

**Strictly Confidential: (For Internal and Restricted use only)**  
**Secondary School Examination, 2023**  
**Marking Scheme – Science (SUBJECT CODE -086)**  
**(PAPER CODE –31/6/1)**

**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.
2. **“Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its’ leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc may invite action under various rules of the Board and IPC.”**
3. 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 due marks be awarded to them. In class-X, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.**
4. The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5. 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. If there is any variation, the same should be zero after deliberation and discussion. 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.
6. Evaluators will mark(  $\surd$  ) wherever answer is correct. For wrong answer CROSS ‘X” be marked. Evaluators will not put right ( $\surd$ ) while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
7. 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. This may be followed strictly.
8. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
9. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note **“Extra Question”**.

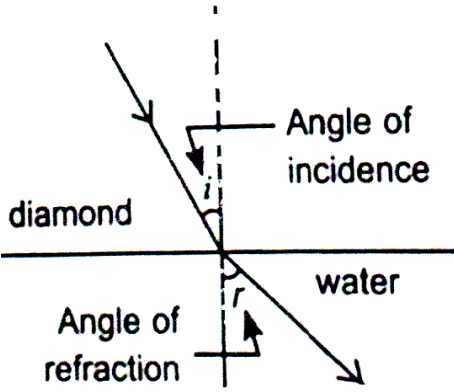
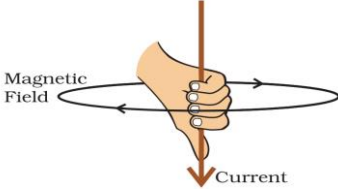
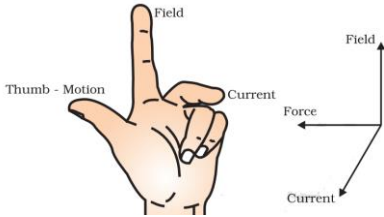
10. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11. A full scale of marks **80** (example 0 to 80/70/60/50/40/30 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.
12. Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines). This is in view of the reduced syllabus and number of questions in question paper.
13. 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 totaling of marks awarded on a reply.
  - 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 / not same.
  - 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.
14. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0) Marks.
15. 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.
16. The Examiners should acquaint themselves with the guidelines given in the “**Guidelines for spot Evaluation**” before starting the actual evaluation. Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.
17. 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.
18. The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme

**MARKING SCHEME**  
 Secondary School Examination, 2023  
**SCIENCE (Subject Code–086)**  
 [ Paper Code:31/6/1]

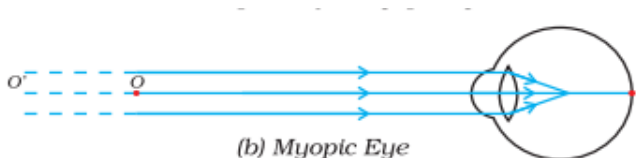
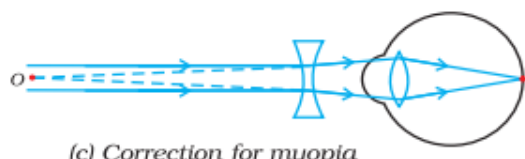
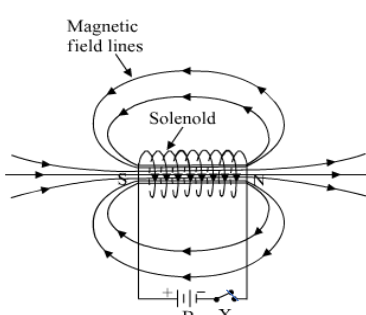
**Maximum Marks: 80**

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
<b>SECTION -A</b>			
1.	(b)	1	1
2.	(c)	1	1
3.	(b)	1	1
4.	(a)	1	1
5.	(b)	1	1
6.	(c)	1	1
7.	(a)	1	1
8.	(d)	1	1
9.	(c)	1	1
10.	(d)	1	1
11.	(b)	1	1
12.	(b)	1	1
13.	(b)	1	1
14.	(c)	1	1
15.	(d)	1	1
16.	(d)	1	1
17.	(d)	1	1
18.	(a)	1	1
19.	(c)	1	1
20.	(a)	1	1
<b>SECTION -B</b>			
21.	Yes	1	



	<p>(a)</p>  <p>(Credit marks for <math>\angle i</math>, <math>\angle r</math> and arrows.)</p> <p>(b)</p> $n_{21} = \frac{n_{2a}}{n_{1a}}$ $\frac{1.33}{2.42} \text{ or } 0.55$	<p>1</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>	<p>2</p>
<p>26.</p>	<p>(a)<b>Right-Hand Thumb Rule</b> : Hold the current carrying conductor in right hand, such that thumb indicates direction of current, then the fingers will wrap around conductor in the direction of field lines of the magnetic field.</p> <p><b>Alternate answer of the statement</b></p>  <p>(b)<b>Fleming's Left Hand Rule</b>: Stretch the forefinger, middle finger, and thumb of the left hand such that they are mutually perpendicular to each other. If the forefinger indicates the direction of the magnetic field, the middle finger indicates the direction of current, then the thumb points in the direction of motion or force acting on the conductor.</p> <p><b>Alternate answer of the statement</b></p> 	<p>1</p> <p>1</p>	

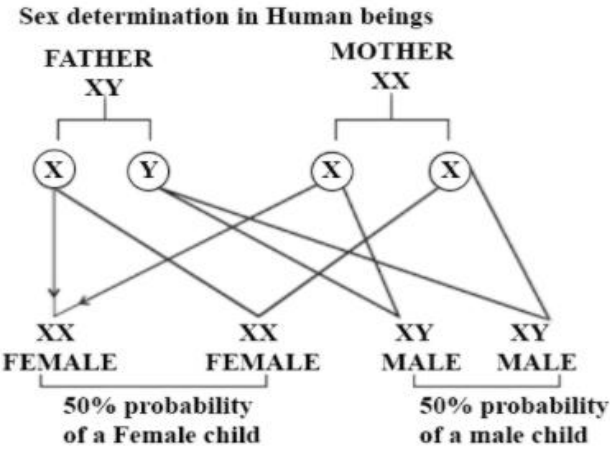
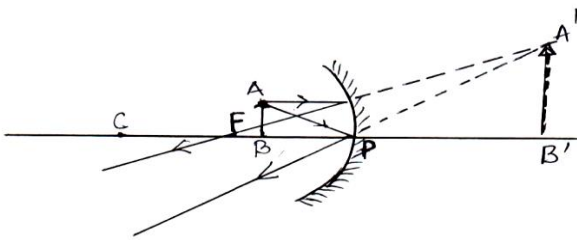
	<b>All the physical quantities mentioned in the diagram are mutually perpendicular to each other.</b>		2
	<b>SECTION- C</b>		
27.	<ul style="list-style-type: none"> <li>• Oxygen rich blood from the lungs comes to the left atrium of heart.</li> <li>• It then contracts and the blood is transferred to left ventricle.</li> <li>• Left ventricle in turn contracts and the blood is pumped out to the body.</li> <li>• Deoxygenated blood from the body enters the right atrium.</li> <li>• On its contraction, blood enters into right ventricle</li> <li>• Right ventricle pumps it to the lungs for oxygenation</li> </ul>	<p style="text-align: right;">½</p> <p style="text-align: right;">½</p> <p style="text-align: right;">½</p> <p style="text-align: right;">½</p> <p style="text-align: right;">½</p> <p style="text-align: right;">½</p>	3
28.	<p>(a) (i) Chemical Name : Calcium Carbonate Chemical formula : <math>\text{CaCO}_3</math></p> <p>(ii) • <math>\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2 \uparrow</math></p> <p style="padding-left: 40px;">• <math>\text{Ca(OH)}_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}</math></p> <p style="text-align: center;"><b>OR</b></p> <p>(b) (i) Hydrogen / <math>\text{H}_2</math></p> <p style="padding-left: 40px;">(ii) The gas burns with a pop sound</p> <p>(iii) (1) <math>2\text{HCl} + \text{Zn} \rightarrow \text{ZnCl}_2 + \text{H}_2</math></p> <p style="padding-left: 40px;">(2) <math>2\text{NaOH} + \text{Zn} \rightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2</math></p>	<p style="text-align: right;">½</p> <p style="text-align: right;">½</p> <p style="text-align: right;">1</p> <p style="text-align: right;">1</p> <p style="text-align: right;">½</p> <p style="text-align: right;">½</p> <p style="text-align: right;">1</p> <p style="text-align: right;">1</p>	3
29.	<p>(a) • Adrenal gland ; Adrenaline hormone</p> <ul style="list-style-type: none"> <li>• Response- <ul style="list-style-type: none"> <li>• Heart beats faster resulting in supply of more oxygen to muscles</li> <li>• Breathing rate increases</li> <li>• Blood supply to digestive system and skin gets reduced.</li> <li>• Blood supply diverted to skeletal muscles.</li> </ul> </li> </ul> <p style="text-align: right;"><b>(any two)</b></p> <p style="text-align: center;"><b>OR</b></p> <p>(b)</p> <p>(i) A - Sensory neuron</p> <p style="padding-left: 40px;">B - Relay Neuron</p> <p style="padding-left: 40px;">C- Effector organ/Muscle</p> <p>(ii) A- Carries impulse from receptor to spinal cord</p> <p style="padding-left: 40px;">C- Responds to stimulus</p> <p>(iii) The thinking process of the brain is not fast enough / Reflex arcs are more efficient in functioning in the absence of true thought processes</p>	<p style="text-align: right;">½ , ½</p> <p style="text-align: right;">1 , 1</p> <p style="text-align: right;">½</p> <p style="text-align: right;">½</p> <p style="text-align: right;">½</p> <p style="text-align: right;">½</p> <p style="text-align: right;">½</p> <p style="text-align: right;">½</p>	3

<p><b>30.</b></p>	<p>(a) <math>\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{Heat}</math>            (or any other reaction showing release or absorption of heat)</p> <p>(b)  <math display="block">\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2(\text{g}) \uparrow</math>           (or any other)</p> <p>(c)  <math display="block">\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \xrightarrow{\text{heat}} \text{CuSO}_4 + 5\text{H}_2\text{O}</math>           (Blue) (White)            (or any other)</p>	<p>1</p> <p>1</p> <p>1</p>	<p>3</p>
<p><b>31.</b></p>	<ul style="list-style-type: none"> <li>excessive curvature of the eye lens</li> <li>elongation of the eyeball</li> </ul> <p>(a)</p>  <p>(b) Myopic Eye</p> <p>(b)</p>  <p>(c) Correction for myopia</p>	<p>½</p> <p>½</p> <p>1</p> <p>1</p>	<p>3</p>
<p><b>32.</b></p>	<ul style="list-style-type: none"> <li>A solenoid is a coil of many turns of insulated copper wires wrapped closely in the shape of a cylinder</li> <li>When electric current is passed through it</li> </ul>  <p>( Deduct ½ mark if direction of current or magnetic field is not marked.)</p>	<p>1</p> <p>1</p> <p>1</p>	<p>3</p>
<p><b>33.</b></p>	<p>(a) (i) 1%            (ii) 10% energy</p> <p>(b) Every step of a food chain where transfer of energy occurs.</p>	<p>½</p> <p>½</p> <p>1</p>	

	Since the amount and available energy keeps on becoming less as we move to higher trophic level, very little usable energy remains after four trophic levels.	1	3
	<b>SECTION -D</b>		
<b>34.</b>	<p>(a) (i) A = CH<sub>3</sub>COOH / (Ethanoic acid) / Acetic acid Nature = acidic Functional group = – COOH / (carboxylic acid) CH<sub>3</sub>COOH + NaOH → CH<sub>3</sub>COONa + H<sub>2</sub>O</p> <p>(ii) (1) B – Ethanol / Ethyl alcohol / C<sub>2</sub>H<sub>5</sub>OH C – Ester / Ethyl ethanoate / Ethyl acetate (2) Acid acts as a Catalyst in this reaction (3) CH<sub>3</sub>COOH + C<sub>2</sub>H<sub>5</sub>OH <math>\xrightarrow{\text{acid}}</math> CH<sub>3</sub>COOC<sub>2</sub>H<sub>5</sub> + H<sub>2</sub>O</p> <p style="text-align: center;"><b>OR</b></p> <p>(b) (i) Ethene/C<sub>2</sub>H<sub>4</sub></p> <div style="text-align: center;"> </div> <ul style="list-style-type: none"> <li>• As a dehydrating agent</li> </ul> <p>(ii) • The process in which unsaturated hydrocarbons/compounds react with hydrogen in the presence of a catalyst (Ni / Pd) to give saturated hydrocarbon.</p> <div style="text-align: center;"> <math display="block">  \begin{array}{ccc}  \text{R} &amp; &amp; \text{R} \\  \diagdown &amp; &amp; / \\  &amp; \text{C} = \text{C} &amp; \\  / &amp; &amp; \diagdown \\  \text{R} &amp; &amp; \text{R}  \end{array}  \xrightarrow[\text{H}_2]{\text{Ni catalyst}}  \begin{array}{ccc}  \text{H} &amp; \text{H} \\    &amp;   \\  \text{R} - \text{C} &amp; - &amp; \text{C} - \text{R} \\    &amp;   \\  \text{R} &amp; \text{R}  \end{array}  </math> </div> <p>Used in the hydrogenation of vegetable oils which are converted into fats with saturated carbon chains.</p>	<p>½</p> <p>½</p> <p>½</p> <p>1</p> <p>½</p> <p>½</p> <p>1</p> <p style="text-align: center;"><b>OR</b></p> <p>½</p> <p>1</p> <p>½</p> <p>1</p> <p>1</p> <p>1</p>	5
<b>35.</b>	<p>(a) As DNA is the information source for making proteins. If the information is changed, different protein will be made and will lead to altered body design.</p> <p>(b) In the absence of pollination no male gametes will be available for fertilisation.</p> <p>(c) Because in many multi cellular organisms specialised cells are organised into tissues, tissues form organ occupying definite positions in the body.</p>	<p>1</p> <p>1</p> <p>1</p>	

	<p>(d) 1. Plants can bear flowers and fruits earlier than those produced from seeds.</p> <p>2. It enables the propagation of plants such as banana, orange, rose and jasmine which have lost the capacity to produce seeds.</p> <p>3. The plants produced are genetically similar enough to the parent plant to have all the characteristics</p> <p style="text-align: right;"><b>(any one point)</b></p> <p>(e) During gamete formation the number of chromosomes is reduced to half. When the zygote is formed / at the time of fertilisation, fusion of male and female gametes restores the original number of chromosomes in the offspring as in the parent.</p>	<p><math>\frac{1}{2}, \frac{1}{2}</math></p> <p>1</p>	<p>5</p>
<p><b>36.</b></p>	<p>(a) (i) The property of conductor to resist the flow of charges through it.</p> <p>If Potential difference across the two ends of a conductor is 1V and the current through it is 1A, then resistance 'R' of the conductor is 1Ω.</p> <p><b>Alternate answer</b></p> $1\Omega = \frac{1 \text{ volt}}{1 \text{ ampere}}$ <p>(ii)</p> <ul style="list-style-type: none"> <li>• Length of the conductor</li> <li>• Area of cross-section of the conductor</li> <li>• Nature of the material</li> <li>• Temperature</li> </ul> <p style="text-align: right;"><b>( any two)</b></p> <p>(iii) (1) The resistance will become one half of its original value.</p> $R = \rho \frac{l}{A} = \rho \frac{l}{\pi r^2}$ $R' = \frac{\rho \cdot 2L}{\pi(2r)^2}$ <p>(2)</p> $R' = \frac{\rho \cdot l}{\pi(2r)^2} \cdot \frac{2}{4} = \frac{R}{2}$ <p>Resistance will reduce to one half.</p> <p style="text-align: center;"><b>OR</b></p> <p>(b) (i) No</p> <ul style="list-style-type: none"> <li>• In series combination overall resistance will increase hence decreasing the current . Potential difference also divides. Therefore power consumption is less by each bulb and glows with less brightness.</li> </ul>	<p>1</p> <p>1</p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p>1</p> <p><math>\frac{1}{2}</math></p> <p>1</p> <p>1</p>	

	<ul style="list-style-type: none"> <li>In parallel combination each bulb will get the required potential difference hence the required current and will glow with its normal brightness.</li> </ul> <p>(ii) None of the bulb glows in series combination as the circuit gets broken and current stops flowing.</p> <p>In parallel combination the other two bulbs will glow with same brightness as the same voltage is available to them.</p>	1					
		1					
		1	5				
<b>SECTION- E</b>							
37.	<p>(a) By electrolytic reduction</p> <p>(b) Carbon cannot reduce the oxides of highly reactive metals / these metals have more affinity for oxygen than carbon.</p> <p>(c) When Cinnabar is heated in the presence of air, it is first converted into mercuric oxide. / This is then reduced to mercury.</p> $2\text{HgS} + 3\text{O}_2 \xrightarrow{\text{heat}} 2\text{HgO} + 2\text{SO}_2$ $2\text{HgO} \xrightarrow{\text{heat}} 2\text{Hg} + \text{O}_2$ <p style="text-align: center;"><b>OR</b></p> <p>(c)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; padding: 5px;"><b>Roasting</b></th> <th style="text-align: center; padding: 5px;"><b>Calcination</b></th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;"> A process in which sulphide ores are converted into oxides by heating strongly in the presence of excess air  <math display="block">2\text{ZnS} + 3\text{O}_2 \xrightarrow{\text{heat}} 2\text{ZnO} + 2\text{SO}_2</math> </td> <td style="padding: 5px;"> A process in which carbonate ores are heated in limited supply air.  <math display="block">\text{ZnCO}_3 \xrightarrow{\text{heat}} \text{ZnO} + \text{CO}_2</math> <p style="text-align: right;"><b>(or any other)</b></p> </td> </tr> </tbody> </table>	<b>Roasting</b>	<b>Calcination</b>	A process in which sulphide ores are converted into oxides by heating strongly in the presence of excess air $2\text{ZnS} + 3\text{O}_2 \xrightarrow{\text{heat}} 2\text{ZnO} + 2\text{SO}_2$	A process in which carbonate ores are heated in limited supply air. $\text{ZnCO}_3 \xrightarrow{\text{heat}} \text{ZnO} + \text{CO}_2$ <p style="text-align: right;"><b>(or any other)</b></p>	1	
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		1					
		1					
		½					
		½					
		2	4				
38.	<p>(a) Zygote – 23 pairs / 46 chromosomes. Gamete – 23 chromosomes.</p> <p>(b) The temperature at which fertilised eggs are kept determines whether the animals developing in the eggs are male or female.</p>	½					
		½					
		1					

	<p>(c)</p> <p style="text-align: center;"><b>Sex determination in Human beings</b></p> <p><b>PARENTS:</b>      <b>FATHER</b>      <b>MOTHER</b></p> <p style="text-align: center;">XY                      XX</p>  <p style="text-align: center;"><b>OR</b></p> <p>(c) The 23<sup>rd</sup> pair or the sex chromosome in human females contains 'XX' chromosome. At the time of gamete formation, each gamete gets one X-chromosome.</p>	2	
<p><b>39.</b></p>	<p>(a) Real, inverted, diminished (Any two)</p> <p>(b) Case II</p> <p>Because focal length of mirror is 15 cm, object distance is 30cm which means the object is placed at C.</p> <p>(c) Dentists use concave mirrors</p> <p>Because concave mirror forms erect and enlarged image when object is very close to the mirror.</p> <p style="text-align: center;"><b>OR</b></p> <p>(c) Case III</p>  <p><b>( Deduct ½ mark if direction of ray is not marked.)</b></p>	<p>½ , ½</p> <p>½</p> <p>½</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	4

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