-50} = \frac{h_1}{6}$$

$$h_1 = -9 \text{ cm}$$

Image formed is real, inverted and enlarged

1

2

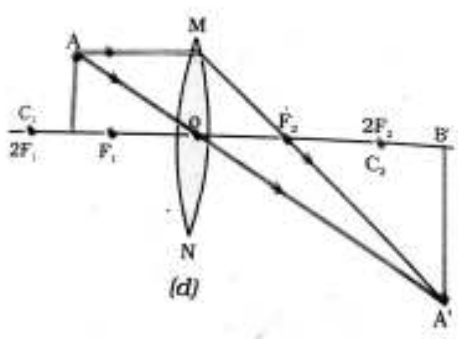
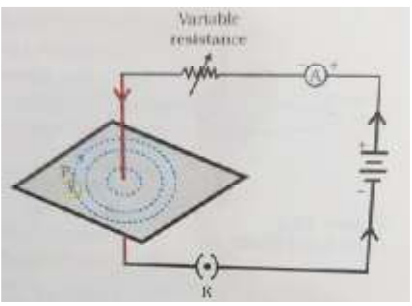
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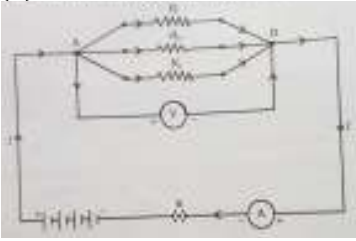
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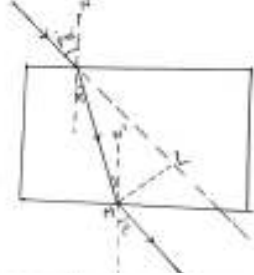
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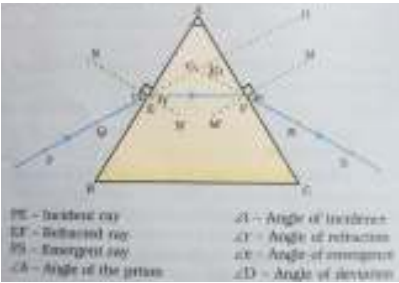
$\frac{1}{2}$

1

	 <p>(d)</p> <p>Well labelled diagram</p>	2	5
A 17	 <p>Diagram 1 ½ and direction ½</p> <p>Statement of right hand thumb rule. The magnetic field strength decreases with increase of distance from the current carrying conductor. Reason: There is inverse relation between field strength and distance from current carrying conductor. Note: Direction of magnetic field should be in accordance with direction of current</p>	1+1 1 1 1	5
A 18	<p>(a)</p> <ol style="list-style-type: none"> Join the three resistors of different values in series Connect them with battery, an ammeter and plug key. Plug the key and note the ammeter reading Change the position of ammeter to anywhere in between the resistors and note the ammeter reading each time. The ammeter reading will remain same everytime. Therefore when resistors are connected in series same current flows through all resistors, when it is connected to a battery. <p>Note: If explained with the help of diagram give full credit</p> <p>(b) Total resistance of the circuit = $R = R_1 + R_2 + R_3 = 5 + 10 + 15 = 30 \text{ ohm}$ Potential difference across the circuit / By ohm's law $V = IR$ or $I = \frac{V}{R} = \frac{30V}{30\text{ohm}} = 1A$ Potential difference across 15 ohm Resistor = $1A \times 15 \text{ ohm} = 15 \text{ volt}$</p>	½ x 5 1 1 ½	

	<p style="text-align: center;">OR</p> <p>(a) Total current $I = I_1 + I_2 + I_3$ Let R_p be the equivalent resistance of R_1, R_2, R_3. Then the total current $I = \frac{V}{R_p}$</p> <p>(i) On applying ohm's law for each R_1, R_2, R_3</p> $I_1 = \frac{V}{R_1}, I_2 = \frac{V}{R_2}, I_3 = \frac{V}{R_3}$ $\therefore I = V \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \right) = \frac{V}{R_p}$ $\therefore \frac{1}{R_p} + \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ <p>(b)</p>  $\frac{1}{R_p} = \frac{1}{20} + \frac{1}{20} = \frac{2}{20} = \frac{1}{10}$ $\Rightarrow R_p = 10 \text{ ohms}$ <p>Equivalent resistance of the network = $R_{eq} = R_1 + R_p = 10 + 10 = 20 \text{ ohm}$</p>	<p style="text-align: center;">1</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p>	<p style="text-align: center;">5</p>																									
A 19	<p>(a)</p> <p>(i) No fixed position of H in the periodic table. (ii) Position of isotopes not clear. (iii) Atomic mass does not increase in a regular manner.</p> <p style="text-align: right;">(or any other)</p> <p>(b)</p> <p>(i) Left to right metallic character decreases Reason: Effective nuclear charge increases / tendency to loose electrons decrease / electro positivity decreases (any one reason)</p> <p>(ii) Top to bottom metallic character increases Reason :- Size of atom increase/tendency to loose electron increases (any one reason)</p> <p style="text-align: center;">OR</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td></td> <td>1</td> <td>3</td> <td>5</td> <td>7</td> </tr> <tr> <td>• Group no.</td> <td>1st</td> <td>13th</td> <td>15th</td> <td>17th</td> </tr> <tr> <td>• B = 2, 8, 3</td> <td></td> <td>D = 2, 8, 7</td> <td></td> <td></td> </tr> <tr> <td>• BD_3</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		A	B	C	D		1	3	5	7	• Group no.	1 st	13 th	15 th	17 th	• B = 2, 8, 3		D = 2, 8, 7			• BD_3					<p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2} \times 4$</p> <p style="text-align: center;">1+1</p> <p style="text-align: center;">1</p>	<p style="text-align: center;">5</p>
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A 20	<ul style="list-style-type: none"> When male and female organisms are involved in producing young ones, is known as sexual reproduction / Gametes from two organisms of opposite sex must fuse to produce young ones. Gametes (germs cells) produced are the products of meiosis / due to combining of DNA from two individuals, this results in mixing of characters and causes variations. In asexual reproduction, single parent produces young ones. There is no mixing of characters. More variations help in the process of evolution. Helpful variations accumulate over time and produce new species and result in evolution. 	1 1,1 1 1	5
A 21	<p>(a)</p> <ul style="list-style-type: none"> Iodine is essential for functioning of thyroid / formation of thyroxine hormone Disease is Goitre Swollen neck <p>(b) Impulse travels from dendrite to cell body, then along the axon to its end. At the end some chemicals are released which fill the gap of synapse, and starts a similar electrical impulse to another neuron and the impulse further travel in the body. (Award marks if attempted as a flow chart also)</p> <p style="text-align: center;">OR</p> <p>The movement/response of part of plant (root) towards water Experiment:- (i) Soak the seeds in water overnight (ii) Place moist cotton in a perforated petridish (iii) Put the soaked seeds in the petridish & place it on a beaker (iv) Roots pass through pores and grow downwards. (v) After sometime roots will bend towards base of petridish having moisture.. (Or Any other relevant experiment)</p>	1 1 1 2 1 ½ ½ 1 1 1	5
A 22	SECTION -E	½ + ½ ½ + ½	2
A 23	 <p>Labelling</p> <ul style="list-style-type: none"> Angle of refraction (r_1) Angle of emergence (e) Lateral displacement (ML) 	½ ½ x3	

	<p style="text-align: center;">OR</p>  <p> <small> PQ – Incident ray QR – Refracted ray RS – Emergent ray ∠A – Angle of the prism ∠i – Angle of incidence ∠r – Angle of refraction ∠e – Angle of emergence ∠d – Angle of deviation </small> </p> <p>Labelling of $\angle i + \angle e + \angle r$ & $\angle d$</p>	$\frac{1}{2} \times 4$	2
A 24	<ul style="list-style-type: none"> • Brisk effervescence of CO_2 evolved. • $\text{CH}_3\text{COOH} + \text{NaHCO}_3 \rightarrow \text{CH}_3\text{COONa} + \text{CO}_2 + \text{H}_2\text{O}$ 	1 1	2
A 25	<ul style="list-style-type: none"> • The pH value of water given is incorrect. • Its correct value is 7 it is neutral in nature. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • There will be no reaction in the beakers having Fe strip & Cu strip. • The solution having Al & Zn strip will show reaction / the solution of FeSO_4 having Al & Zn strip will become colourless. 	1+1 1+1	2
A 26	<ol style="list-style-type: none"> Size of the leaf peel should be very small. Put peel immediately in the drop of water. Place cover slip carefully to avoid the air bubbles. It should not be overstained. No fold in the peel <p style="text-align: right;">(Any four)</p>	$\frac{1}{2} \times 4$	2
A 27	<ol style="list-style-type: none"> Soaking of seeds Emergence of radicle Splitting of cotyledons Emergence of plumule <p style="text-align: center;">OR</p> <ol style="list-style-type: none"> Elongation of nucleus Constriction appears due to the division of the cytoplasm 	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 1	2