BRITISH COUNCIL

CBSE

Competency-based education for CBSE

Item Bank:

Science Class 10

September 2021

Content created by AlphaPlus

Introduction for teachers

A bank of resources has been created to support teachers to develop and administer end-of-class tests. These resources should be used together. You can view and download the following resources from http://cbseacademic.nic.in:

- Learning ladder for science
- Assessment specification for science
- Sample lesson plans

This document is a compilation of the sample items for Science Class 10. There are 78 items.

This item bank is supported by the assessment specification which sets out the end-of-class assessment requirements and the learning ladder for the subject which maps the CBSE syllabi content to the NCERT curriculum. The item index (page 6) shows how each item maps to the learning ladder content and the assessment objectives.

What these assessment items can be used for

You can use the bank of questions in whatever way you wish but three main purposes have been identified:

- Create end-of-class assessments using the items from the bank to meet the requirements set out in the assessment specifications.
- Create end-of-topic tests using the items from the bank for when you finish teaching a topic.
- Use individual or groups of questions from the bank to create or add to worksheets for use in class and for homework.

What is in this document

You will find linked questions and single questions which cover different aspects of the learning ladder content and different assessment objectives. You can use these questions to create your own assessments.

Each item in this document begins with the metadata (see Figure 1). The metadata gives details of the content, assessment objective coverage and the number of marks.

There is then a section showing any source material needed followed by the questions themselves and finally the mark scheme for the questions.

Item identity	AO1 marks	AO2 Marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10TM2		1			10.3.22 Identify the relationships between current, potential difference, resistance and power.	1

Figure 1: Example of metadata

How to use the assessment items

You can peruse the bank of items by flicking through this document and selecting questions you wish to use. However, if you are assessing specific content then you can use the learning ladder to identify this content and then use the item index (page 6) to find any items which cover that content.

Please note that not all of the content will have items. The item bank is only a sample of the questions which could be created so it may be necessary for you to write questions of your own to fill gaps.

When you find a relevant assessment item in this document, you can copy and paste the question(s) and any source material into a new Word document which will form the assessment or worksheet. Other questions from the bank can be copied and pasted to this document and an assessment or worksheet covering a range of items created. The questions can then easily be edited in the new document using Word and you can add any questions you write to best meet the needs of your classes.

Once the questions have been pasted into the new document the numbering of the items can be changed so that they run through 1, 2 etc. There should be no need to change the numbering of parts (a), (b) etc unless a question has been deleted.

You can create the mark schemes in the same way by copying the relevant section of the item documents and pasting them into a separate Word document which will form the mark scheme. Again, the question numbering will need to be amended. You can use these mark schemes to make sure that the marking is standardised, particularly if more than one teacher uses the assessment.

When creating an end-of-class test the teacher should use the assessment specification to identify the number of marks and questions needed, the balance of content to be covered and the weighting of the assessment objectives needed. You can then select items from the bank to build a test that meets the assessment specification and then order these in a logical manner so that it allows the students to work through the assessment. You should also add a front page

with the assessment name and details of the number of marks and the length of the assessment. Again, the mark scheme can be created at the same time and question numbers will need to be amended.

When copying items from the bank care needs to be taken to keep the format and style of the items consistent including the spacing and layout and ensuring that the number of marks available for each question is clearly linked to the question.

Assessment objectives

This document sets out the assessment objectives for CBSE Science and their percentage weighting for the CBSE end of year tests for the different classes from VI to X.

		Class				
No.	**Description of Assessment Objective**	**VI**	**VII**	**VIII**	**IX**	**X**
AO1	Demonstrate knowledge and understanding of scientific ideas, techniques, and procedures.	40	40	40	30	30
AO2	Apply knowledge and understanding of scientific ideas, techniques and procedures to classroom and real-world situations	40	40	40	30	30
AO3	Analyse scientific information and ideas to present data and interpret patterns and relationships	10	10	10	20	20
AO4	Evaluate scientific information to: • make judgments and draw conclusions • develop and improve experimental procedure	10	10	10	20	20

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Assessment content	Assessment topic	Filename	Question ID	AO1	AO2	AO3	AO4	Page
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Class 6	Class 6	Science10AP5	Science10AP51ci	2				**18**
Class 6	Class 6	Science10YP3	Science10YP31a	4				**14**
Class 6	Class 6	Science10AP5	Science10AP51cii	4				**18**
Class 6	Class 6	Science10NG3	Science10NG31aiii		1			**22**
Class 6	Class 6	Science10YP3	Science10YP31c	1	2			**14**
Class 6	Class 6	Science10TM3	Science10TM31f	2	2			**26**
Class 6	Class 6	Science10YP4	Science10YP41b		2			**31**
Class 6	Class 6	Science10YP3	Science10YP31d	3				**14**
Class 7	Class 7	Science10TM3	Science10TM31a	1				**26**
Class 7	Class 7	Science10TM3	Science10TM31bi		1			**26**
Class 7	Class 7	Science10TM3	Science10TM31bii		1			**26**
Class 7	Class 7	Science10SG4	Science10SG41ci, cii		2	2		**37**
Class 9	Class 9	Science10MS4	Science10MS41aii	1				**39**
Class 9	Class 9	Science10RR4	Science10RR41ci	1				**42**
Class 9	Class 9	Science10MS4	Science10MS41bii	2				**39**
Class 9	Class 9	Science10RR4	Science10RR41cii	2				**42**
Class 9	Class 9	Science10MS4	Science10MS41ai	2	1			**39**
Class 9	Class 9	Science10R3	Science10R31b	2	2			**48**
Class 9	Class 9	Science10DP6	Science10DP61b		5			**48**
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10.3.9	Living world	Science10AP3	Science10AP31a	3			**157**
10.3.9	Living world	Science10AP3	Science10AP31ci	3			**157**
10.3.9	Living world	Science10AP3	Science10AP31cii	4			**157**
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10.4.7	Natural phenomena	Science10RR5	Science10RR51b		1			**186**
10.4.7	Natural phenomena	Science10YP4	Science10YP41ai		1			**31**
10.4.7	Natural phenomena	Science10ST3	Science10ST31b		2			**183**
10.4.7	Natural phenomena	Science10TM4	Science10TM41aii				2	**170**
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10.8.13	Natural phenomena	Science10ST1	Science10ST1	1				**192**
10.8.14	Natural phenomena	Science10RR5	Science10RR51d	4				**186**
10.8.14	Natural phenomena	Science10YP4	Science10YP41c	1	2	1		**31**
10.8.15	Natural phenomena	Science10GK4	Science10GK41c	2				**167**
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10.1.22	Natural resources	Science10GK5	Science10GK51b		2			**50**
10.1.23	Natural resources	Science10GD4	Science10GD41e	2			2	**74**
10.3.32	Natural resources	Science10PB2	Science10PB2	1				**193**
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10.3.32	Natural resources	Science10NB4	Science10NB41d			2	2	**81**
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10.6.9	Natural resources	Science10DP5	Science10DP51a	1				**198**
10.6.9	Natural resources	Science10YP1	Science10YP1	1				**200**
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10.6.9	Natural resources	Science10MS4	Science10MS41c		4			**39**
10.8.24	Natural resources	Science10AP6	Science10AP61b	2				**195**
10.8.27	Natural resources	Science10ST5	Science10ST51b	4				**203**
10.8.27	Natural resources	Science10RR4	Science10RR41b		3			**42**
10.8.27	Natural resources	Science10DP5	Science10DP51b		2		2	**198**

Science10YP3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10YP3 1a	4				10.3.25 Explain how an electric current flowing through a wire heats the wire	4
Science10YP3 1b	2				10.3.24 Explain the impact of resistors in series and in parallel on the resistance of a simple circuit.	2
Science10YP3 1c	1	2			No syllabus reference for paying for kWh – see Chapter 12 p219 and p220 of NCERT textbook X	3
Science10YP3 1d	3				10.8.23 Explain the greenhouse effect and how human activities contribute to global warming through burning fossil fuels, agriculture and industry linked to the greenhouse effect of different atmospheric gases-methane and carbon dioxide.	3
Total marks	**10**	**2**				**12**

Item purpose

The question assesses the understanding of students regarding Joule's heating effect, the advantages of parallel connection in home appliances, comparison of the cost of the energy to operate electrical household appliances, the greenhouse gas used in refrigerators and its impact to the environment.

Questions

1 **Fig. 1** shows the filament in a lamp.

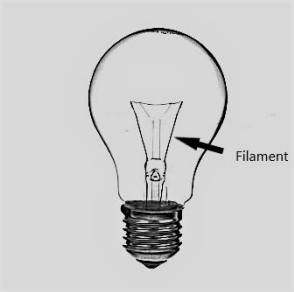


Fig. 1

The filament is made from a very thin piece of metal.

When there is a current in the filament it glows brightly and becomes very hot.

1 (a) Explain how the current causes the filament to become hot.

(4 marks)

1 (b) Lamps in the home are connected in parallel.

Give **two** reasons why lamps are connected in parallel.

(2 marks)

1 (c) The cost of electricity is Rs 4 per kilowatt-hour.

Calculate the cost of using a 100 W lamp for 8 hours.

(3 marks)

1 (d) The coolant in a modern refrigerator is called HFC.

HFC does not damage the ozone layer. However, HFC is a powerful greenhouse gas.

Explain why HFC must **not** be released into the atmosphere.

(3 marks)

(Total marks 12)

Mark scheme

1. 1 (a) Explain how the current causes the filament to become hot.	
Answer	Guidance
the filament/metal has resistance; work done against the current; releasing heat energy; electrical energy is transferred to thermal/heat energy;	**ALLOW** higher level explanations i.e. Any **four** from: work is done [1] by the resistance of the circuit [1] against the electrons [1] when they collide [1] with the ions of the metal lattice [1]
1 (b) Lamps in the home are connected in parallel. Give **two** reasons why lamps are connected in parallel.	
Answer	Guidance
Any **two** from: each lamp gets the full supply voltage; if one lamp breaks the others remain working; they can be switched on and off independently;	
1 (c) The cost of electricity is Rs 4 per kilowatt-hour. Calculate the cost of using a 100 W lamp for 8 hours.	
Answer	Guidance
If answer = Rs 3.2 award 3 marks conversion: 100 W = 0.1 kW; Substitution : 0.1 x 4 x 8; Calculation: Rs 3.2;	
1 (d) The coolant in a modern refrigerator is called HFC. HFC does not damage the ozone layer. However, HFC is a powerful greenhouse gas. Explain why HFC must **not** be released into the atmosphere.	

Answer	Guidance
Idea that thermal radiation absorbed and re-emitted by the Earth is absorbed by gases / CO_2 / methane / HFC (in the atmosphere); increased greenhouse effect / global warming/heating; climate change; named consequence of climate change e.g., drought / sea level rise / melting icecaps;	**ALLOW** they absorb the Sun's radiation

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10AP51ai-v	6				**10.5.6** Draw and label diagrams showing the flow of nutrients in plants and animals. **7.1.5** Identify examples of plant and animal organs and organ systems	6
Science10AP51b	2				10.11.4 Understands the need for balanced nutrition and potential impact if it is not achieved. 6.1.6 Classify foods as sources of particular nutritional requirements: • Rice and other grains and sugars for carbohydrates • Pulses, eggs and meat for proteins • Oils and fats and dairy products for lipids • Various drinks for water • Fruits and vegetables or vitamins and minerals • Vegetables for fibre	2
Science10AP51ci	2				6.1.6 Classify foods as sources of particular nutritional requirements: • Rice and other grains and sugars for carbohydrates • Pulses, eggs and meat for proteins	2
Science10AP51cii	4					4

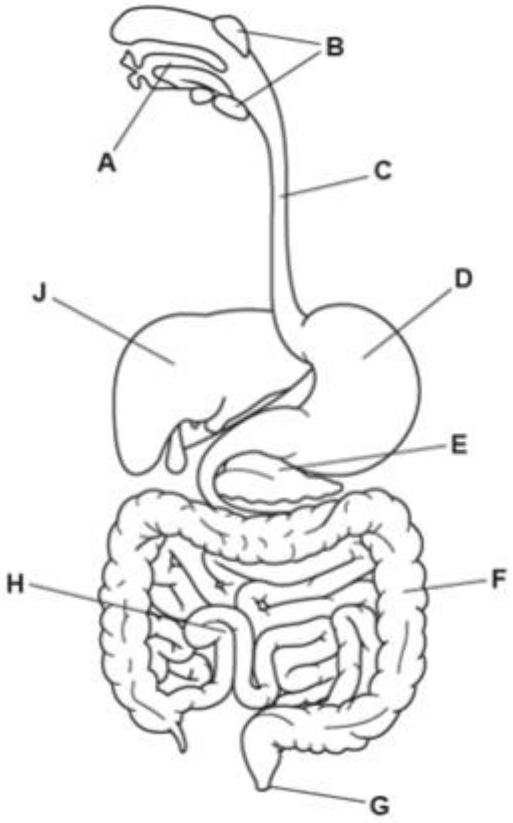
					• Oils and fats and dairy products for lipids • Various drinks for water • Fruits and vegetables or vitamins and minerals • Vegetables for fibre	
Total marks						14

Item purpose

The question assesses the skill to draw and present information and understands the need for balanced nutrition and potential impact if it is not achieved.

Question(s)

1 A diagram of the digestive system is shown.



1(a) Identify the letters on the diagram where:

1(a)(i)	starch is digested _____ and _____	(2 marks)
1(a)(ii)	saliva is produced _____	(1 mark)
1(a)(iii)	the environment is acidic _____	(1 mark)
1(a)(iv)	water is re-absorbed _____	(1 mark)
1(a)(v)	egestion occurs _____	(1 mark)
1(b)	State the name of organ: • E • J	(2 marks)
1(c)	One requirement of a balanced diet is fibre. Fibre cannot be digested or absorbed.	
1(c)(i)	State **one** source of fibre and explain why it is necessary in a balanced diet.	(2 marks)
1(c)(ii)	State **four** other requirements of a balanced diet.	(4 marks)
		(Total marks 14)

Mark scheme

1 (a) Identify the letters on the diagram where: starch is digested _____ and _____ saliva is produced _____ the environment is acidic _____

water is re-absorbed _____ egestion occurs _____

Answer	Guidance
(a)(i) A; H; (a)(ii) A (a)(iii) D; (a)(iv) F; (a)(v) G	

1 (b) State the name of organ: • E • J	
Answer	**Guidance**
E – pancreas; J – liver;	

1 (c)(i) State one source of fibre and explain why it is necessary in a balanced diet.	
Answer	**Guidance**
Plants / vegetables / fruit / named vegetable/fruit; Helps to move food through (the alimentary canal) / prevents constipation	ALLOW lowers risk of cancer/heart disease

1 (c)(ii) State **four** other requirements of a balanced diet.	
Answer	**Guidance**
Any four from: • Vitamins • Minerals / named mineral e.g., iron • Protein • Fat • Carbohydrate • Water	

Science10NG3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10NG31ai		2			10.6.1 Write balanced word and symbol equations,	2
Science10NG31aii	1				10.1.1 Define types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction.	1
Science10NG31aiii		1			LO: applies scientific concepts in daily life and solving problems, such as, suggest precautions	1
Science10NG31b		2			10.6.1 Write balanced word and symbol equations,	2
Science10NG31c		5			10.2.3 Describe **how to perform** the following practical activities … (ii) Action of heat on ferrous sulphate crystals	5
Total marks	1	10				11

Item purpose

The question assesses the understanding and ability of students to interpret chemical reactions and relate their impact on the environment.

Question(s)

1 Calcium oxide reacts vigorously with water.

1(a)(i) Construct the balanced symbol equation for the reaction between calcium oxide and water. (2 marks)

1(a)(ii) State and explain the type of reaction between calcium oxide and water. (1 mark)

1(a)(iii) State **two** precautions you should take when reacting calcium oxide with water. (1 mark)

1(b) The product of the reaction in **(a)(i)** can be used to make calcium carbonate ($CaCO_3$).

Identify:

- the reacting gas
- the other product formed

(2 marks)

1(c) Describe how to obtain a dry sample of iron oxide from a solution of ferrous sulfate.

You should give experimental details, observations, and precautions at each stage of the procedure.

(5 marks)

(Total 11 marks)

Mark scheme

1 (a)(i) Construct the balanced symbol equation for the reaction between calcium oxide and water.	
Answer	Guidance
Left hand side correct; Right hand side correct; Ca + H2O □ Ca(OH)2	
1 (a)(ii) State and explain the type of reaction between calcium oxide and water.	
Answer	Guidance
Combination; (because) more than one reactant, only one product; OR Exothermic; (because) heat released.	Dependent mark
1 (a)(iii) State two precautions you should take when reacting calcium oxide with water.	
Answer	Guidance
Any two from: Wear goggles; Use a heat resistant container; Use small quantities of CaO.	
1 (b) The product of the reaction in (a)(i) can be used to make calcium carbonate (CaCO3). Identify: • the reacting gas • the other product formed	
Answer	Guidance
Carbon dioxide / CO2; Water / H2O	
1 (c) Describe how to obtain a dry sample of iron oxide from a solution of ferrous sulfate. You should give experimental details, observations and precautions at each stage of the procedure.	

Answer	Guidance
Indicative science Methods / observation • Heat solution to evaporate water. • Crystals of ferrous sulfate form • Heat ferrous sulfate in a test tube • Sulfur oxides are given off • Decolorizes as iron oxide forms Precautions: • Sulfur oxides are toxic – don't inhale deeply • Wear goggles • Ventilated room • Hold the test tube using tongs	Points must be awarded from both methods and precautions – max 3 marks if not

Level of response

Level	Description	Marks
4	Clear well-structured explanation linking effects to causes or underpinning theory.	4
3	Clear description of relevant facts with some explanation relating effects to causes or underpinning theory.	3
2	Description of the basic facts but no link of effects to causes or underpinning theory.	2
1	Limited isolated descriptive points relevant to the topic	1
0	Nothing worthy of credit	0

Science10TM3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10TM31a	1				7.2.7 Describe the outcome of investigations of electromagnetism in terms of the magnetic fields that form around current-carrying wires and solenoids.	1
Science10TM31bi		1				1
Science10TM31bii		1				1
Science10TM31c	2	2			10.3.30 Explain how the movement of a magnet in a coil of wire generates a current and Flemming's right hand rule is used to determine the direction of the current.	4
Science10TM31d	1					1
Science10TM31e	2				10.3.31 Explain how AC current is produced (in a generator).	2
Science10TM31f	2	2				4
Total marks	8	6				**14**

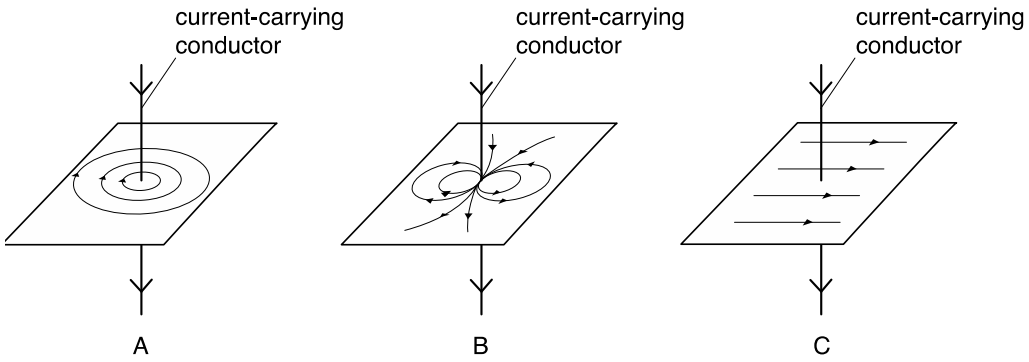
Item purpose

The question assesses the understanding of magnetic field due to various current carrying conductors and the factors on which the intensity of this magnetic field depends, and also child can learn how to produce electricity from magnetism.

Question(s)

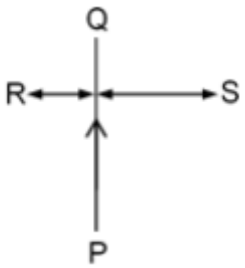
1

1 (a) Which diagram, A, B or C shows the shape of the magnetic field around a current-carrying conductor?



(1 marks)

1 (b) An electrical current is in the direction P to Q as shown in the diagram.



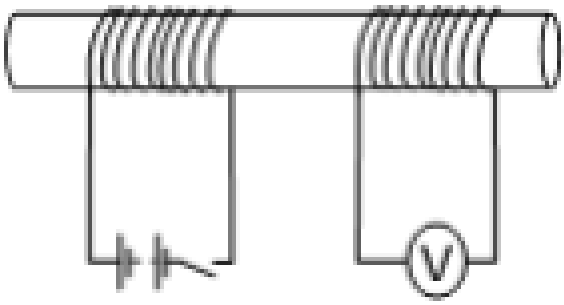
The magnetic field strength is measured at R and S.

(i) State and explain where the field strength is largest. (1 mark)

(ii) The current in the wire is reversed.

Explain how this affects the magnetic field at R. (1 mark)

1 (c) Two solenoids are coiled around a non-conducting rod as shown in the diagram.



The switch is closed.

Explain why the reading on the voltmeter first increases and then returns to zero.

(4 marks)

1 (d) When there is a reading on the voltmeter there is also a current in the coil.

State the name of the rule used to determine the direction of this current.

(1 marks)

1 (e) State and explain the type of current produced in a generator.

(2 marks)

1 (f) In mountainous areas dams are constructed.

Water held behind the dam is released through a generator to produce electricity.

Explain why some people are opposed to the construction of dams.

(4 marks)

(Total marks 14)

Mark scheme

1. 1 (a) Which diagram, A, B or C shows the shape of the magnetic field around a current-carrying conductor?	
Answer	Guidance
(a) A;	
1 (b) (i) State and explain where the field strength is largest. 1 (b) (ii) The current in the wire is reversed. Explain how this affects the magnetic field at R.	
Answer	Guidance
(b)(i) R because field lines are closer together/more dense / more flux density; (b)(ii) same strength opposite direction;	**IGNORE** R because it is closer to the wire **ALLOW** higher flux density at R
1 (c) Explain why the reading on the voltmeter first increases and then returns to zero.	
Answer	Guidance
voltage / emf is induced; magnetic field; changing magnetic field; returns to zero when magnetic field is constant / stops changing;	
1 (d) When there is a reading on the voltmeter there is also a current in the coil. State the name of the rule used to determine the direction of this current.	
Answer	Guidance
Fleming's right hand (grip) rule;	
1 (e) State and explain the type of current produced in a generator.	
Answer	Guidance
alternating; a coil/solenoid rotates in a magnetic field;	

1 (f) Explain why some people are opposed to the construction of dams.	
Answer	Guidance
indicative science: loss of habitat loss of water for irrigation downstream loss of farmland very expensive to build can become silted up / need dredging possible to generate electricity more cheaply by other means climate change may result in insufficient rainfall to fill the dam.	

Science10YP4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10YP4 1ai		1			10.4.7 Calculate the magnification and power of a convex spherical lens	1
Science10YP4 1aii		1			10.4.6 Using the lens formula calculate object distance, image distance and focal length of a convex spherical lens	1
Science10YP4 1aiii		3			10.4.6	3
Science10YP4 1aiv		1			10.4.6	1
Science10YP4 1b		2			Learning Outcome • calculates using the data given, such as, …..... power of a lens, electric power, etc. & NCERT textbook X Ch 10 page 184	2
Science10YP4 1c	1	2	1		10.8.14 Explain how sight defects can occur (long and short sightedness) and how they can be corrected.	4
Total marks	1	**10**	**1**			**12**

Item purpose

The question assesses the understanding of students regarding calculation of the object distance, the image distance of a convex lens, the power and focal length of a combination of two convex lens, long-sightedness and its correction.

Questions

1 **Fig. 1** shows the image formed by a lens when it is used as a magnifying glass.

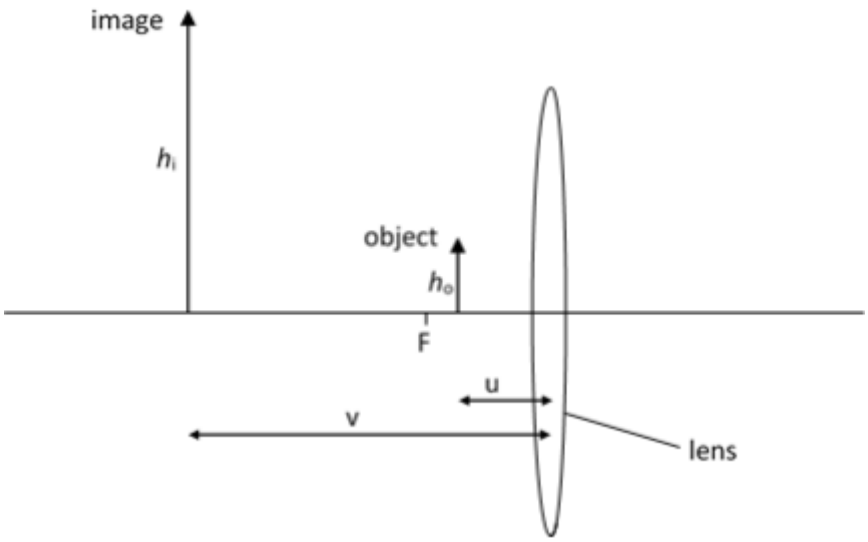


Fig. 1

The height of the image h_i is four times larger than the height of the object h_o.

1 (a) (i) State the magnification *M* of the image.

(1 mark)

(ii) Use your value of *M* to determine the ratio of the image distance v to the object distance u.

v = ...

(1 mark)

(iii) The focal length *f* of the lens is 20 cm.

Using your answer in **(a)(ii)** in the lens equation:

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

calculate the object distance *u.*

(3 marks)

(iv) Using your answer in **(a)(ii)** and **(a)(iii)** calculate *v*.

(1 mark)

1 (b) The power *P* of a lens is calculated using the equation:

$$P = \frac{1}{f}$$

Calculate the power of lens with a focal length f = 20 cm. State the unit.

(2 marks)

1 (c) **Fig. 2** shows the effect of long sightedness in an eye.

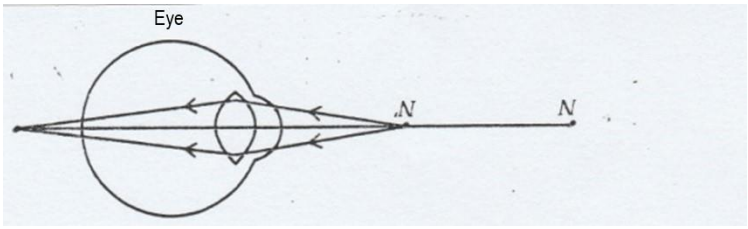


Fig. 2

Explain what causes long-sightedness and what can be done to correct it.

(4 marks)

Mark scheme

1 (a) (i) State the magnification *M* of the image. (1 mark) (ii) Use your value of *M* to deduce the ratio of the image distance v to the object distance u. (1 mark) (iii) The focal length *f* of the lens is 20 cm. Using your answer in **(a)(ii)** in the lens equation: $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ calculate the object distance *u.*	
Answer	Guidance
(i) M = 4 (ii) v = 4U or v/u = 4;	

(iii) If answer u = -15 cm award 3 marks Substitution: $\frac{1}{20} = \frac{1}{4u} - \frac{1}{u}$; Rearrangement to give u = ¾ x 20; Calculation u = -15 cm; (iv) (4 x –15 =) -60 cm;	**ALLOW** 15 **ALLOW** ecf (a)(ii) x (a)(iii)
1 (b) Calculate the power of lens with a focal length f = 20 cm. State the unit.	
Answer	Guidance
If answer P = 5 D award 2 marks Conversion 20 cm = 0.2; Substitution, calculation **and** unit D/Dioptre;	**ALLOW** 0.05 D = 1 mark
1 (c) Explain what causes long-sightedness and what can be done to correct it.	
Answer	Guidance
Indicative science Causes: • Increased curvature of lens; • Dislocation of lens; • Shortening of eyeball; • Image is formed behind retina (when observing a near point *N'*) Corrections: • Spectacles / contact lenses • Convex lens • Surgery	**ALLOW** lens changes shape **ALLOW** lens changes position **ALLOW** eyeball changes shape **ALLOW** image is not in focus **ALLOW** only distant images are focused on the retina

Science10SG4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
SCIENCE10SG41a	2				10.8.7 Describe the properties and uses of ethanol and ethanoic acid.	2
SCIENCE10SG41bi, bii, biii	1	2			10.1.5 Define bonding as ionic, covalent, and metallic and relate this to physical and chemical properties. 10.8.7 Describe the properties and uses of ethanol and ethanoic acid.	3
SCIENCE10SG41ci, cii		2	2		7.2.2 Explain that chemical reactions form new products.	4
Total marks	3	4	2			9

Item purpose

The question assesses the students understanding of the physical and chemical properties of important organic compounds such as ethanol.

Question(s)

1 Ethanol is an important carbon compound.

1(a) State **one** property and **one** use of ethanol.

(2 marks)

1(b) Ethanol has the chemical formula C_2H_5OH.

Ethanol can be converted to ethene C_2H_4.

1(b)(i) Determine the number of covalent bonds in **one** molecule of ethanol. (1 mark)

1(b)(ii) Name the acid that is used to convert ethanol to ethene. (1 mark)

1(b)(iii) Suggest why the acid that is used to convert ethanol to ethene is described as a dehydrating agent. (1 mark)

1(c) In an investigation, a piece of sodium metal is added to excess ethanol.

The gas produced in the reaction is collected as shown in Fig. 1.

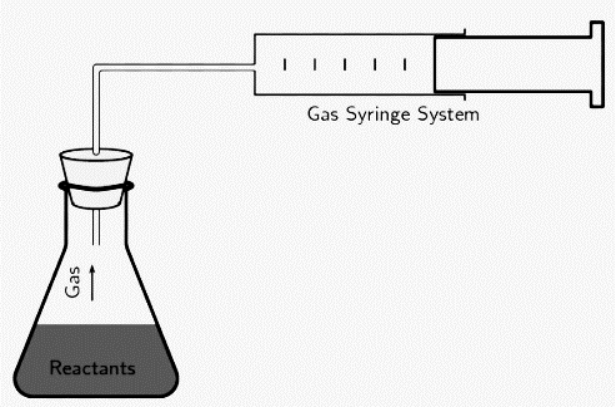


Fig. 1

The volume of gas collected is recorded every 10 seconds as shown in **Table 1**.

Results	
Time (seconds)	Volume of gas (cm^3)
0	0
10	20
20	40
30	58

40	72
50	80
60	80

Table 1

1(c)(i) Describe how the reaction changed during the reaction. Suggest why the reaction changed in this way (3 marks)

1(c)(ii) Deduce the identity of the gas released in this reaction. (1 mark)

(Total marks 9)

Mark scheme

1 (a) State one property and one use of ethanol.	
Answer	Guidance
Property: colourless / liquid at room temp. / flammable / soluble in water ; Use: medicine / anti-freeze / solvent / fuel ;	
1 (b)(i) Determine the number of covalent bonds in **one** molecule of ethanol.	
Answer	Guidance
8;	
1 (b)(ii) Name the acid that is used to convert ethanol to ethene.	
Answer	Guidance
sulfuric acid / H_2SO_4 ;	
1 (b)(iii) Suggest why the acid that is used to convert ethanol to ethene is described as a dehydrating agent.	
Answer	Guidance
It removes H_2O / water (from ethanol);	
1 (c)(i) Describe how the reaction changed during the reaction. Suggest why the reaction changed in this way	
Answer	Guidance
It slows down;	

(then) stops; sodium is used up;	
1 (c)(ii) Deduce the identity of the gas released in this reaction.	
Answer	Guidance
Hydrogen / H2	**ALLOW** H

Science10MS4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10MS41ai	2	1			9.4.25 Explain how the addition of fertilisers (natural manure and man-made ammonium nitrate) change crop productivity but can have negative effects.	3
Science10MS41aii	1					1
Science10MS41bi	2	2			10.1.21 Define an ecosystem in terms of communities of organisms interacting with abiotic factors	4
Science10MS41bii	2				9.9.7 Explain the impact of industry and agriculture on ……fertiliser run off promoting eutrophication of water courses	2
Science10MS41c		4			10.6.9 Explain how different forms of energy are created and used- fossil fuels, nuclear, solar, biogas, ethanol wood/biomass, wind, water and tidal and describe the advantages and disadvantages of each	4
Total marks	7	7				**14**

Item purpose

The question assesses the students' understanding about the ecosystems made by man. It also tests their understanding about the comparative analysis of different types of fuels.

Question(s)

1 Animal dung is used as an organic fertiliser.

1 (a)(i) Explain what is meant by the term organic fertiliser.

(3 marks)

1 (a)(ii) Name one man-made fertiliser.

(1 marks)

1 (b)(i) In periods of high rainfall, fertiliser can flow into lake ecosystems.
Explain what is meant by the term ecosystem.

(4 marks)

1 (b)(ii) Suggest **two** negative impacts of fertiliser in lake ecosystems.

(2 marks)

1 (c) Animal dung can be used as a fuel and burned to heat homes.

Animal dung can also be fermented to produce biogas. Biogas can be burned to heat homes.

Explain the advantages of using animal dung to produce biogas.

(4 marks)
(Total marks 14)

Mark scheme

1 (a)(i) Explain what is meant by the term organic fertiliser.	
Answer	Guidance
Produced by a plant/animal; To increase / replenish nutrients in soil; For the production of crops	
1 (a)(ii) Name one man-made fertiliser.	
Answer	Guidance
Ammonium nitrate /AVP;	
1 (b)(i) Explain what is meant by the term ecosystem.	
Answer	Guidance
Organisms/plants animals; In a habitat / community; Interact with each other/biotic; Interact with the surroundings/abiotic;	**ALLOW** named abiotic factor e.g., climate
1 (b)(ii) Suggest two negative impacts of fertiliser in lake ecosystems.	
Answer	Guidance
increased growth of plants / algae; Eutrophication;	**ALLOW** a description of eutrophication i.e., Deoxygenation of water by (respiration) of decomposers feeding on decaying algae.
1 (c) Explain the advantages of using animal dung to produce biogas.	
Answer	Guidance
Indicative science: • clean / no smoke / no ash; • Smoke from burning dung affects lungs; • (biogas) releases more heat when it burns; • The dung can still be used as a fertiliser; • Can be used in other processes e.g. electrical generators;	

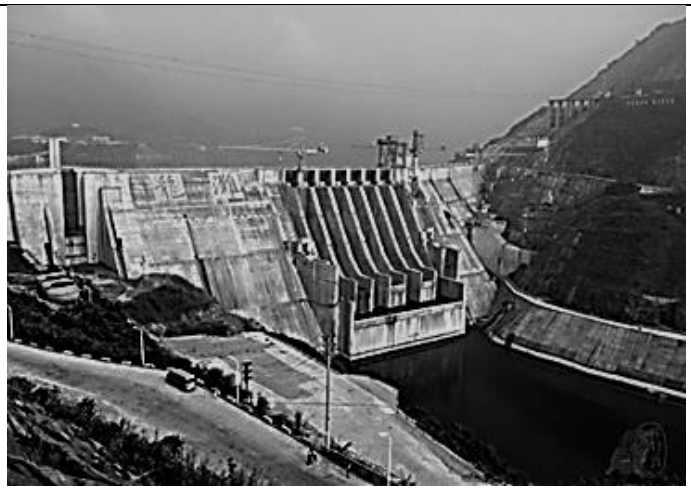
Science10RR4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10RR41a	5				10.8.19 Explain how a generator is used to produce electricity ...	5
Science10RR41b		3			10.8.27 Explain the advantages and disadvantages of large dam projects.	3
Science10RR41ci	1				9.1.12 Classify resources as renewable and non-renewable.	1
Science10RR41cii	2					2
Total marks	8	3				**11**

Item purpose

The question assesses the learner's ability to understand the impact of dam construction on the environment and the importance of renewable energy.

Source(s)



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https://www.google.com/search?q=tehri%20dam%20images&tbm=isch&hl=en&rlz=1C1JZAP_enIN932IN932&sa=X&ved=0CB4QtI8BKABqFwoTCODqs_-47O8CFQAAAAAdAAAAABAW&biw=1519&bih=666

Question(s)

1. Large dams are used to generate electricity.

1 (a) Use words from the list to complete the sentences about electricity generation.

You may use each word once, more than once or not at all.

attract **chemical** **electrical** **generator** **kinetic**
motor **potential** **repel** **rotate**

Water behind the dam has _____ energy. This energy is transferred to _____ energy when the water flows through a turbine. The turbine turns a _____. This causes a large magnet to _____ inside a coil of wire and produce _____ energy.

(5 marks)

1 (b) Describe **three** environmental impacts of large dams.

(3 marks)

1 (c) (i) Dams are a renewable source of energy.

Explain what is meant by a renewable source of energy.

(1 marks)

1 (c) (ii) Give **two** more examples of renewable sources of energy.

(2 marks)

(Total marks 11)

Mark scheme

1 (a) Use words from the list to complete the sentences about electricity generation.	
Answer	Guidance
Potential; Kinetic; Generator; Rotate; Electrical;	
1 (b) Describe **three** environmental impacts of large dams.	
Answer	Guidance
Any **three** from: Loss of habitat / deforestation; Loss of farmland; Silting up; Loss of water for downstream irrigation; Loss of nutrients in silt for downstream agriculture; AVP;	**IGNORE** cost / impacts on people
1 (c) (i) Dams are a renewable source of energy. Explain what is meant by a renewable source of energy. 1 (c) (ii) Give two more examples of renewable sources of energy.	
Answer	Guidance
(i) always available / not finite / won't run out; (ii) Any **two** from Solar; Wind; Wave; Tidal; Geothermal.	

Science10R3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10R31a		2			10.6.1 Write balanced word and symbol equations, including phase information for common examples of combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction reactions.	2
Science10R31b	2	2			9.2.5 Explain how to design and conduct an experiment to verify the law of conservation of mass in a chemical reaction.	4
Total marks	2	4				**6**

Item purpose

The question assesses …students' ability to write a balanced chemical equation.

Identify the principal on which balancing is done.

Question(s)

1. The reaction of lead nitrate with potassium iodide produces lead iodide and potassium nitrate.

(a) Construct a balanced chemical equation for this reaction.

(2 marks)

(b) Explain why chemical reactions are balanced.

(4 marks)

Mark scheme

1 (a) Construct a balanced chemical equation for this reaction.	
Answer	Guidance
all formulae correct; balancing; $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$;	$PbNO_3 + KI \rightarrow PbI_2 + KNO_3$ = 1 mark Dependent mark – only award if the formulae mark is awarded
1 (b) Explain why chemical reactions are balanced.	
Answer	Guidance
Technique described, e.g., oxidation ; Chemical formula of product to deduce amount of oxygen added; mass of products = mass of reactants; (because) mass is conserved.	ALLOW e.g., heat known mass of Mg ribbon until fully oxidised ALLOW use mass of oxidised Mg in MgO

Science10DP6

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
SCIENCE10DP61a	3				10.10.2 Mendel's work on heredity in plants	3
SCIENCE10DP61b		5			9.3.11 Explain how selective breeding in plants and animals is used to improve quality, yield and manage diseases.	5
Total marks	3	5				**8**

Item purpose

The question assesses the students' understanding of Mendel's work, ability to analyse scientific information, interpret patterns and relationships.

Question(s)

1 Gregor Mendel studied pea plants.

This helped him to understand how features are passed from parents to offspring.

1 (a) Suggest three reasons why Mendel studied pea plants.

(3 marks)

1 (b) Mendel's pea plants flowered with a range of colours.

He could not predict which seeds would produce which colour of flower.

(5 marks)

(Total marks 8)

Mark scheme

1 (a) Suggest three reasons why Mendel studied pea plants.	
Answer	Guidance
Any **three** from: Easy to grow; Have observable features/characteristics; Reproduce rapidly; Easy to pollinate; Can grow successive generations in a short time/season;	**ALLOW** quick to mature
1 (b) Use ideas about selective breeding to explain how Mendel was able to ensure that his seeds would only produce white flowers.	
Answer	Guidance
Any five from: Choose the plants with white flowers; Breed them together; Select the offspring with white flowers; Breed them together; Repeat for a few more generations; Detail – e.g., transfer the pollen manually/use a pollen brush / cover the white flowers to prevent insect pollination;	

Science10GK5

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10GK51ai aii aiii	3				10.1.22 Define primary producers, primary and secondary consumers in food chains and webs	3
Science10GK51b		2				2
Science10GK51c		2		2	9.9.7 Explain the impact of ... agriculture on the environment in the form of pollution – ….. pesticides and drugs used in farming poisoning animals because of bioaccumulation.	4
Total marks	3	4		2		**9**

Item purpose

The question assesses the understanding of the role of the decomposers in an ecosystem and the effects of using harmful chemicals on the environment.

Question(s)

1 Fig. 1 shows part of a desert food web.

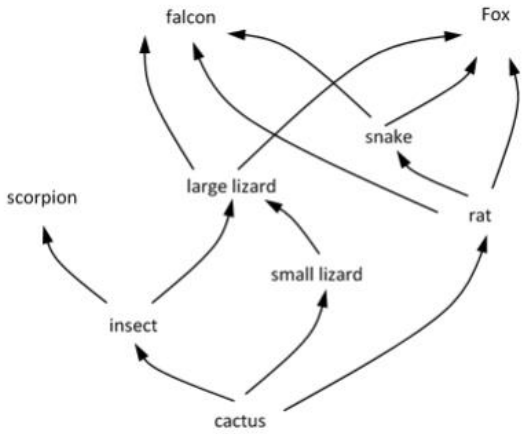


Fig. 1

1(a) Identify in Fig. 1.1:

1(a)(i) A producer (1 mark)

1(a)(ii) A primary consumer (1 mark)

1(a)(iii) A secondary consumer (1 mark)

1(b) Draw a food chain containing a snake. (2 marks)

< 4 cm space >

1(c) Discuss the impact of pesticides on the food web in Fig.1. (4 marks)

(Total marks 9)

Mark scheme

1 (a)(i) Identify in Fig. 1.1: A producer	
Answer	Guidance
Cactus	
1 (a)(ii) Identify in Fig. 1.1: A primary consumer	
Answer	Guidance
insect / small lizard /rat ;	
1 (a)(iii) Identify in Fig. 1.1: A secondary consumer	
Answer	Guidance
scorpion / large lizard / snake / falcon / fox	
1 (b) Draw a food chain containing a snake.	
Answer	Guidance
All organisms; Arrows correct direction; i.e., Cactus -> rat -> snake	
1 (c) Discuss the impact of pesticides on the food web in Fig.1.	
Answer	Guidance
Indicative science • Kills insects • Less food for scorpion / large lizard • Less large lizards, less food for fox / falcon • Bioaccumulation in top predator/falcon/fox • Damage to offspring due to bioaccumulation • Less damage to cacti from insects • More food for small lizard / rat Change in populations of secondary consumers	

Level of response

Level	Description	Marks
4	Clear well-structured explanation linking effects to causes or underpinning theory.	4
3	Clear description of relevant facts with some explanation relating effects to causes or underpinning theory.	3
2	Description of the basic facts but no link of effects to causes or underpinning theory.	2
1	Limited isolated descriptive points relevant to the topic	1
0	Nothing worthy of credit	0

ScienceCKV4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
SCIENCECKV41a			2		10.5.19 Draw or interpret a food chain or food web 10.1.22 Define primary producers, primary and secondary consumers in food chains and webs	2
SCIENCECKV41b	1				10.5.19 Draw or interpret a food chain or food web	1
SCIENCECKV41c				4	9.9.7 Explain the impact of ...agriculture on the environment in the form of..... pesticides …... because of bioaccumulation.	4
Total marks	1		2	4		**7**

Item purpose

The question assesses the students' knowledge about food chains and calculate energy at different levels in the food chain.

Source(s)

1 Some information about a food chain is listed.

- Caterpillars are herbivores.
- Blackbirds eat secondary consumers.
- Eagles eat blackbirds.
- Spinach carries out photosynthesis.

1(a) Draw a food chain using all of the information. (2 marks)

1(b) What do the arrows in a food chain represent? (1 mark)

1(c) A farmer sprays their spinach with pesticide and kills most of the caterpillars.

Some caterpillars survive.

(4 marks)

Discuss the impact on the food chain.

(Total marks 7)

Mark scheme

1 (a) Draw a food chain using all the information.	
Answer	Guidance
Correct sequence. Correct arrow direction, Spinach □□caterpillar □ blackbird □ eagle	
1 (b) What do the arrows in a food chain represent?	
Answer	Guidance
the transfer of energy; from the producer to the consumer(s);	
1 (c) Discuss the impact on the food chain.	
Answer	Guidance
Less food for blackbird / blackbirds die out; Less food for eagle / eagles die out; Pesticides in surviving caterpillars transfers to consumers; Bio-accumulation in consumers;	

Science10PB1

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10PB1	1				10.1	1

Item purpose

The question assesses

Source(s)

Source information: Own question

Question(s)

1 Methane gas is burnt in air.

State whether the reaction is exothermic or endothermic.

(1 mark)

Mark scheme

1 **Methane** gas is burnt in air. State whether the reaction is exothermic or endothermic.	
Answer	Guidance
It is exothermic reaction (1)	

Science10PB6

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10PB6	1				10.1.1 Scientific classification • recognise the difference between reactions, such as, exothermic and endothermic, oxidation and reduction, etc.	1

Item purpose

The question assesses the students' learning and understanding about type of reaction.

Source(s)

Based on types of reactants and the product formed, there are different types of reaction

Source information: Own question

Question(s)

1 Which of the following reactions is exothermic?

A. Quick lime is dissolved in water to produce slaked lime.

B. Calcium carbonate is heated to produce carbon dioxide gas and quick lime.

C. Lead nitrate is heated to produce lead oxide, nitrogen dioxide and oxygen.

D. Mercuric oxide is heated to produce mercury and oxygen.

(1 mark)

Mark scheme

1 Which of the following reactions is exothermic?	
Answer	Guidance
A	

Science10GD3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10GD31a		3			10.4.1 Balance chemical equations	3
Science10GD31bi,bii,biii		3			10.1.1 Define types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction.	3
Science10GD31ci		2				2
Science10GD31cii		3				3
Science10GD31d	1					2
Total marks	2	11				13

Item purpose

The question assesses the type of chemical reactions which underpin the characteristics of chemical reactions and potential impact on environments.

Question(s)

1 The reaction between magnesium and oxygen produces magnesium oxide. Energy is released as heat and light during the reaction.

1(a) Complete and balance the symbol equation to show this reaction.

Include the state symbols.

Mg + O_2 → (3 marks)

1(b) The reaction between magnesium and oxygen can be described in different ways.

Explain why the reaction can be described as:

i. a combination reaction. (1 mark)

ii. an oxidation reaction. (1 mark)

iii. an exothermic reaction. (1 mark)

1(c) **Fig. 1** shows a piece of magnesium ribbon.

Fig. 1

1(c)(i) Suggest why the surface of the ribbon must be cleaned before the ribbon is used. (2 marks)

1(c)(ii) Describe **three** other precautions that must be taken when burning magnesium.

1. _____

2. _____

3. _____ (3 marks)

1(d) Magnesium oxide dissolves in water to produce an aqueous solution.

Suggest the pH of the solution _____

Explain your answer

(2 marks)

(Total marks 13)

Mark scheme

1 (a) Complete and balance the symbol equation to show this reaction. Include the state symbols.	
Answer	Guidance
Formulae; Balancing; State symbols; $2Mg\ (s) + O_2\ (g) \rightarrow 2MgO\ (s)$	
1 (b) The reaction between magnesium and oxygen can be described in different ways. Explain why the reaction can be described as: i. a combination reaction. ii. an oxidation reaction. iii. an exothermic reaction.	
Answer	Guidance
(b)(i) more than one reactant and a single product; (b)(ii) oxygen is gained/added (by Mg); (b)(iii) heat is released;	
1 (c)(i) Suggest why the surface of the ribbon must be cleaned before the ribbon is used.	
Answer	Guidance
to remove oxide/carbonate layer;	**ALLOW** to remove Mg compounds

which prevent burning / to allow burning AW;	

1 (c)(ii) Describe **three** other precautions that must be taken when burning magnesium.

1. _____
2. _____
3. _____

Answer	Guidance
Any **three** from: • wear goggles • hold in tongs / crucible • do not observe the flame directly • use a small amount Safety screen / tie hair back / heat proof mat	

1 (d) Magnesium oxide dissolves in water to produce an aqueous solution.

Suggest the pH of the solution _____

Explain your answer

Answer	Guidance
8 –10; metal oxides are basic;	

Science10NG1

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Mark
Science10NG1	1				10.1.1	1

Item purpose

The question assesses whether the student understands the concept of different types of reaction to identify the combination reaction.

Source(s)

NCERT TEXTBOOK FOR CLASS-X Ch-1 Chemical reactions and equations

Question

1 A chemical reaction in which two or more substances combine to form a single product is

A. a decomposition reaction
B. a combination reaction
C. a displacement reaction
D. an exothermic reaction

(1 mark)

Mark scheme

1 A chemical reaction in which two or more substances combine to form a single product is A. a decomposition reaction B. a combination reaction C. a displacement reaction D. an exothermic reaction	
Answer	Guidance
B	

Science10R5

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10R51a	4				10.1.1 Define types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction.	4
Science10R51b		1				2
Total marks	4	1		1		5

Item purpose

The question assesses …students' ability to define decomposition reaction.

Effect of nature of water on electrolytic decomposition of water

Question(s)

1 Decomposition is a type of chemical reaction.

1 (a) Using water as an example, state and explain what happens in electrolytic decomposition.

(4 marks)

1 (b) Suggest why pure water does not undergo electrolytic decomposition.

(1 marks)

Mark scheme

1 (a) Using water as an example, state and explain what happens in electrolytic decomposition.	
Answer	Guidance
Any **four** from: one reactant forms more than one (stable) product; (when) energy/electricity is supplied; hydrogen **and** oxygen; hydrogen released at cathode / oxygen released at anode.	**ALLOW** reference to ions
1 (b) Suggest why pure water does not undergo electrolytic decomposition.	
Answer	Guidance
it is not ionic / no ions are present.	**ALLOW** it is covalently bonded

Science10R1

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10R1		1			10.1.1 Define types of chemical reactions: combination, decomposition, **displacement**, double displacement, precipitation, neutralization, oxidation and reduction.	1

Item purpose

The question assesses …students' ability to identify the type of reaction.

Question(s)

1 What type of chemical reaction is shown?

$$4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$$

A. Combination reaction
B. Displacement reaction
C. Double displacement reaction
D. Neutralisation reaction

(1 mark)

Mark scheme

1 What type of chemical reaction is shown?	
Answer	Guidance
B	

Science10GD1

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10GD1	1				10.1.3	1

Item purpose

The question assesses whether students understand the concepts of acids and bases and to identify the acid and bases with indicator.

Source(s)

NCERT TEXTBOOK FOR CLASS-X Ch-2 Acids bases and salts.

Question(s)

1 Which statement about litmus in acids and bases is correct?

A. Acids turn blue litmus to red and bases turn red litmus to blue

B. Acids turn blue litmus to red and bases turn blue litmus to red

C. Acids turn red litmus to blue and bases turn red litmus to blue

D. Acids turn red litmus to blue and bases turn blue litmus to red

(1 mark)

Mark scheme

1. Which statement about litmus in acids and bases is correct? A. Acids turn blue litmus to red and bases turn red litmus to blue B. Acids turn blue litmus to red and bases turn blue litmus to red C. Acids turn red litmus to blue and bases turn red litmus to blue D. Acids turn red litmus to blue and bases turn blue litmus to red	
Answer	Guidance

A	

Science10NG4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10NG41ai-ax	10				10.1.4 Define elements as metals and non-metals and relate this to their position in the periodic table and their properties	10
Science10NG41b	3				10.1.5 Define bonding as ionic, covalent and metallic and relate this to physical and chemical properties.	3
Total marks	13					13

Item purpose

The question assesses understanding of elements as metals and non-metals and relate their position in the periodic table based on electronic configuration.

Question(s)

1 The symbols of the elements in **Period 2** of the Periodic Table are shown.

Li Be B C N O F Ne

For each of the following, give the symbol of an element from Period 2 which matches the description.

Each element may be used once, more than once or not at all.

1(a) Which element:

1(a)(i)	is an unreactive monatomic gas	(1 mark)
1(a)(ii)	forms oxides which contribute to acid rain	(1 mark)
1(a)(iii)	forms compounds that improve the fertility of soil	(1 mark)
1(a)(iv)	is a reactive metal that must be stored in oil	(1 mark)
1(a)(v)	has atoms with only 4 protons	(1 mark)
1(a)(vi)	has a relative atomic mass of 19	(1 mark)
1(a)(vii)	has 5 valence electrons	(1 mark)
1(a)(viii)	forms saturated and unsaturated compounds	(1 mark)
1(a)(ix)	forms flammable compounds with hydrogen	(1 mark)
1(a)(x)	is least metallic in nature	(1 mark)
1(b)	Some of the elements in Period 2 form ionic compounds	(3 marks)
	State **three** properties of ionic compounds.	

(Total 13 marks)

Mark scheme

1(a) Which element:

i. is an unreactive monatomic gas
ii. forms oxides which contribute to acid rain
iii. forms compounds that improve the fertility of soil
iv. is a reactive metal that must be stored in oil
v. has atoms with only 4 protons
vi. has a relative atomic mass of 19
vii. has 5 valence electrons
viii. forms saturated and unsaturated compounds
ix. forms flammable compounds with hydrogen
x. is least metallic in nature

Answer	Guidance
(i) Ne (ii) N (iii) N (iv) Li (v) Be (vi) F (vii) B (viii) C (ix) C (x) Ne	

1 (b) State three properties of ionic compounds. State **three** properties of ionic compounds.

Answer	Guidance
Any **three** from: • They form crystals • high **melting points** • high **boiling points**. • They're hard and brittle • Soluble in water • They **conduct electricity** when they are dissolved in water • They're good insulators.	

Science10SG2

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
SCIENCE10SG2	1				10.1.5 Define bonding as ionic, covalent and metallic and relate this to physical and chemical properties.	1

Item purpose

The question assesses the students' understanding about the properties of ionic compounds and covalent compounds.

Question(s)

1 The table shown above gives some information about five substances: A, B, C, D and E.

Substance	Melting point (K)	Electrical conductivity	
	Solid	Liquid/aqueous	Solid
A	290	poor	poor
B	209	poor	poor
C	887	poor	good
D	156	poor	poor
E	985	poor	good

Which substances are covalent compounds?

(1 mark)

Mark scheme

1 Which substances are covalent compounds?	
Answer	Guidance
Covalent compounds – A, B and D	1 mark for correct identification of all three compounds.

Science10GD4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10GD41a	2				10.6.3 Understand that the periodic table is based on the atomic structure of the elements and that the variation in properties ... related to this structure and hence the position in the table.	2
Science10GD41bi		1			10.9.1 Identify products of different reactions.	1
Science10GD41bii		1			10.1.5 Define bonding as ionic, covalent and metallic and relate this to physical and chemical properties.	1
Science10GD41ci		1			10.1.8 Define homologous series prefixes of carbon compounds up to 10 carbon atoms long 10.1.6 Classify carbon compounds as alkanes, alkenes alkynes, alcohols, carboxylic acids, ketones, aldehydes 10.1.7 Define hydrocarbons as being saturated or unsaturated	1
Science10GD41cii			1			1
Science10GD41di		1				1
Science10GD41dii			1			1
Science10GD41e	2			2	10.1.23 Define substances as biodegradable and non-biodegradable	4

Total marks	4	4	2	2		**12**

Item purpose

The question assesses the properties of carbon and its compounds which underpin the saturated and unsaturated carbon compounds and their potential impact on environments.

Question(s)

1 Most carbon compounds release large amounts of heat and light when they burn.

1(a) State the group and period of carbon in the Periodic Table. (2 marks)

1(b) Carbon reacts with the element with atomic number 8.

1(b)(i) Name the compound formed in the reaction. (1 mark)

1(b)(ii) Name the type of bonding in the compound formed in the reaction. (1 mark)

1(c) Alkanes are a family of hydrocarbons in crude oil.

They have the same general formula CnH2n+2.

n = 2

1(c)(i) Calculate the molecular formula of this alkane. (1 mark)

1(c)(ii) Draw the structural formula of this alkane. (1 mark)

<5cm space>

1(d) Alkenes have the same general formula CnH2n.

n= 2

1(d)(i) Calculate the molecular formula of this alkene. (1 mark)

1(d)(ii) Draw the structural formula of this alkene. (1 mark)

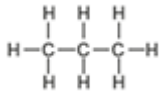
<5cm space>

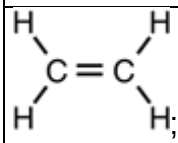
1(e) Alkanes and alkenes are used to make plastics. (4 marks)

Discuss why plastics are used in food wrapping and the impact on the environment when plastic wrappers are not disposed of properly.

(Total marks 12)

Mark scheme

1 (a) State the group and period of carbon in the Periodic Table.	
Answer	Guidance
Group 4 / 14 Period 2;	
1 (b)(i) Name the compound formed in the reaction.	
Answer	Guidance
Carbon dioxide;	
1 (b)(ii) Name the type of bonding in the compound formed in the reaction.	
Answer	Guidance
Covalent;	
1 (c)(i) Calculate the molecular formula of this alkane.	
Answer	Guidance
C2H6;	
1 (c)(ii) Draw the structural formula of this alkane.	
Answer	Guidance
 ;	**ALLOW** ecf using answer to (c)(i) **DO NOT ALLOW** double carbon bonds

1 (d)(i) Calculate the molecular formula of this alkene.	
Answer	Guidance
C_2H_4;	
1 (d)(ii) Draw the structural formula of this alkene.	
Answer	Guidance
 ;	
1 (e) Alkanes and alkenes are used to make plastics. Discuss why plastics are used in food wrapping and the impact on the environment when plastic wrappers are not disposed of properly.	
Answer	Guidance
Indicative science Use in food wrapping • Non-biodegradable • Hygienic / can be kept clean • Does not contaminate food • Keeps food fresh/for longer • AVP Ideas related to improper disposal • Accumulation in the environment • Harm to wildlife • Enters food chains • AVP	

Science10MS3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10MS31a	2				10.10.1 Mendel's work on heredity in plants	2
Science10MS31b	1				10.6.4 Explain gene theory and the role of chromosomes and DNA.	1
Science10MS31ci	1				10.6.4 Explain gene theory and the role of chromosomes and DNA.	1
Science10MS31dii			3		10.4.3 Calculate the number of offspring with different characteristics using laws of heredity	3
Total marks	4		3			**7**

Item purpose

The question assesses the students' understanding of Mendel's work on heredity and the laws of inheritance. It also tests their understanding about the mechanism of sex determination in humans and the phenomenon of co-dominance.

Question(s)

1 Mendel made observations of pea plants.

1 (a) Describe the observations Mendel made.

(2 marks)

1 (b) Mendel did not know about genes.
What are genes made of?

(1 mark)

1 (c)(ii) Some plants have an allele for making the red pigment anthocyanin.

There are two alleles:

P^A - plant with allele for anthocyanin

P^N - plant with no allele for anthocyanin

What is an allele?

(1 mark)

1 (c)(ii) A plant breeder crosses a $P^A P^N$ with a $P^A P^A$ plant.

Predict, using a genetic diagram, the proportion of pure breeding plants in the offspring.

(3 marks)

(Total mark 7)

Mark scheme

<table>
<tr><td colspan="2">1 (a) Describe the observations Mendel made.</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>Characteristics / features traits;
That are passed from parent to offspring;</td><td>ALLOW named feature e.g. colour of petals</td></tr>
<tr><td colspan="2">1 (b) What are genes made of?</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>DNA</td><td></td></tr>
<tr><td colspan="2">1 (c)(i) What is an allele?</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>A different form of the same gene.</td><td></td></tr>
<tr><td colspan="2">1 (c)(ii) A plant breeder crosses a PA PN with a PA PA plant.
Predict, using a genetic diagram, the proportion of pure breeding plants in the offspring.</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>Gametes separated into column and row headings;
Four genotype crosses;
50% are PA PA;</td><td>
<table>
<tr><td></td><td>PA</td><td>P^A</td></tr>
<tr><td>PA</td><td>PA PA</td><td>PA PA</td></tr>
<tr><td>PN</td><td>PN PA</td><td>PN PA</td></tr>
</table>
</td></tr>
</table>

Science10NG2

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10NG2	1				10.2.1	1

Item purpose

The question assesses whether the learner recognises the concept of acids underpinning the ions responsible for showing acidic properties.

Source(s)

NCERT TEXTBOOK FOR CLASS-X Ch-2 Acids, bases and Salts

Question

1. The acidic properties of hydrochloric acid are due to the concentration of

   A. hydrogen ions
   B. chloride ions
   C. bromide ions
   D. nitrate ions

(1 mark)

Mark scheme

1 The acidic properties of hydrochloric acid are due to the concentration of A. hydrogen ions B. chloride ions C. bromide ions D. nitrate ions	
Answer	Guidance
A	

Science10R4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10R41a		4			10.4.2 Calculate mass and percentage yields of metals from ores.	4
Science10R41b	2				10.2.2 Describe and explain the properties of acids and bases (HCl & NaOH) on the basis of their reaction with: i) Litmus solution (Blue/Red) ii) Zinc metal iii) Solid sodium carbonate	2
Total marks	2	4				**6**

Item purpose

Effect of acids and bases on litmus.

Question(s)

1 In an experiment 12 g of magnesium is reacted with oxygen to produce magnesium oxide.

The equation for the reaction is:

$2Mg + O_2 \longrightarrow 2MgO$

1 (a) Determine the mass of MgO produced.
[A_r: Mg, 24; O, 16]

(4 marks)

1 (b) The magnesium oxide produce in the reaction is place on a strip of wet red litmus paper.

State and explain what is observed.

(2 marks)

Mark scheme

1 (a) Determine the mass of MgO produced.	
Answer	Guidance
If answer = 20 g award all 4 marks Mass of 2Mg = 48; Mass of 2MgO = 80; Molar ratio: (12/48 =) 0.25 0.25 x 80 = 20 (g);	
1 (b) The magnesium oxide produce in the reaction is place on a strip of wet red litmus paper. State and explain what is observed.	
Answer	Guidance
(turns) blue MgO is basic	**ALLOW** purple **ALLOW** alkaline

Science10NB4

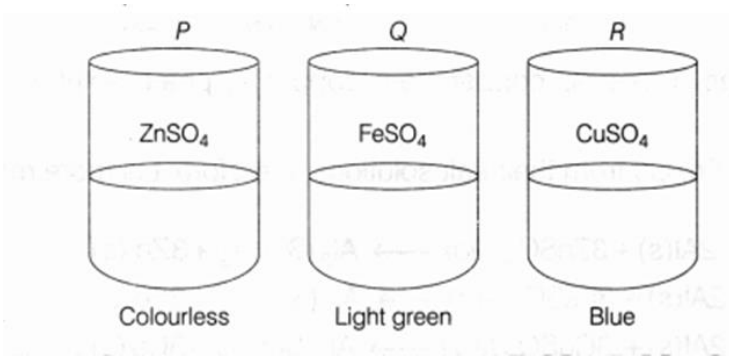
Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10NB41a		1			10.9.2 Identify relative reactivity of a metal given chemical reaction data	1
Science10NB41b	1	1			10.2.4. Describe the reactions seen for Zn, Fe, Cu and Al metals …..and arrange Zn, Fe, Cu and Al (metals) in the decreasing order of reactivity	2
Science10NB41 ci,cii,ciii	1	1	1		10.2.4. Describe the reactions seen for Zn, Fe, Cu and Al metals on the following salt solutions: i) $ZnSO_4(aq)$ ii) $FeSO_4(aq)$ iii) $CuSO_4(aq)$ iv) $Al_2(SO_4)_3(aq)$ and arrange Zn, Fe, Cu and Al (metals) in the decreasing order of reactivity based on the above results. 10.3.1 Explain how chemical reactions involving the following mechanisms take place: combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction.	3
Science10NB41d			2	2	10.3.32 Explain major environmental problems and their causes, impacts and solutions which can be	4

					implemented – desertification, deforestation, water deficit, waste production. 10.8.25 Explains the importance of resource conservation and methods for achieving it – reduce, replace, reuse, recycle.	
Total marks	2	3	3	2		**10**

Item purpose

The question assesses student's ability to understand reactivity series of metals.

Source(s)



Metal	Iron (II) sulphate	Copper (II) Sulphate	Aluminium sulphate	Silver nitrate
A	No reaction	Displacement		
B	Displacement		No reaction	
C	No reaction	No reaction	No reaction	Displacement
D	No reaction	No reaction	No reaction	No reaction

Source information: (I) https://www.aplustopper.com/cbse-class-10-science-lab-manual-reactivity-series/

Question(s)

1 The equations of two reactions are shown.

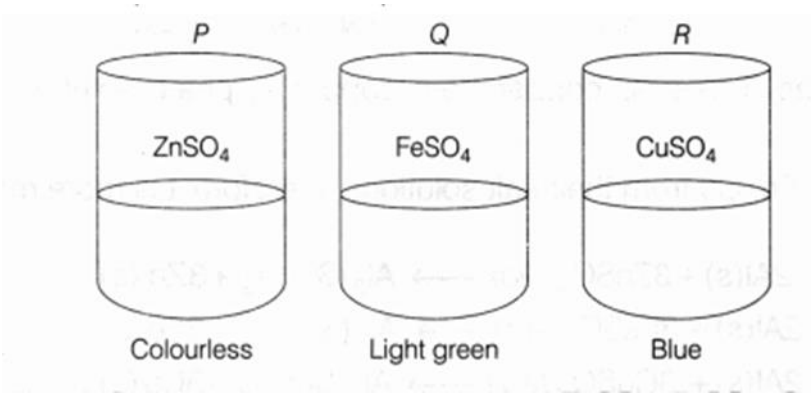
$P + QX \longrightarrow PX + Q$
$R + PY \longrightarrow RY + P$

1(a) Which row of the table shows the most reactive element and the least reactive element?

	Most reactive	Least reactive
A	P	R
B	Q	R
C	R	P
D	R	Q

(1 mark)

1(b) In an investigation pieces of zinc are added to containers P, Q and R containing zinc sulphate, iron sulphate and copper sulphate.



In which containers will a colour change be observed?

Give a reason for your answer.

(2 marks)

1(c) In an investigation, metals **A, B, C** and **D** are added to different solutions.

The observations are shown in Table 1.

	Solutions			
Metal	**Iron (II) sulphate**	**Copper (II) sulphate**	**Aluminium sulphate**	**Silver nitrate**
A	No reaction	Displacement		
B	Displacement		No reaction	
C	No reaction	No reaction	No reaction	Displacement
D	No reaction	No reaction	No reaction	No reaction

Table 1

(i) Explain what is observed when metal **B** is added to copper (II) sulphate solution. (2 marks)

(ii) Explain why silver nitrate must not be stored in a copper vessel. (2 marks)

(iii) Write the metals **A**, **B**, **C** and **D** in order of least reactive to most reactive. (1 mark)

1(d) The production of metals uses resources and has impacts on the environment.

(4 marks)

Explain why metals are recycled.

(Total marks 11)

Mark scheme

1 (a) Which row of the table shows the most reactive element and the least reactive element?	
Answer	Guidance
D;	
1 (b) In which containers will a colour change be observed?	
Answer	Guidance
Q and R; Zinc displaces / is more reactive than iron and copper.	
1 (c)(i) Explain what is observed when metal B is added to copper (II) sulfate solution.	
Answer	Guidance
Displacement / changes colour; B displaces iron and iron is more reactive than copper.	ALLOW blue disappears
1 (c)(ii) Explain why silver nitrate must not be stored in a copper vessel.	
Answer	Guidance
Any two from: copper is more reactive than silver; silver precipitate; holes will appear in the vessel walls.	
1 (c)(iii) Write the metals A, B, C and D in order of least reactive to most reactive.	
Answer	Guidance
D, C, A, B;	
1 (d) Explain why metals are recycled.	
Answer	Guidance
Indicative science: Less energy consumed Less greenhouse gas released Less impact of mining on habitats Less impact on landscape by landfill / waste sites Less refining / no need to remove impurities compared with metal ore Processed metal is valuable / more profitable to recycle No loss of metal properties with repeated recycling	

Level of response

Level	Description	Marks
4	Clear well-structured explanation linking effects to causes or underpinning theory.	4
3	Clear description of relevant facts with some explanation relating effects to causes or underpinning theory.	3
2	Description of the basic facts but no link of effects to causes or underpinning theory	2
1	Limited isolated descriptive points relevant to the topic	1
0	Nothing worthy of credit	0

Science10NB3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10NB31ai		3			10.4.1 Balance chemical equations	3
Science10NB31aii	1				10.8.7 Describe the properties and uses of ethanol and ethanoic acid	1
Science10NB31b		3			10.2.6. Explain how to carry out an investigation of the comparative cleaning capacity of a sample of soap in soft and hard water. 10.8.6 Describe the properties and uses of soaps and detergents.	3
Science10NB31c	4				10.8.6 Describe the properties and uses of soaps and detergents. 10.3.32 Explain major environmental problems and their causes, impacts and solutions which can be implemented – desertification, deforestation, water deficit, waste production.	4
Total marks	5	6				**11**

Item purpose

The question assesses the students understanding of properties of Ethanoic acid and soaps , the chemical reactions which underpin this and the potential impact on ecosystem.

Question(s)

1 Ethanoic acid reacts with sodium to produce sodium ethanoate.

1(a)(i) Complete and balance the symbol equation to show this reaction.
Include the state symbols.

CH_3COOH (aq) + Na(s) → (3 marks)

1(a)(ii) State one use of ethanoic acid. (1 mark)

1(b) In an investigation, Saanvi dissolves salts in distilled water.

Experiment	Salt
1	$NaCl$
2	$CaCl_2$
3	$MgCl_2$
4	KCl

In each experiment she adds a soap solution, containing Na^+ ions, to each salt solution. She shakes each mixture vigorously.

In which experiments will Saanvi **not** observe the formation of lather (foam)?

Explain your answer.

(3 marks)

1(c) Detergents are non-biodegradable.

Explain **two** negative environmental impacts of detergents in a lake ecosystem.

(4 marks)

(Total marks 11)

Mark scheme

<table>
<tr><td colspan="2">1 (a)(i) Complete and balance the symbol equation to show this reaction.
Include the state symbols.</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>2CH3COOH (aq) + 2Na(s) →
2CH3COONa(aq) + H2(g)↑
CH3COONa, H2 product (1)
balanced equation (1)
both state symbols correct for products (1)</td><td>No half marks so all state symbols are required for the mark.</td></tr>
<tr><td colspan="2">1 (a)(ii) State one use of ethanoic acid.</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>Any one from:
dyes / pigments / paints / coatings;</td><td></td></tr>
<tr><td colspan="2">1 (b) In which experiments will Saanvi not observe the formation of lather (foam)?</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>2 and 3;

Ca and Mg ions displaced by Na in soap;
Insoluble precipitate;</td><td>ALLOW Ca and Mg react with soap

ALLOW scum is formed (instead)

ALLOW reverse argument e.g., K is more reactive than Na in 4 and no reaction in 1

so, no precipitate [3 marks]</td></tr>
<tr><td colspan="2">1 (c) Explain two negative environmental impacts of detergents in a lake ecosystem.</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>Indicative science.
• Detergents act as fertiliser
• Contain phosphates
• Increased growth of algae / algal bloom
• Eutrophication / oxygen depletion.
• (due to) increased respiration of microbes;
• Death of organisms / fish / plants
• Endocrine disruptors / disruption of hormones in aquatic animals</td><td></td></tr>
</table>

Level of response

Level	Description	Marks
4	Clear well-structured explanation linking effects to causes or underpinning theory.	4
3	Clear description of relevant facts with some explanation relating effects to causes or underpinning theory.	3
2	Description of the basic facts but no link of effects to causes or underpinning theory	2
1	Limited isolated descriptive points relevant to the topic	1
0	Nothing worthy of credit	0

Science10R2

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10R2		1			10.3.1 Explain how chemical reactions involving the following mechanisms take place: combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction.	1

Item purpose

The question assesses student's ability to apply the knowledge of concept oxidation and reduction to the equation provided.

Question(s)

1 Which of the following statement(s) about the given reaction are correct?

$3Fe + 4H_2O$ -------→ $Fe_3O_4 + 4H_2$

1. Iron is oxidised
2. Water is oxidised
3. Water is reducing agent
4. Water is oxidising agent

A. 1 and 4
B. 2 and 3
C. 1 and 3
D. 1 only

(1 mark)

Mark scheme

1 Which of the following statement(s) about the given reaction are correct?	
Answer	Guidance
A	

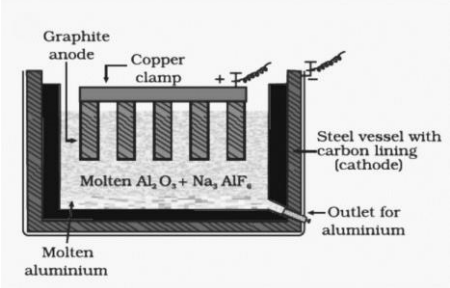
Science10SG3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
SCIENCE10SG31a		2			10.3.5 Explain how copper, iron and aluminium are extracted from their ores (Chalcopyrite, Magnetite and Bauxite) and the conditions required **and reactions which take place**.	2
SCIENCE10SG31 bi	1					1
SCIENCE10SG31bii	1	1				2
SCIENCE10SG31c		4			10.8.2 Explain how iron, copper and aluminium are extracted from their ore at an industrial scale and the environmental impact.	4
Total marks	2	7				**9**

Item purpose

The question assesses the students' understanding of the process of extraction of aluminium from its ore, the chemical reactions which accompany this and the potential impact on the environment.

Source



Source information: NCERT Textbook

Question(s)

1 (a) Pure aluminium is extracted from alumina by electrolysis as shown in **Fig. 1.**

Fig. 1

Write an ionic half-equation for the reaction at each electrode.

A. ionic half-equation for the anode reaction:
B. ionic half-equation for the cathode reaction:

(2 marks)

1 (b) Alumina, Al_2O_3, is mixed with cryolite, Na_3AlF_6, before electrolysis.

1(b)(i) Suggest why cryolite is added to alumina. (1 mark)

1(b)(ii) Explain why the anode must be replaced regularly. (2 mark)

1 (c) Explain two adverse effects on the environment caused by the mining and production of aluminium. (4 marks)

(Total marks 9)

Mark scheme

1 (a) Write an ionic half-equation for the reaction at each electrode. A. ionic half-equation for the anode reaction: B. ionic half-equation for the cathode reaction:	
Answer	Guidance
anode reaction: $2O^{2-} \rightarrow O_2 + 4e^-$; cathode reaction: $Al^{3+} + 3e^- \rightarrow Al$;	
1 (b)(i) Suggest why cryolite is added to alumina.	
Answer	Guidance
decreases melting point (of alumina) / increases conductivity ;	
1 (b)(ii) Explain why the anode must be replaced regularly.	
Answer	Guidance
Carbon / It reacts with oxygen; Released as carbon monoxide / CO / carbon dioxide CO_2;	
1 (c) Explain two adverse effects on the environment caused by the mining and production of aluminium.	
Answer	Guidance
Indicative science: • Loss of habitat due to mining • Strip mining removes vegetation / food • Mining process results in soil erosion • Impurities may be toxic • Impurities may enter water supplies • Noise pollution • Atmospheric pollution from the various stages of extraction. e.g., CO_2 from the burning of anodes (increased greenhouse effect / climate change); • CO is poisonous. • Dust and particulate matter can cause respiratory problems. • Dumping of unwanted aluminium scrap can lead to soil pollution. • AVP;	

Level of response

Level	Description	Marks
4	Clear well-structured explanation linking effects to causes or underpinning theory.	4
3	Clear description of relevant facts with some explanation relating effects to causes or underpinning theory.	3
2	Description of the basic facts but no link of effects to causes or underpinning theory	2
1	Limited isolated descriptive points relevant to the topic	1
0	Nothing worthy of credit	0

Science10PB4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10PB4ai		1	4		10.5.1 Draw and label a diagram showing **ionic...**bonding (a dot-cross diagram)	5
Science10PB4aii		2				2
Science10PB4b	2	2			10.3.5 Explain how copper, iron and aluminium are extracted from their ores (Chalcopyrite, Magnetite and Bauxite) and the conditions required and reactions which take place.	4
Total marks	2	5	4			**11**

Item purpose

The question assesses the learning and understanding of extraction of metals and about ionic compounds.

Question(s)

1 Pure aluminium is obtained by the electrolytic reduction of molten Alumina (Al_2O_3)

1 (a)(i) Draw a diagram to show how the aluminium and oxide ions are formed.

< provide 8cm space for student diagram >

(5 marks)

1 (a)(ii) State the charge on each ion.

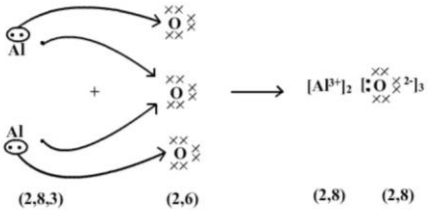
A. Aluminium ion
B. Oxide ion

(2 marks)

1 (b) Explain the process of electrolytic reduction of alumina.

(4 marks)
(Total marks 11)

Mark scheme

1 (a)(i) Draw a diagram to show how the aluminium and oxide ions are formed.	
Answer	Guidance
Separation of ions i.e., two Al atoms on left, **and** three oxygen atoms on right; Al – 3 valence electrons; O – 6 valence electrons; Arrows show electron transfer from Al to O; O ion with 8 outer shell electrons.	
1 (a)(ii) State the charge on each ion. A. Aluminium ion B. Oxide ion	
Answer	Guidance
(Al) 3^+ ; (O) 2^- ;	
1 (b) Explain the process of electrolytic reduction of alumina.	
Answer	Guidance
Indicative science: • Alumina is heated; • Heated so that the ions can move; • Al ion to the negative electrode / cathode; • Al ion gains (3) electrons / reduction (to form Al metal); • O ion to the positive electrode / anode; • O ion loses (2) electrons / oxidation (to form oxygen gas); • Detail: Anode is carbon, so CO_2 is produced / cryolite is added to reduce the melting point of the mixture	

Level of response

Level	Description	Marks
4	Clear well-structured explanation linking effects to causes or underpinning theory.	4
3	Clear description of relevant facts with some explanation relating effects to causes or underpinning theory.	3
2	Description of the basic facts but no link of effects to causes or underpinning theory	2
1	Limited isolated descriptive points relevant to the topic	1
0	Nothing worthy of credit	0

Science10PB3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10PB31ai	1	1			10.6.1	2
Science10PB31aii	1					1
Science10PB31bi	1				10.8.5	1
Science10PB31bii	1					1
Science10PB31ci	1				10.6.2	1
Science10PB31cii	1					1
Science10PB31ciii		1				1
Science10PB31di	1				10.8.5	1
Science10PB31dii	1	1				2
Science10PB31diii	1	1				2
Total marks	9	4				**13**

Item purpose

The question assesses the learning and understanding of preparation, properties and uses of salts.

Question(s)

1 Salts are formed in the reaction of an acid with a base.

1 (a)(i) Write a word equation for the reaction that produces ammonium nitrate.

(2 marks)

1 (a)(ii) State the nature of ammonium nitrate.

(1 marks)

1 (b)(i) State the name and chemical formula of the hydrated salt that changes from blue to white when it is heated.

(1 marks)

1 (b)(ii) Explain why this salt changes colour from blue to white when it is heated.

(1 marks)

1 (c)(i) Suggest the pH of sodium hydroxide.

(1 marks)

1 (c)(ii) What happens to the pH of sodium hydroxide when it is diluted?

(1 marks)

1 (c)(iii) What happens to the concentration of OH- ions when sodium hydroxide is diluted?

(1 marks)

1 (d)(i) Sodium hydrogen carbonate (NaHCO3) is heated strongly to produce sodium carbonate, water and carbon dioxide.

State the name of this type of reaction.

(1 marks)

1 (d)(ii) Construct a balanced symbol equation for this reaction.

(2 marks)

1 (d)(iii) Sodium carbonate is dissolved in water to produce sodium carbonate decahydrate.
Construct a balance symbol equation for this reaction.

(2 marks)

(Total marks 13)

Mark scheme

1 (a)(i) Write a word equation for the reaction that produces ammonium nitrate.	
Answer	Guidance
Ammonium hydroxide + nitric acid ; → Ammonium nitrate + water;	1 mark reactants 1 mark products
1 (a)(ii) State the nature of ammonium nitrate.	
Answer	Guidance
Acidic.	
1 (b)(i) State the name and chemical formula of the hydrated salt that changes from blue to white when it is heated.	
Answer	Guidance
(hydrated) copper sulfate; $CuSO_4$ $5H_2O$;	
1 (b)(ii) Explain why this salt changes colour from blue to white when it is heated.	
Answer	Guidance
Water is lost;	
1 (c)(i) Suggest the pH of sodium hydroxide.	
Answer	Guidance
12 – 14	
1 (c)(ii) What happens to the pH of sodium hydroxide when it is diluted?	
Answer	Guidance
decreases.	

1 (c)(iii) What happens to the concentration of OH- ions when sodium hydroxide is diluted	
Answer	Guidance
decreases;	
1 (d)(i) State the name of this type of reaction.	
Answer	Guidance
Decomposition.	
1 (d)(ii) Construct a balanced symbol equation for this reaction.	

Answer	Guidance
Left hand side correct; Right hand side correct;	**2**$NaHCO_3$ → Na_2CO_3+ H_2O + CO_2

1 (d)(iii) Sodium carbonate is dissolved in water to produce sodium carbonate decahydrate.
Construct a balance symbol equation for this reaction.

Answer	Guidance
Formulae correct; Balancing correct / **10**H_2O;	Na_2CO_3+ 10H_2O---→ Na_2CO_3.10H_2O

Science10SG5

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
SCIENCE10SG51ai	3				10.6.2 Understand the pH scale as a measure of concentration of hydrogen ions and relate it to furnishing of H^+ and OH^- ions and the properties of acids and bases	3
SCIENCE10SG51aii	1					1
SCIENCE10SG51b	1					1
SCIENCE10SG51c	3			1	8.2.9 Explain the origin of a variety of pollutants formed as a result of combustion reactions: • Sulfur and nitrogen oxides, which contribute to acid rain 10.3.32 Explain major environmental problems and their causes, impacts and solutions which can be implemented – desertification, deforestation, water deficit, waste production.	4
Total marks	8			1		**9**

Item purpose

The question assesses the students understanding of the pH and how pH change of water bodies indicates the extent of water pollution

Question(s)

1 The quality of water can be checked by measuring its pH. Pure water is neutral.

1(a)(i) State the pH of:

A. pure water
B. a strong acid
C. a weak base

(3 marks)

1(a)(ii) Define pH. (1 mark)

1(b) Universal indicator is a chemical substance used to measure pH.

Name one other chemical substance that can be used to measure pH. (1 mark)

1(c) Atmospheric pollutants can cause acid rain.

Describe the formation of these pollutants and their impact on the environment. (4 marks)

(Total marks 9)

Mark scheme

1 (a)(i) State the pH of: A. pure water B. a strong acid C. a weak base	
Answer	Guidance
7; 1 – 4; 8 – 10;	**ALLOW** e.g., 4.9
1 (a)(ii) Define pH.	
Answer	Guidance
concentration of hydrogen ions (in a solution).	

1 (b) Name one other chemical substance that can be used to measure pH.	
Answer	Guidance
Litmus / AVP;	
1 (c) Describe the formation of these pollutants and their impact on the environment.	
Answer	Guidance
Indicative science • Combustion • Combustion of fossil fuels containing sulfur • Oxides of sulfur / oxides of nitrogen • Dissolve in water in the atmosphere • pH soil changes • fertility of soil changes / mineral ions in soil reacts with acid • damage to crops • Damage to (limestone) buildings • AVP;	

Level of response

Level	Description	Marks
4	Clear well-structured explanation linking effects to causes or underpinning theory.	4
3	Clear description of relevant facts with some explanation relating effects to causes or underpinning theory.	3
2	Description of the basic facts but no link of effects to causes or underpinning theory	2
1	Limited isolated descriptive points relevant to the topic	1
0	Nothing worthy of credit	0

Science10NB1

Item identity	AO1 mark	AO2 mark	AO3 mark	AO4 mark	Content Reference(s)	Mark
Science10NB1		1			10.6.3 Understand that the periodic table is based on the atomic structure of the elements and that the variation in properties shown (melting and boiling point, the valency and reactivity and atomic number and RAM) are related to this structure and hence the position in the table.	1

Item purpose

The question assesses the student's ability to relate properties of elements in period.

Question(s)

1 The electronic shell structure of elements Q, P, R and S is shown

Q – 2,2

P – 2,8,3

R – 2,8,7

S – 2,8,8,1

The letters Q, P, R and S are **not** the symbols of the elements.

Which is the order of increasing metallic character of Q, P, R and S?

A. Q P R S
B. R P Q S
C. S Q P R
D. S R P Q

Mark scheme

1 Which is the order of increasing metallic character of Q, P, R and S?	
Answer	Guidance
B	

Science10SG1

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
SCIENCE10SG1		1			10.6.3 Understand that the periodic table is based on the atomic structure of the elements and that the variation in properties shown (melting and boiling point, the valency and reactivity and atomic number and RAM) are related to this structure and hence the position in the table.	1

Item purpose

The question assesses the students' understanding about trends in the modern periodic table through a graph.

Source(s)

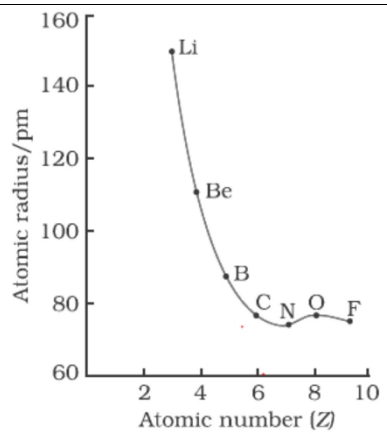
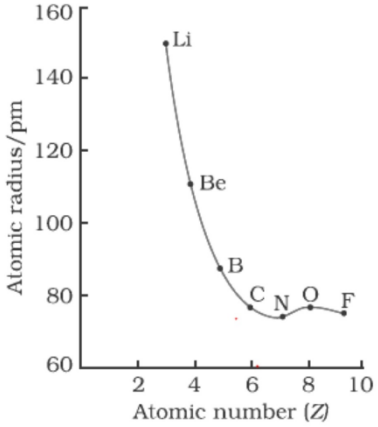


Figure 1: Variation of atomic radius with atomic number across the second period

Source information: Chemistry Class 11 NCERT.

Question(s)

1 (a) A graph of atomic radius against atomic number is shown.



Which is the correct conclusion from this graph?

A. Metallic character increases with increasing radius
B. Metallic character decreases with increasing radius
C. Metallic character increases with decreasing radius
D. Metallic character decreases with decreasing radius

(1 mark)

Mark scheme

1 Which is the correct conclusion from this graph? A. Metallic character increases with increasing radius B. Metallic character decreases with increasing radius C. Metallic character increases with decreasing radius D. Metallic character decreases with decreasing radius	
Answer	Guidance
D	

Science10CKV3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
SCIENCE10CKV31a	1				10.9.1 Identify products of different reactions involving .... reduction reactions	1
SCIENCE10CKV31b	2				10.3.9 Explain the processes of photosynthesis and respiration in plants and respiration in animals	2
SCIENCE10CKV31c	3				10.3.11 Explain the movements of nutrients in plants and animals through nutrition, transport respiration	3
SCIENCE10CKV31d		2	2		10.5.6 Draw and label diagrams showing the flow of nutrients in plants and animals.	4
Total marks	6	2	2			**10**

Item purpose

The question assesses the student's ability to describe and analyse Photosynthesis as a process.

Question(s)

1 Photosynthesis occurs in plants.

1(a) What type of reaction is photosynthesis?

A. Combination reaction
B. Decomposition reaction
C. Displacement reaction
D. Reduction reaction

(1 mark)

1(b) Write down the balanced symbol equation for photosynthesis. (2 marks)

1(c) Explain how the two reactants in photosynthesis become available in the leaves of plants. (3 marks)

1(d) **Fig. 1** shows how water is transported from the root to the leaf of a plant

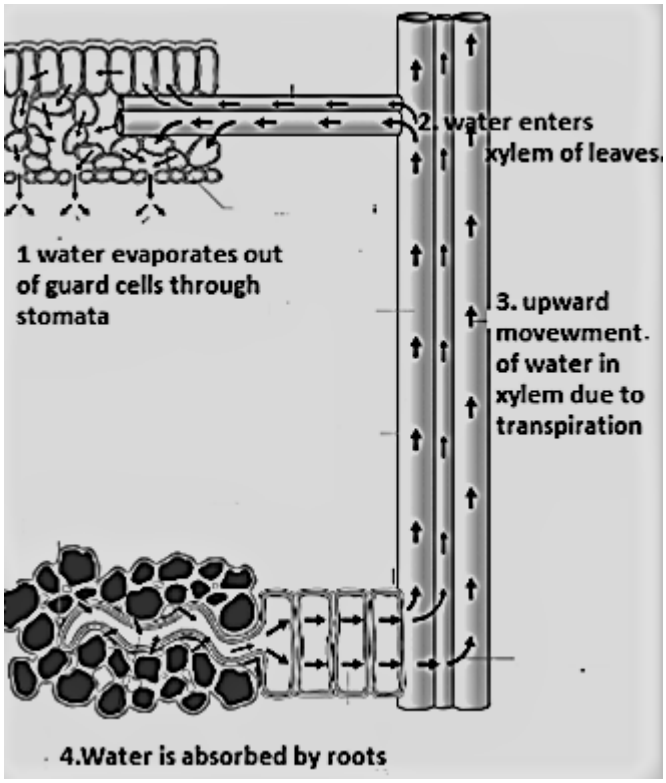


Fig. 1

Explain the role of transpiration and guard cells in this process.

You may draw a diagram of the guard cells in your answer.

(4 marks)

(Total marks 10)

Mark scheme

1 (a) What type of reaction is photosynthesis? A. Combination reaction B. Decomposition reaction C. Displacement reaction D. Reduction reaction	
Answer	Guidance
D	Mark to be given only for this option
1 (b) Write down the balanced symbol equation for photosynthesis.	
Answer	Guidance
All formulae; Balancing; $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$	**ALLOW** left hand correct / right hand correct = 1 mark
1 (c) Explain how the two reactants in photosynthesis become available in the leaves of plants.	
Answer	Guidance
Carbon dioxide enters through stomata; Water enters through roots; Transfer of water through xylem.	
1 (d) Explain the role of transpiration and guard cells in this process. You may draw a diagram of the guard cells in your answer.	
Answer	Guidance
(d) Indicative science Transpiration: Transpiration is water loss Causes decrease in pressure / creates a 'pull' More transpiration = more absorption Guard cells Turgidity (AW) changes shape Turgidity causes stomata to close to prevent water leaving/loss reducing absorption	**ALLOW** at least **one** mark from each list **ALLOW** reverse argument for flaccid guard cells

Science10SK4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10SK4				2	10.1.19	2

Item purpose

The question assesses the ability of students to identify the relationship between the current passing through a coil, number of turns in a coil and radius of the coil with the strength of magnetic field produced in a coil.

Question(s)

1 (a) The results of two experiments to determine the relationships between current, radius and magnetic field strength are shown.

Experiment 1	current in the coil (mA)	magnetic field strength (mT)
coil 1	20	50
coil 2	25	75
coil 3	30	100

Experiment 2	radius of coil (m)	magnetic field strength (mT)
coil 1	0.10	100
coil 2	0.25	50
coil 3	0.50	20

Describe the relationships.

(2 marks)

Mark scheme

1 (a) Describe the relationships.	
Answer	Guidance
field strength increases with increasing current; field strength decreases with increasing radius.	

Science10RR1

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10RR1	1				10.1.21 Identify the features of AC and DC	1

Item purpose

The question assesses the learner's ability to comprehend the sources of alternating current.

Source(s)

Oswaal Science question bank

Question(s)

1 Which of these statements apply to the alternating current produced in a generator?

1. has constant frequency
2. has constant amplitude
3. has constant direction

A. 1 only
B. 1 and 2
C. 2 and 3
D. 1, 2 and 3

(1 mark)

Mark scheme

1. Which of these statements apply to the alternating current produced in a generator?	
Answer	Guidance
A	

Science10NB2

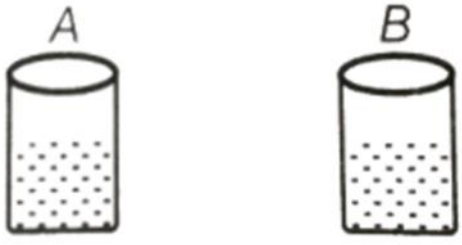
Item identity	AO1 mark	AO2 mark	AO3 mark	AO4 mark	Content Reference(s)	Mark
Science10NB2	1				10.2.1 Describe how to finding the pH of the following samples by using pH paper/universal indicator: (i) Dilute Hydrochloric Acid (ii) Dilute sodium Hydroxide solution (iii) Dilute Ethanoic Acid solution (iv) Lemon juice (v) Water (vi) Dilute Hydrogen Carbonate solution 10.6.2 Understand the pH scale as a measure of concentration of hydrogen ions and relate it to furnishing of H^+ and OH^- ions and the properties of acids and bases	1

Item purpose

The question assesses understanding of students about properties of base and identification power of acid and base.

Question(s)

1 Rama gives test-tube **A** and test-tube **B** to Seeta.
One contains water and the other contains a dilute solution of sodium hydroxide.



Which test should Seeta use to identify the sodium hydroxide solution?

A. Blue litmus solution
B. Baking soda solution
C. Dilute soap solution
D. Red litmus solution

(1 mark)

Mark scheme

1 Which test should Seeta use to identify the sodium hydroxide solution. A. Blue litmus solution B. Baking soda solution C. Dilute soap solution D. Red litmus solution	
Answer	Guidance
D	

Science10AP2

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10AP2	1				10.1.21 Define an ecosystem in terms of communities of organisms interacting with abiotic factors.	1

Item purpose

The question assesses the scientific classification in Natural Resources related to Ecosystem.

Question(s)

1 The primary source of energy in an ecosystem is

A. Starch stored in plants

B. Glycogen stored in animals

C. Heat energy from respiration

D. Solar energy (1 mark)

Mark scheme

1 The primary source of energy in an ecosystem is A. Starch stored in plants B. Glycogen stored in animals C. Heat energy from respiration D. Solar energy	
Answer	Guidance
D	

Science10RR3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10RR31a	2				10.3.23 Explain the factors which govern the resistance of a conductor (material, length, cross sectional area and temperature).	2
Science10RR31b		2			10.12.4	2
Science10RR31c	2	2			10.3.22	4
Science10RR31d	1	2			10.3.24	3
Science10RR31e		4			10.3.24 Explain the impact of resistors in series and in parallel on the resistance of a simple circuit.	4
Total marks	5	10				**15**

Item purpose

The question assesses the ability of the learners to identify the relationship between current, potential difference and resistance. It also assesses that the learners can compare resistors in series and parallel.

Question(s)

1 The circuit in Fig. 1.1 has resistors in series and parallel.

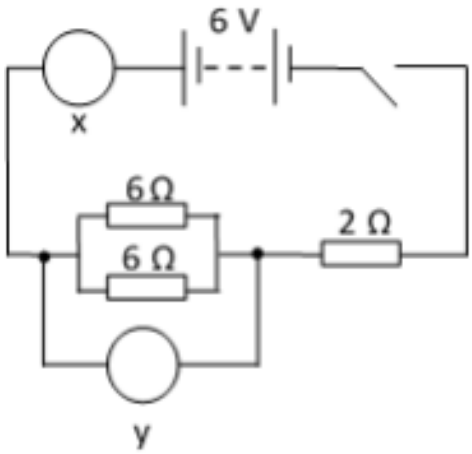


Fig. 1.1

1 (a) State **two** factors that affect the resistance of a resistor.

(2 marks)

1 (b) X and Y are meters.

Identify X and Y and the electrical property that each meter measures.

(2 marks)

1 (c) Calculate the equivalent resistance in the circuit.

(4 marks)

1 (d) Using your answer to (c) calculate the current in the circuit. State the unit.

(3 marks)

1 (e) Explain the impact of connecting resistors in series and connecting resistors in parallel on the resistance of a simple circuit.

Series .....

.....

Parallel ……

……

(4 marks)

(Total mark 15)

Mark scheme

1 (a) State **two** factors that affect the resistance of a resistor.	
Answer	Guidance
length; cross sectional area of the material; temperature; Material.	
1 (b) X and Y are meters. Identify X and Y and the electrical property that each meter measures.	
Answer	Guidance
X – ammeter AND current ; Y – voltmeter AND voltage/potential difference;	**ALLOW** 1 mark for Y- ammeter and current / X – voltmeter and voltage **ALLOW** 1 mark for Y voltmeter and voltage / X – ammeter and current
1 (c) Calculate the equivalent resistance in the circuit.	
Answer	Guidance
If answer = 5 (Ω) award 4 marks Recall parallel equation **or** substitute - 1/R = 1/6 + 1/6; 3 (seen) (Ω); Recall series equation **or** substitute - 3 + 2; = 5 (Ω);	**ALLOW** first mark also **ALLOW** their calculated parallel resistance + 2 (max 3 marks)
1 (d) Using your answer to (c) calculate the current in the circuit. State the unit.	
Answer	Guidance
If answer = 1.2 A award 3 marks	

Recall of V= IR Rearrange and substitute: I = 6/5 Answer 1.2	
1 (e) Explain the impact of resistors in series and in parallel on the resistance of a simple circuit.	
Answer	Guidance
Indicative science Series: • Shared voltage • Increased total resistance • Reduced current • (because) increased length of resistance Parallel: • Have the same voltage • Decreased resistance • Increased current • Can be switched on and off independently • (because) increased cross-sectional area of resistance • (because) more pathways for electrons	

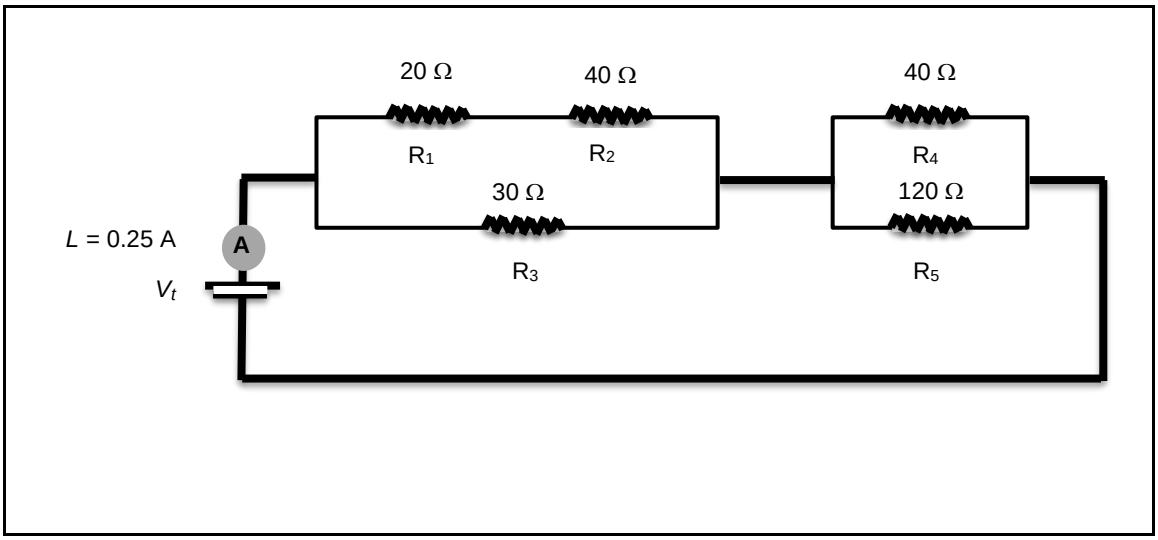
Science10SD1(1)

Item identity	AO1 marks	AO2 Marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10SD1a				1	10.2.16 Explain how to determine the equivalent resistance of two resistors when connected in series and in parallel.	1
Science10SD1b				1	10.2.16	1
Science10SD1c	1	2			10.2.16	3
Science10SD1di	1	2			10.2.15 Explain how to study the relationship between potential difference (V) across a resistor on the current (I) passing through it and determine its resistance.	3
Science10SD1dii		2			10.2.15	2
Total marks	**2**	**6**		**2**		**10**

Item purpose

The question assesses whether students understand and can interpret the given circuit. Identify the resistors which are in series, and which are in parallel. Find the resultant resistance and potential difference of cell given as well as given resistors.

Source(s)



Question(s)

1 The circuit diagram shows resistors connected in series and parallel combinations.

1 (a) State **two** resistors that are connected in series.

(1 mark)

1 (b) State **one** combination of resistors in parallel.

(1 mark)

1 (c) Calculate the equivalent resistance R_T of the combination R1, R2 and R3.

(3 marks)

1 (d) The total resistance of the circuit is 50 Ω.

The current in the circuit is 0.25 A.

1 (d)(i) Calculate the potential difference of the cell. State the unit.

(3 marks)

1 (d)(ii) Determine the potential difference across the combination R4 and R5.

(2 marks)

(Total marks 10)

Mark scheme

1 (a) State **two** resistors that are connected in series	
Answer	Guidance
R1 and R2;	**ALLOW** R2 and R4 / R3 and R4 / R3 and R5
1 (b) State **one** combination of resistors in parallel.	
Answer	Guidance
R4 and R5;	R1 **and** R2 are in parallel with R3
1 (c) Calculate the equivalent resistance R_T of the combination R1, R2 and R3.	
Answer	Guidance
If answer R_T = 20 Ω award 4 marks (R1+R2 =) 60 Ω; Recall of equation: $1/R_T = 1/R1 + 1/R2$; Substitution: $1/R_T = 1/60 + 1/30$; Rearrangement to give RT = 20 Ω;	
1 (d)(i) Calculate the potential difference of the cell. State the unit.	
Answer	Guidance
If answer with unit = 12.5 V award 3 marks Recall of V = IR;	

Substitution and calculation: 0.25 x 50 = 12.5; Unit: V / voltage;	
1 (d)(ii) Determine the potential difference across the combination R4 and R5.	
Answer	Guidance
If answer = 7.5 award 2 marks Calculation of R4, R5 combination = 30 Ω; Proportional reasoning: 30/50 x 12.5 **OR** use of Ohm's law: 30 x 0.25; = 7.5 V;	**ALLOW** ecf using answer to (d)(i) **ALLOW** max 2 marks if student uses an incorrect value of R4, R5 combination

Science10ST4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10ST41ai			4		10.2.15 Explain how to study the relationship between potential difference (V) across a resistor on the current (I) passing through it and determine its resistance. Plot a graph showing the relationship between V and I for a resistor.	4
Science10ST41aii	1	2			10.4.8 Use Ohm's Law to calculate current, potential difference and resistance	3
Science10ST41b	2	2			10.2.16 Explain how to determine the equivalent resistance of two resistors when connected in series and in parallel.	4
Science10ST41c		2			10.3.23 Explain the factors which govern the resistance of a conductor (material, length, cross sectional area and temperature).	2
Total marks	3	6	4			**13**

Item purpose

The question assesses the students' understanding of Ohm's law and how current, potential difference and resistance are related. How to calculate the resistance when connected in series and in parallel.

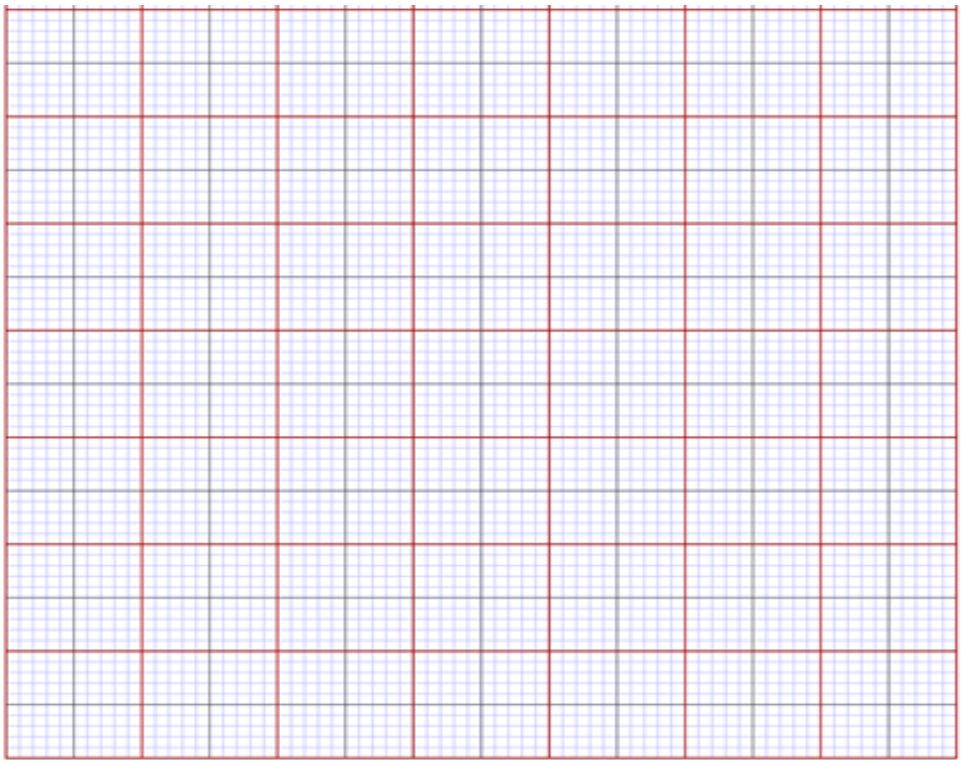
Question(s)

1(a) In an investigation, the current in a circuit and the potential difference across a resistor in the circuit were measured. The results are shown in **Table 1**.

I (A)	0.5	1	2	3	4
V (V)	1.6	3.4	6.8	10.2	13.2

Table 1

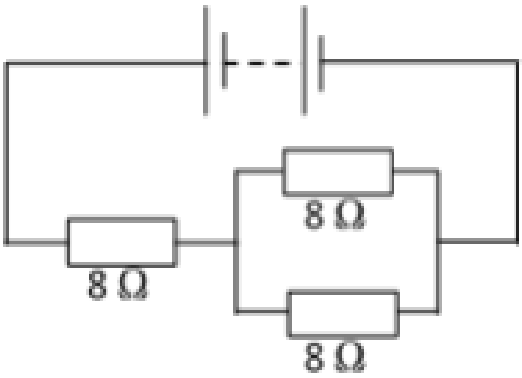
1(a)(i) On the grid plot a graph of *V* on the *y*-axis against *I* on the *x*-axis.



(4 marks)

1(a)(ii) Calculate the resistance of the resistor at 13.2 V. (3 marks)

1(b) Calculate the equivalent resistance of the arrangement of resistors shown in Fig. 1.



(4 marks)

Fig. 1

1(c) A wire has a length *l* and a cross-sectional area *A*.

The wire has a resistance of 16 Ω.

Determine the resistance of a wire made from the same material with length 0.5 *l*. and cross-sectional area 2*A*.

(2 marks)

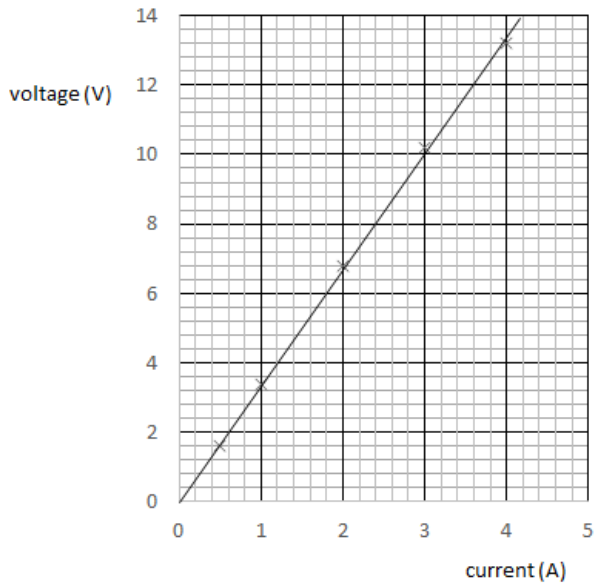
(Total marks 12)

Mark scheme

<table>
<tr><td colspan="2">1 (a)(i) On the grid plot a graph of V on the y-axis against I on the x-axis.</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>axes labelled and unit;

Suitable scale and points in > 4 large squares vertically and >3 large squares horizontally ;

all points plotted to within ½ a small square; (DO NOT award if the scale mark is not awarded)

Suitable line of best fit with equal distribution of points above and below the line</td><td> 
</td></tr>
<tr><td colspan="2">1 (a)(ii) Calculate the resistance of the resistor at 13.2 V.</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>If answer with unit = 3.6 Ω award 3 marks
Recall of V = IR or 13.2 = 4 x R;
Rearrange and calculate: 3.6;</td><td></td></tr>
<tr><td colspan="2">1 (b) Calculate the equivalent resistance of the arrangement of resistors shown in Fig. 1.</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>If answer with unit = 12 Ω award 4 marks
● Recall of parallel resistor equation:
1/RT = 1/R1 + 1/R2;
● Substitution and rearrangement:
1/RT = 2/8
● Calculation: 4 Ω
● Recall of series resistor equation:
RT = R1 + R2 or 8 + 4 ;</td><td>M1

M2 – also gains M1
M3 – gains M1 and M2
ALLOW ecf using M3 [Max 2 marks]</td></tr>
<tr><td colspan="2">1 (c) Determine the resistance of a wire made from the same material with length 0.5 l. and cross-sectional area 2A.</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>If answer is 4 (Ω) award 2 marks</td><td></td></tr>
</table>

OR Shows that half the length has half of the resistance (8 Ω); Shows that double the area, halves the resistance (4 Ω);	

Science10TM2

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10TM2		1			10.3.22 Identify the relationships between current, potential difference, resistance and power.	1

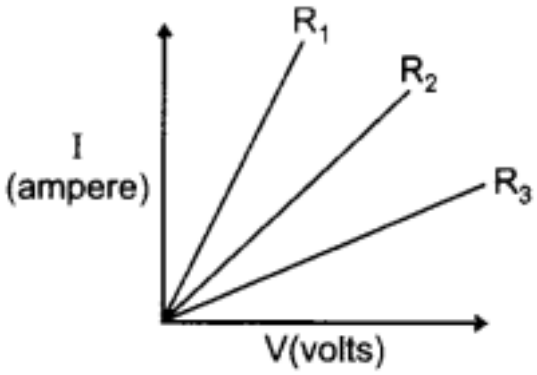
Item purpose

The question assesses the understanding of potential difference and how its related to electric current and learning about resistance.

Question(s)

1 A student plots the current-voltage graphs of three samples of nichrome wire.

The samples have resistances R_1, R_2 and R_3.



The student writes three conclusions:

1. R_3 has the lowest resistance
2. The resistors are ohmic
3. R_3 dissipates the most power

1 (a)

Which conclusions are correct?

A. 1, 2 and 3

B. 1 and 2 only

C. 1 and 3 only

D. 2 and 3 only

(1 mark)

Mark scheme

1 Which conclusions are correct?	
Answer	Guidance
D	

Science10SK3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Mark
Science10SK3		2			10.3.23 Explain the factors which govern the resistance of a conductor (material, length, cross sectional area and temperature).	2

Item purpose

The question assesses the ability of students to interpret the relation between length and area of cross-section of the conducting wire and resistance offered by it.

Question(s)

1 (a) The diagram shows a thick copper wire A and a thin copper wire B.

Both wires have the same length.

State and explain the difference, if any, in the resistance of the wires.

(2 marks)

Mark scheme

1 (a) State and explain the difference, if any, in the resistance of the wires.	
Answer	Guidance
Wire A has less resistance than wire B because it has a larger cross-sectional area; so there are more pathways for the movement of electrons;	ALLOW vice-versa for wire B

Science10SK6

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10SK61ai	1	2			10.4.8 Use Ohm's Law to calculate current, potential difference and resistance	3
Science10SK61aii	1	2			10.4.9 Use Joule's Law to calculate power, current and resistance	3
Science10SK61b	3				10.3.24 Explain the impact of resistors in series and in parallel on the resistance of a simple circuit.	3
Science10SK61c	4				10.6.9 Explain how different forms of energy are created and used – fossil fuels, nuclear, solar energy, biogas, ethanol wood/biomass, wind, water and tidal and describe the advantages and disadvantages of each.	4
Total marks	9	4				**13**

Item purpose

These questions assess the ability of students to know the advantages of parallel combination of resistors over series combination, differentiate between AC and DC current, calculate the power consumption, heat generated by an electrical appliance, energy consumption,

Question(s)

1 An electrical appliance has a resistance of 11 Ω.

1 (a)(i) The appliance is connected to a supply voltage of 220 V.

Calculate the current in the appliance. State the unit.

(3 marks)

1 (a)(ii) Using your answer in **(a)** calculate the power dissipated by the appliance.

State the unit.

(3 marks)

1 (b) Electrical appliances in the home are connected in parallel.

Give **three** advantages of connecting appliances in parallel.

(3 marks)

1 (c) Some electrical energy is generated in nuclear power stations.

Describe the advantages and disadvantages of nuclear power.

(4 marks)

(Total marks 13)

Mark scheme

1. 1 (a)(i) An electrical appliance has a resistance of 11 Ω The appliance is connected to a supply voltage of 220 V. Calculate the current in the appliance. State the unit.	
Answer	Guidance
If answer = 11 A award 3 marks Recall of V = IR Substitution and rearrangement I = 220/11 Answer: 11 (A)	
1 (a)(ii) Using your answer in (a) calculate the power dissipated by the appliance. State the unit.	

Answer	Guidance
If answer = 2420 W award 3 marks Recall of P = VI Substitution: 220 x 11; Answer: 2420 (W);	
1 (b) Electrical appliances in the home are connected in parallel. Give three advantages of connecting appliances in parallel.	
Answer	Guidance
all receive the full supply voltage; can be switched on or off independently; if one appliance stops working, the operation of the others continues.	
1 (c) Some electrical energy is generated in nuclear power stations. Describe the advantages and disadvantages of nuclear power.	
Answer	Guidance
Indicative science Advantages: produce a lot of energy; do not release greenhouse gases; will be available for a long time; do not depend on weather/wind/sunshine. Disadvantages: very expensive to build; harmful / toxic waste; difficulty of storing waste; waste remains harmful for a long time; expensive to dismantle/decommission.	

Science10GK3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10GK31a	2				9.4.10 Explains the law of conservation of energy and energy transformations 10.3.29 Explain how an electric motor works.	2
Science10GK31b	4				10.3.27 Explain how an electric wire creates a magnetic field and causes a motor effect the direction of which is determined using Fleming's left-hand rule.	4
Science10GK31ci		2			10.1.21 Identify the features of AC and DC	2
Science10GK31cii	2				10.8.22 Explain the advantages of AC over DC.	2
Total marks	8	2				**10**

Item purpose

The question assesses the understanding of the working of electric motor, difference between the types of electric current and application of their knowledge.

Question(s)

1 In an electric motor a coil of wire spins in a magnetic field.

1(a) Complete the sentence to describe the useful energy transfers in an electric motor.

An electric motor energy is transferred from _____ energy

(2 marks)

to _____ energy.

1(b) State and explain the rule that is used to determine the direction in which the coil of wire spins.

You may draw a labelled diagram. (4 marks)

<provide 8cm space for student's diagram>

1(c) **Fig. 1**. represents the current input to an electric motor.

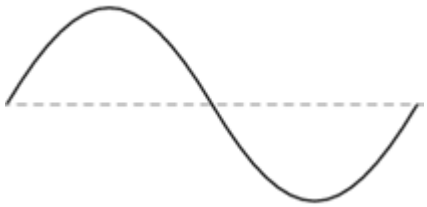


Fig. 1

1(c)(i) State and explain the type of current in Fig. 1. (2 marks)

1(c)(ii) State **two** advantages of using the type of current shown in **Fig. 1**. (2 marks)

(Total marks 10)

Mark scheme

1 (a) Complete the sentence to describe the useful energy transfers in an electric motor.	
Answer	Guidance
Electrical; Kinetic.	**ALLOW** mechanical
1 (b) State and explain the rule that is used to determine the direction in which the coil of wire spins.	
Answer	Guidance
Fleming's left hand rule; Thumb – movement / force / thrust; First finger – (magnetic) field direction; Second finger – current direction	**ALLOW** left hand rule **ALL** marks may be obtained from a labelled diagram
1 (c)(i) State and explain the type of current in Fig. 1.	
Answer	Guidance
Alternating current / AC; (Because it is) changing direction.	
1 (c)(ii) State two advantages of using the type of current shown in Fig. 1.	
Answer	Guidance
Any two from: Voltage can be changed easily; Transmission over large distances; Transmission of power at low current; Less heat lost in transmission cables.	

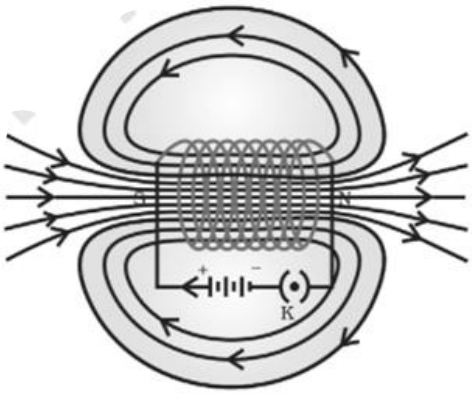
Science10YP2

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10YP2	1				10.3.28 Explain how a wire coil creates a magnetic field in a solenoid and an electromagnet	1

Item purpose

The question assesses the understanding of students regarding the magnetic field inside the solenoid when a soft iron bar is introduced inside a current carrying solenoid.

Source



Source information: Textbook for class X Science, NCERT.

Question

1. A soft iron bar is placed inside a current carrying solenoid.
   How will this affect the strength and direction of the magnetic field around the
   solenoid?
   A. it will change direction and decrease in strength
   B. it will change direction and increase in strength
   C. it will increase in strength only
   D. it will decrease in strength only (1 mark)

Mark scheme

1. How will this affect the strength and direction of the magnetic field around the solenoid?	
Answer	Guidance
C. it will increase in strength only	

Science10GK1

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10GK1	1				10.7.4 Understand how to measure, current and potential difference using a multimeter or ammeter and voltmeter.	1

Item purpose

The question assesses the knowledge of the students regarding the measurement of the electric current flowing through a circuit.

Question(s)

1. Which row of the table shows the instrument used to measure current and how it is connected in a circuit.

	instrument	how it is connected
A	Ammeter	parallel
B	Ammeter	series
C	Voltmeter	parallel
D	Voltmeter	series

(1 mark)

Mark Scheme

1 Which row of the table shows the instrument used to measure current and how it is connected in a circuit.	
Answer	Guidance
B	

Science10MS1

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10MS1	1				10.1.12 Identify the differences between hormonal and nervous controls in animals	1

Item purpose

The question assesses the students' understanding about the various actions under neural control in humans.

Question(s)

1 (a) Which row of the table describes a hormone?

	mechanism	source
A	chemical messenger	brain
B	nerve signal	brain
C	chemical messenger	gland
D	nerve signal	gland

(1 marks)

Mark scheme

1 (a) Which row of the table describes a hormone?	
Answer	Guidance
C	

Science10CKV5

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10CKV51ai		4			10.10.2 Mendel's work on heredity in plants	4
Science10CKV51ii		2				2
Science10CKV51b			3		10.5.9 Interpret heredity data	3
Science10CKV51c	3				10.3.17 Explain how organisms evolve to adapt to their environment through genetic mutation, inheritance and survival of the fittest leading to natural selection.	3
Total marks	3	6	3			**12**

Item purpose

The question assesses the student's knowledge of Mendel's experiments and ability to describe and recreate and interpret inheritance data.

Question(s)

1 Mendel carried out experiments on pea plants.

He germinated pea seeds and observed that some plants were tall and some were dwarf. He did not know which seeds produced dwarf plants.

Pea flowers are pollinated by insects. Mendel observed that insects visit different flowers on different plants randomly.

1(a) Describe:

(i) the steps Mendel took to ensure that the seeds he planted would only produce dwarf pea plants.

(4 marks)

(ii) the techniques Mendel used to ensure that the flowers were not pollinated randomly by insects.

(2 marks)

1(b) The allele for tallness in pea plants is T.

The allele for dwarfism in pea plants is t.

Draw a genetic diagram to show the genotypes of the offspring of a heterozygous tall pea plant and a homozygous dwarf pea plant.

State the ratio of the phenotypes.

(3 marks)

1(c) Explain how natural selection is different from the technique used by Mendel. (3 marks)

(Total marks 12)

Mark scheme

1 (a)(i) Describe the steps Mendel took to ensure that the seeds he planted would only produce dwarf pea plants.	
Answer	Guidance
Selected dwarf plants; Breed them together; Select dwarf plants from the offspring; Repeat many times.	
1 (a)(ii) Describe the techniques Mendel used to ensure that the flowers were not pollinated randomly by insects.	
Answer	Guidance
transfer pollen by hand/ use a pollen brush; cover flowers / remove stamens.	
1 (b) State the ratio of the phenotypes.	
Answer	Guidance
Parent plants: Tt and tt; Genotype of offspring: Tt, Tt, tt, tt; Ratio: 1:1	
1 (c) Explain how natural selection is different from the technique used by Mendel.	
Answer	Guidance
Random; More variety in offspring; More chance of variation being adaptive to the environment / offspring are more 'fit' to survive.	

Science10DP3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
SCIENCE10DP31a	2	1			10.3.14 Explain how sexual reproduction leads to features of both parents being present in the offspring through the transfer of genes.	3
SCIENCE10DP31b	3				10.3.16 Explains how the sex of an offspring is determined.	3
SCIENCE10DP31c	1				10.12.3 Understands the importance of safe sex to limit the spread of sexually transmitted diseases and HIV/AIDS.	1
Total marks	6	1				**7**

Item purpose

The question assesses the students' understanding of importance of safe sex in relation to sexually transmitted diseases and evaluate how sex of an offspring is determined in human beings.

Question(s)

1 Nivedita has dark brown eyes, like her mother. But she has the same shaped nose as her father.

1 (a) Explain why Nivedita has features from both of her parents.

(3 marks)

1 (b) Explain why Nivedita is genetically female.

(3 marks)

1 (c) Which contraceptive method protects against sexually transmitted infections?

(1 marks)

(Total marks 7)

Mark Scheme

1 (a) Explain why Nivedita has features from both of her parents.	
Answer	Guidance
Inheritance; Sexual reproduction; Transfer of genes.	
1 (b) Explain why Nivedita has features from both of her parents.	
Answer	Guidance
Reference to chromosomes; Sex (determining) chromosomes / 23rd pair; Identical sex chromosomes / XX.	**ALLOW** the female sex cell/egg/gamete fused with male sex cell/sperm/gamete carrying an X chromosome
1 (c) Which contraceptive method protects against sexually transmitted infections?	
Answer	Guidance
Condom.	

Science10CKV1

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10CKV1	1				10.2.10	1

Item purpose

The question assesses the ability of the students to recall the function of the parts of a dicot seed.

Question

1 Which row is the function of cotyledons in a germinating dicot seed?

A. To form the roots.
B. To provide a protective coat around the embryo.
C. To form the shoot system.
D. To provide nutrients to the embryo.

(1 mark)

Mark scheme

1 Which row is the function of cotyledons in a germinating dicot seed? A. To form the roots. B. To provide a protective coat around the embryo. C. To form the shoot system. D. To provide nutrients to the embryo.	
Answer	Guidance
D	

Science10DP4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10DP41a	1				10.3.10 Explain tropic movements in plants being caused by external stimuli and relate this to hormone controls.	1
Science10DP41bi	1					1
Science10DP41bii	1					1
Science10DP41ci	1					1
Science10DP41cii	1					1
Science10DP41d	1	3				4
Total marks	6	3				**9**

Item purpose

The question assesses the students' understanding of tropic movements in plants and their relationship with plant hormones.

Question(s)

1 Fig. 1.1 shows how the root and shoot of a seed develop in response to stimuli.

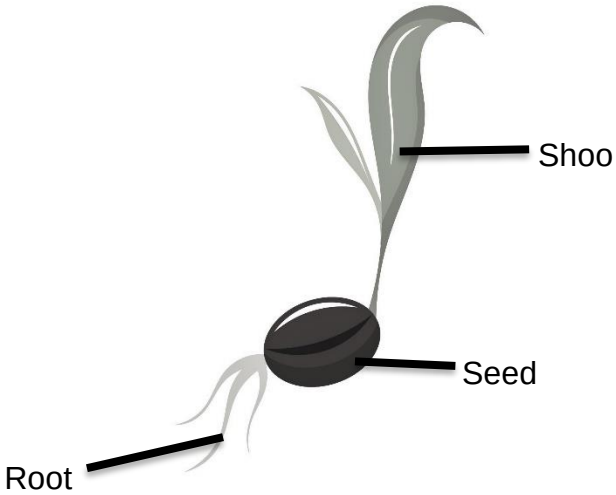


Fig. 1.1

1 (a) State the name of the plant hormone that causes the root and shoot to develop in the way shown in Fig. 1.1

(1 mark)

1 (b)(i) Identify the stimulus that causes the roots to grow in the direction shown in Fig. 1.1.

(1 mark)

1 (b)(ii) State the name of this response.

(1 mark)

1 (c)(i) Identify the stimulus that cause the shoot to grow in the direction shown in Fig. 1.1.

(1 mark)

1 (c)(ii) State the name of this response.

(1 mark)

1 (d) Explain how the plant hormone controls the growth response of the shoot.

(4 marks)

(Total marks 9)

Mark scheme

1 (a) State the name of the plant hormone that causes the root and shoot to develop in the way shown in Fig. 1.1.	
Answer	Guidance
Auxin.	
1 (b)(i) Identify the stimulus that causes the roots to grow in the direction shown in Fig. 1.1.	
Answer	Guidance
Gravity.	
1 (b)(ii) State the name of this response.	
Answer	Guidance
Gravitropism / geotropism;	
1 (c)(i) Identify the stimulus that cause the shoot to grow in the direction shown in Fig. 1.1.	
Answer	Guidance
Light.	
1 (c)(ii) State the name of this response.	
Answer	Guidance
Phototropism.	
1 (d) Explain how the plant hormone controls the growth response of the shoot.	
Answer	Guidance
hormone is produced/made at the tip; hormone moves/diffuses/passes/spreads; hormone collects on side away from light/shaded side; hormone causes cell elongation; AVP e.g., by stretching of cell walls / osmosis of water	

Science10CKV2

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10CKV2		1			10.3.10	1

Item purpose

The question assesses the knowledge about plant hormones and phototropism

Question

1 Which statement explains why the shoot of a plant bends when exposed to light from one side?

A. Diffusion of auxin into cells that are in shade causes cell division of those cells
B. Diffusion of auxin out of cells in that are in shade causes cell division of those cells
C. Diffusion of auxin into cells that are in shade causes elongation of those cells
D. Diffusion of auxin out of cells in that are in shade causes elongation of those cells

(1 mark)

Mark scheme

1 Which statement explains why the shoot of a plant bends when exposed to light from one side? A. Diffusion of auxin into cells that are in shade causes cell division of those cells B. Diffusion of auxin out of cells in that are in shade causes cell division of those cells C. Diffusion of auxin into cells that are in shade causes elongation of those cells D. Diffusion of auxin out of cells in that are in shade causes elongation of those cells	
Answer	Guidance
C	

Science10AP1

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10AP1	1				10.3.11 Explain the movements of nutrients in plants and animals through nutrition, transport respiration and excretion including the source of nutrients in plants and different categories of animals (herbivore and carnivore) and the importance of balanced nutrient intake.	1

Item purpose

The question assesses the causal effects to trace the movement of waste during the process of excretion.

Question(s)

1 Which row is the sequence of organs that urine passes through after it is formed in the nephron?

A. Collecting duct-> urethra-> urinary bladder->ureter

B. Ureter-> urinary bladder-> collecting duct -> urethra

C. Collecting duct-> ureter-> urinary bladder-> urethra

D. Urethra-> urinary bladder-> collecting duct-> ureter (1 mark)

Mark scheme

1 Which row is the sequence of organs that urine passes through after it is formed in the nephron? A. Collecting duct-> urethra-> urinary bladder->ureter B. Ureter-> urinary bladder-> collecting duct -> urethra C. Collecting duct-> ureter-> urinary bladder-> urethra D. Urethra-> urinary bladder-> collecting duct-> ureter	
Answer	Guidance
C.	

Science10AP3

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10AP31a	3				10.3.9 Explain the processes of photosynthesis and respiration in plants and respiration in animals	3
Science10AP31bi		1			10.3.9 Explain the processes of photosynthesis and respiration in plants and respiration in animals	1
Science10AP31bii	2				10.3.9 Explain the processes of photosynthesis and respiration in plants and respiration in animals	2
Science10AP31ci	3				10.3.9 Explain the processes of photosynthesis and respiration in plants and respiration in animals	3
Science10AP31cii	4				10.3.9 Explain the processes of photosynthesis and respiration in plants and respiration in animals	4
Science10AP31d	4				10.8.8 Explains how the processes of photosynthesis, respiration, transport and excretion in	4

					animals and plants sustain life.	
Total marks	16	1				**17**

Item purpose

The question assesses to relate processes and phenomena with causes and effects, such as, survival of aquatic life with pH of water and nutrient flow in various animals.

Question(s)

1. 1 The balanced symbol equation for aerobic respiration is:

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

1(a) Describe the process of aerobic respiration (3 marks)

1(b)(i) Deduce the balanced symbol equation for photosynthesis (1 mark)

1(b)(ii) Explain why photosynthesis occurs in the leaves of plants. (2 marks)

1(c) Respiration also occurs in plants.

1(c)(i) Explain how plants remove the products of respiration. (3 marks)

1(c)(ii) State one product of respiration that plants must replace continuously.

State where this is absorbed and how it is transferred to the cells of leaves.

product _____

absorbed _____

transferred by _____

(4 marks)

to the cells by _____

1(d) Discuss how the processes of photosynthesis and respiration sustain life. (4 marks)

(Total marks 17)

Mark scheme

1 (a) Describe the process of aerobic respiration	
Answer	Guidance
Glucose and oxygen; React; Produce carbon dioxide and water.	
1 (b)(i) Deduce the balanced symbol equation for photosynthesis	
Answer	Guidance
6CO2 + 6H2O --> C6H12O6 + 6O2	
1 (b)(ii) Explain why photosynthesis occurs in the leaves of plants.	
Answer	Guidance
(Leaves contain) chlorophyll; trap/absorb light energy.	**ALLOW** chloroplasts
1 (c)(i) Explain how plants remove the products of respiration.	
Answer	Guidance
(Pass out through) stomata; by evaporation of H20; by diffusion of CO2	
1 (c)(ii) State one product of respiration that plants must replace continuously. State where this is absorbed and how it is transferred to the cells of leaves	
Answer	Guidance
Water; Root hair cells; Active transport / in xylem; Osmosis.	
1 (d) Discuss how the processes of photosynthesis and respiration sustain life.	
Answer	Guidance
Indicative science Photosynthesis: plants make food / starch (light) energy enters food chains consumers eat plants/gain energy from plants oxygen is released in photosynthesis Respiration releases energy (from food) energy for growth / movement / maintaining body temperature / AVP • consumes oxygen from photosynthesis	**ALLOW** at least **one** point from each list

Science10MS5

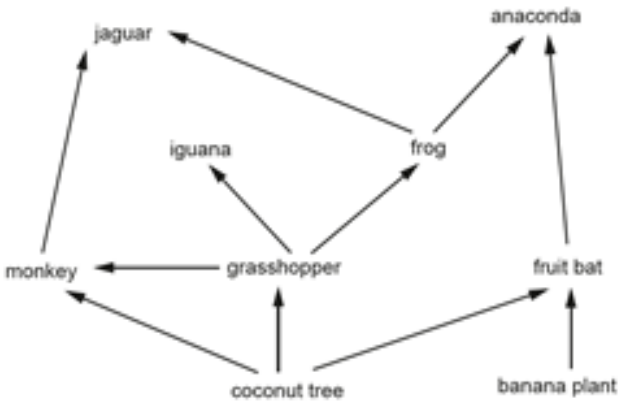
Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10MS51a	1				10.1.22 Define primary producers, primary and secondary consumers in food chains and webs	1
Science10MS51b	5				10.3.9 Explain the processes of photosynthesis and respiration in plants and respiration in animals 9.7.6 Explain cell structures and their functions:…..... chloroplast	5
Total marks	6					**6**

Item purpose

The question assesses the students' understanding about the role of various enzymes and acidic pH to maintain digestive health in humans.

Question(s)

1 Part of forest food web is shown.



The producers in the food web make their own food.

1 (a) Identify one producer.

(1 marks)

1 (b) Name the process that producers use to make their own food.

Explain how this process produces food.

(5 marks)

(Total marks 6)

Mark scheme

1 (a) Identify one producer.	
Answer	Guidance
Coconut tree or banana plant.	
1 (b) Name the process that producers use to make their own food. Explain how this process produces food.	
Answer	Guidance
Photosynthesis; And any **four** from Chloroplasts; Absorb light; Conversion of carbon dioxide and water; Conversion to chemical energy Production of glucose / carbohydrate; (Stored as) starch.	

Science10AP4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10AP41a			2		10.4.3 Calculate numbers of offspring with different characteristics using laws of heredity.	2
Science10AP41b		1	2		10.9.5 Predict proportion of features in offspring given genetic data.	3
Total marks		1	4			**5**

Item purpose

The question assesses to calculate the probability of offspring using laws of heredity and predicts proportion of features in the given genetic data.

Question(s)

1 A species of mammal has two phenotypes, white fur and brown fur.

Table 1 shows the parent genotypes.

Genotype	Phenotype
WW	White fur
Wb	White fur
bb	Brown fur

Table 1

1(a) Draw a Punnett square to show how an individual with white fur and an individual with brown fur produce a generation, F1, all with white fur.

(2 marks)

<8cm space>

1(b) Draw a Punnett square to show how individuals from the F1 generation produce a generation, F2, with white fur and brown fur.

Identify the genotypes in the F2 generation and calculate the proportion of individuals with brown fur.

<provide 8cm space for student diagram>

(3 marks)

(Total marks 5)

Mark scheme

1 (a) Draw a Punnett square to show how an individual with white fur and an individual with brown fur produce a generation, F1, all with white fur.

Answer	Guidance
Selection of bb and WW; Four Wb crosses; **W** **W** **B** Wb Wb **B** Wb Wb	

1 (b) Draw a Punnett square to show how individuals from the F1 generation produce a generation, F2, with white fur and brown fur.

Identify the genotypes in the F2 generation and calculate the proportion of individuals with brown fur.

Answer	Guidance
W **b** **W** WW Wb **B** Wb bb Genotypes: WW, Wb, bb; Proportion brown: ¼ / 25%;	

Science10MS2

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10MS2		1			10.8.12 Describes the methods of contraception in humans and the importance of safe sex in relation to sexually transmitted diseases and HIV/AIDS	1

Item purpose

The question assesses the students' understanding about contraceptive devices which can prevent STD's.

Question(s)

1 Some methods of birth control are listed.

1. Abstinence
2. Condom
3. Inter-Uterine Device
4. Oral pill

1 (a) Which methods limit the spread of sexually transmitted diseases?

A. 1 and 2 only
B. 2 and 3 only
C. 2 and 4 only
D. 3 and 4 only

(1 marks)

Mark scheme

1 (a) Which methods limit the spread of sexually transmitted diseases?

A. 1 and 2 only
B. 2 and 3 only
C. 2 and 4 only
D. 3 and 4 only

Answer	Guidance
A.	

Science10DP2

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
SCIENCE10DP2		1			10.9.4 Identify the impact of changes in **hormone** levels in a system.	1

Item purpose

The question assesses students' understanding of hypothalamus functions and the impact of changes in hormone levels on excretory system.

Question(s)

1 Examples of responses to hormones are listed.

1. growth of facial hair
2. increased blood pressure and pulse rate
3. widened pupils

1 (a) Which responses are caused by the hormone adrenaline?

A. 1 and 2 only
B. 1 and 3 only
C. 2 and 3 only
D. 1, 2 and 3

(1 marks)

Mark scheme

1 (a) Which responses are caused by the hormone adrenaline? A. 1 and 2 only B. 1 and 3 only C. 2 and 3 only D. 1, 2 and 3	
Answer	Guidance
C	

Science10GK4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10GK41ai	1				10.1.14 Defines reflection and refraction	1
Science10GK41aii	2				10.1.17 Differentiate between real and virtual images	2
Science10GK41aiii		1			10.3.19 Explain why light is refracted when passing between two media	1
Science10GK41b	1	2	1		10.1.15 Identifies convex and concave lenses Learning Outcome: draws labelled diagrams, ...ray diagrams,	4
Science10GK41c	2				10.8.15 Explain the use of lenses in microscopes and telescopes	2
Total marks	6	3	1			**10**

Item purpose

The question assesses the understanding of the concepts of phenomena of refraction and the spherical lenses. It also assesses the application of their knowledge in everyday life.

Question(s)

1 Light rays from a coin in water change direction at the surface of the water before entering the eye as shown in **Fig.1**.

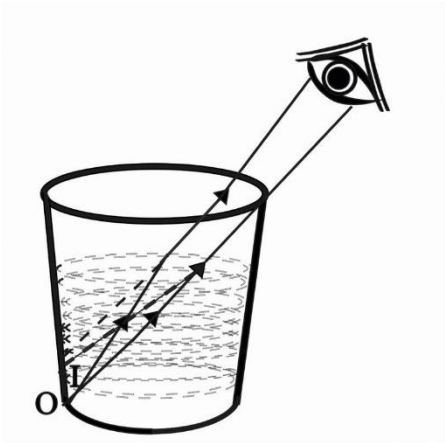


Fig. 1

1(a)(i) Name the wave process which occurs as the light passes from the water into

the air.

(1 mark)

1(a)(ii) Explain why this wave process in occurs.

(2 marks)

1(a)(iii) Explain why the image of the coin is a virtual image.

(1 mark)

1(b) Complete the ray diagram in **Fig. 2** to show how light is focussed by a convex lens.

Fig. 2

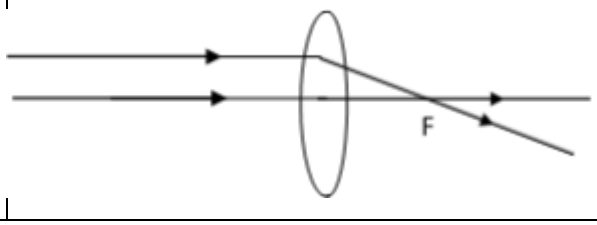
(4 marks)

1(c) Explain why convex lenses are used in telescopes and microscopes.

(2 marks)

(Total marks 10)

Mark scheme

1 (a)(i) Name the wave process which occurs as the light passes from the water into the air.	
Answer	Guidance
Refraction;	
1 (a)(ii) Explain why this wave process in occurs.	
Answer	Guidance
Air is less dense; Light changes speed/is faster in air;	
1 (a)(iii) Explain why the image of the coin is a virtual image.	
Answer	Guidance
Rays do not meet;	
1 (b) Complete the ray diagram in Fig. 2 to show how light is focussed by a convex lens.	
Answer	Guidance
Convex lens; Correct refraction of rays; Rays meet; Meeting point labelled F or focal point;	**ALLOW**: 
1 (c) Explain why convex lenses are used in telescopes and microscopes.	
Answer	Guidance
magnify / enlarge images; of distant objects (telescope) / of small objects (microscope);	

Science10TM4

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10TM41ai	2				10.4.7 Use the Law of Refraction to calculate the angle of incidence and angle of refraction and refractive index	2
Science10TM41aii				2		2
Science10TM41bi		1			10.3.21 Explain why light is dispersed to create a spectrum by a glass prism	1
Science10TM41bii		2			10.1.14 Defines reflection and refraction 10.6.6 Explain the electromagnetic spectrum in terms of waves and relate the wavelength to the different portions of the spectrum	2
Science10TM41c	1	2			10.8.17 Explain how rainbows are formed	3
Total marks	3	5		2		**10**

Item purpose

The question assesses the understanding of refraction and how the refractive index depends on the nature of medium. What will happen to white light when it passes through a prism and what are the process behind the formation of rainbow and how its related to refraction.…

Source(s)

Refraction of light is the phenomenon of change in the path of light in going from one medium to another. In going from a rarer to a denser medium, the ray of light bends towards normal and in going from a denser to a rarer medium, the ray of light bends away from normal

Question(s)

1 **Table 1** shows the refractive index of mediums air, diamond and glass.

medium	**refractive index *n***
air	1.33
diamond	2.42
glass	1.50

Table 1

1 (a)(i) Explain what is meant by the term refractive index.

(2 marks)

1 (a)(ii) State and explain which medium in **Table 1** the speed of light is slowest

(2 marks)

1 (b)(i) **Fig. 1** shows the effect of a prism on white light.

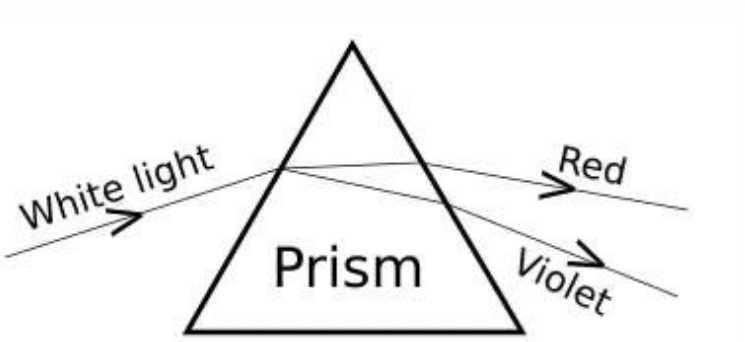


Fig. 1

State the name of the process shown in **Fig. 1**

(1 marks)

1 (b)(ii) Explain why the change in the direction of violet light is greater than the change in the direction of red light.

(2 marks)

1 (c) Draw and label a diagram to show how a rainbow is formed

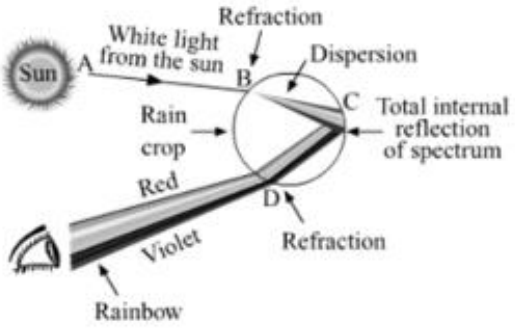
(3 marks)

(Total marks 10)

Mark scheme

1 (a)(i) Explain what is meant by the term refractive index.	
Answer	Guidance
reference to vacuum; ratio of the speed of light in a vacuum to different mediums.	**ALLOW** ratio of speed of light in different mediums
1 (a)(ii) State and explain which medium in Table 4.1 the speed of light is slowest	
Answer	Guidance
diamond; highest density.	
1 (b)(i) State the name of the process shown in Fig. 4.1	
Answer	Guidance
dispersion / dispersal.	

1 (b)(ii) Explain why the change in the direction of violet light is greater than the change in the direction of red light.	
Answer	Guidance
reference to wavelength; shorter wavelength;	

1 (c) Draw and label a diagram to show how a rainbow is formed.	
Answer	Guidance
all correct – award 3 marks **OR** Any **two** from labelled white light ray incident on raindrop; refraction at surface of raindrop; refraction and dispersion at surface of raindrop; internal Reflection of ray at back of raindrop; dispersion of light after reflection; dispersion and refraction as light enters air; correct sequence of colours / red at top violet at bottom.	

Science10GK2

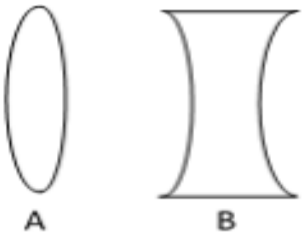
Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10GK2	1				10.1.15 Identifies convex and concave lenses	1

Item purpose

The question assesses the students about their knowledge to identify the given spherical lenses and understand the differences between them.

Question(s)

1 Two lenses are shown.



1 (a) Which statement is correct about lens A?

A. it is concave and forms a real image at the focal point of converging rays
B. it is convex and forms a virtual image at the focal point of diverging rays
C. it is concave and forms a real image at the focal point of diverging rays
D. it is convex and forms a real image at the focal point of converging rays

(1 marks)

Mark scheme

1 Which statement is correct about lens A? A. it is concave and forms a real image at the focal point of converging rays B. it is convex and forms a virtual image at the focal point of diverging rays C. it is concave and forms a real image at the focal point of diverging rays D. it is convex and forms a real image at the focal point of converging rays	
Answer	Guidance
D	

Science10SK5

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10SK5a		2			10.7.2 Describe how to measure focal length, object and image height, and object and image distance for a concave spherical mirror and convex spherical lens.	2
Science10SK5b		2				2
Science10SK5c	1				10.1.16 Define focal length for a concave spherical mirror and convex spherical lens.	1
Science10SK5d		5			10.2.14. Finding the image distance for varying object distances in case of a convex lens and drawing corresponding ray diagrams to show the nature of image formed.	5
Total marks	1	9				**10**

Item purpose

These questions assess the ability of students to differentiate between refraction from convex and concave lenses, identify the factors affecting refraction, apply knowledge of lens formula and magnification, apply knowledge of defects of sights and their correction.

Questions

1 **Table 1** shows the results of an investigation using a lens.

Observation	Object distance u (cm)	Image distance v (cm)	Object height h_o (cm)	image height h_i (cm)
1	-10	- 20.0	+5	+ 10
2	-30	+ 30.0	+5	- 5
3	-45	+ 22.5	+5	- 2.5
4	-60	+ 20.0	+5	-1.7
5	-75	+ 18.8	+5	- 1.3
6	-90	----------	+5	----------

Table 1

1 (a) Using the values of u and v in observation 2, calculate the focal length *f* of the lens.

Use the equation:

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

(2 marks)

1 (b) Using the equation in (a) and your value of *f* calculate the image distance of observation 6.

(2 marks)

1 (c) Describe the focal length of a lens.

(1 marks)

1 (d) On **Fig. 1** draw a ray diagram to show how the lens is used as a magnifying glass to produce an image of an object that is enlarged and virtual.

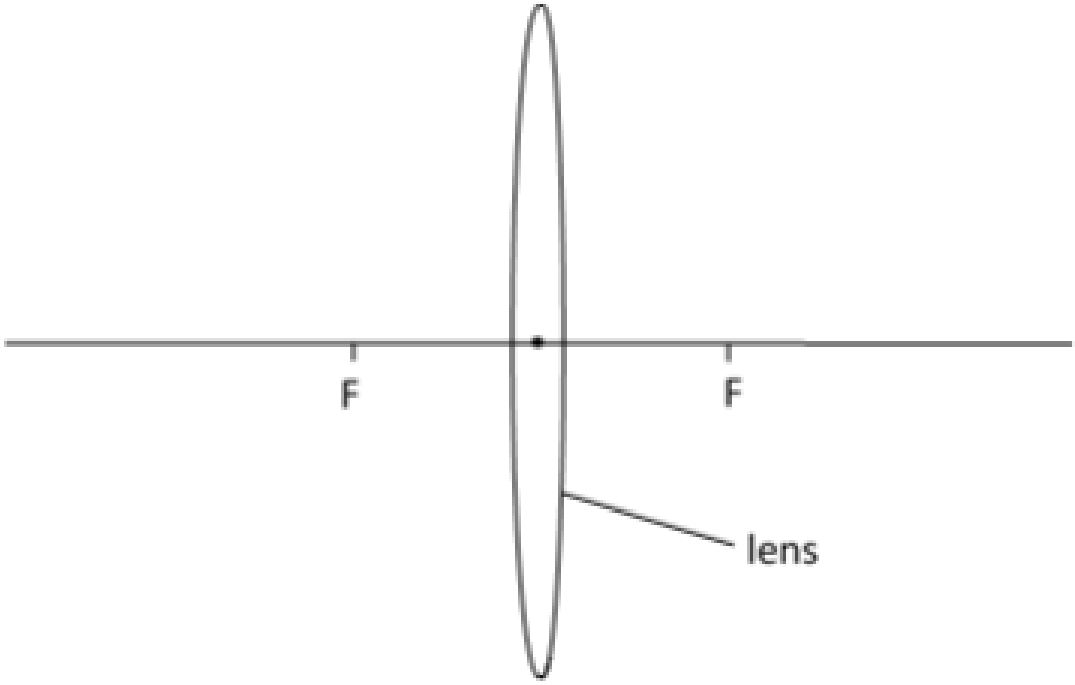


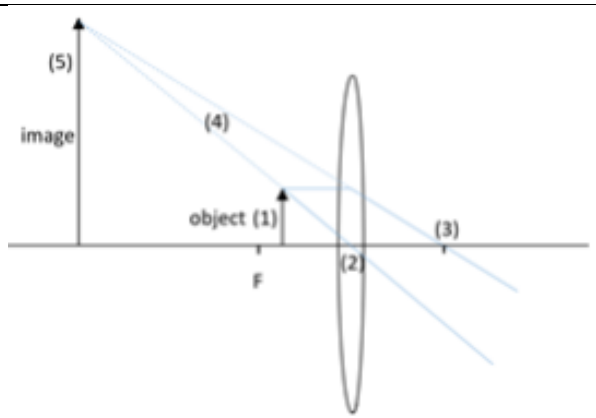
Fig. 1

(5 marks)

(Total marks 10)

Mark scheme

1. 1 (a) Using the values of u and v in observation 2, calculate the focal length *f* of the lens.	
Answer	Guidance
If answer = 15 cm award 2 marks; Substitution: 1/30 + 1/30 = 2/30; Rearrange and calculate 30/2 = 15 cm;	
1 (b) Using the equation in (a) and your value of *f* calculate the image distance of observation 6.	
Answer	Guidance
If answer = 12.9 cm award 2 marks Substitution: 1/15 = 1/-90 + 1/v;	

Rearrange and calculate: 90/7 = 12.9 cm;	
1 (c) Describe the focal length of a lens.	
Answer	Guidance
the distance from the centre of the lens to the focal point;	
1 (d) Complete Fig. 1.1 to show how a lens is used as a magnifying glass.	
Answer	Guidance
(1) Object between focal point and centre of lens; (2) ray from top of object through centre of lens; (3) ray from top of object refracts in lens and passes through focal point on other side of lens; (4) both rays extended backwards; (5) image at convergence of extended rays.	

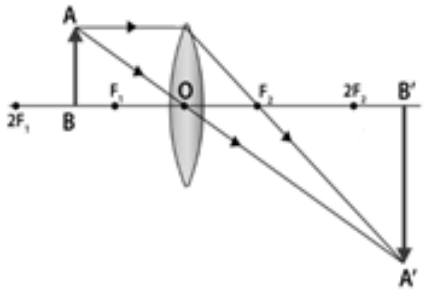
Science10RR2

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10RR2		1			10.2.14 Finding the image distance for varying object distances in case of a convex lens and drawing corresponding ray diagrams to show **the nature of image formed.**	1

Item purpose

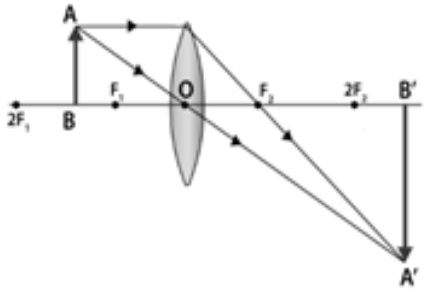
The question assesses the learner's ability to identify the image formation in lenses and nature of the images formed.

Source(s)



Question(s)

1 (a) The diagram shows how an image at B is formed by light from an object at A passing through a lens.



Describe the nature of the image at B.

(1 marks)

Mark scheme

1. The diagram shows how an image is produced by a lens. Describe the image formed.	
Answer	Guidance
inverted and same size (1)	**ALLOW** upside down and same size.

Science10SK1

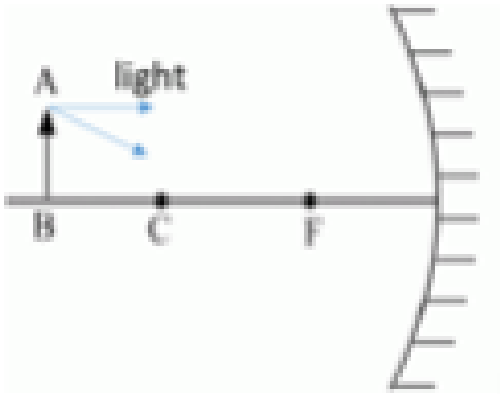
Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10SK1a		3			10.3.18 Explain how an image is formed by a spherical mirror.	3
Science10SK1b		2				2
Total marks		5				**5**

Item purpose

The question assesses the ability of students to interpret the nature and size of the image formed by spherical mirror.

Question(s)

1 The diagram shows an object A in front of a concave mirror.



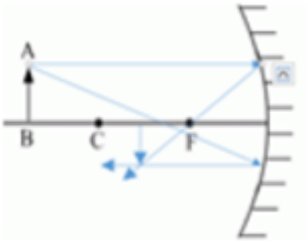
1 (a) Complete the diagram to show how the light rays at point A reflect from the mirror and form an image between C and F.

(3 marks)

1 (b) Describe the nature and size of the image.

(2 marks)

Mark scheme

1 (a) Complete the diagram to show how the light rays at point A form an image between C and F.	
Answer	Guidance
Image from principle axis to point where rays cross; reflection at surface of mirror; rays cross.	
1 (b) Describe the nature and size of the image.	
Answer	Guidance
inverted / upside down; diminished / smaller.	

Science10ST3

Item identity	AO1 marks	AO2 Marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10ST31ai	1	2			10.5.12 Draw and label a diagram of refraction across a media interface.	3
Science10ST31aii	2				10.3.19 Explain why light is refracted when passing between two media.	2
Science10ST31b		2			10.4.7 Use the Law of Refraction to calculate the angle of incidence and angle of refraction and refractive index.	2
Total marks	3	4				7

Item purpose

The question assesses the students understanding the concept of refractive index of light and how to calculate the refractive index.

Question(s)

1 A ray of light is incident on a glass block as shown in **Fig. 1.**

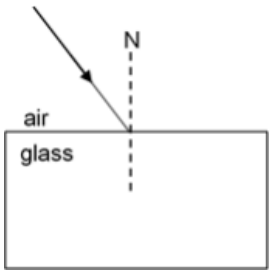


Fig. 1

1(a)(i) On Fig. 1 draw:

- the path of the refracted ray in the block.
- the path of the refracted ray in the air after it passes through the block.
- label the angle of incidence i

(3 marks)

1(a)(ii) Explain why the ray refracts. (2 marks)

1(b) In an experiment, the sine of the refracted angle θ_r is 0.5°

The refractive index *n* of the medium is 1.4.

Calculate the sine of the incident angle θ_i.

(2 marks)

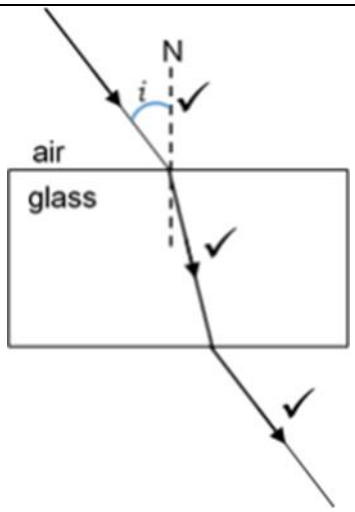
(Total marks 7)

Mark scheme

<table>
<tr><td colspan="2">1 (a)(i) On Fig. 1 draw:

the path of the refracted ray in the block.
the path of the refracted ray in the air after it passes through the block.
label the angle of incidence i</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>Correct path of ray in the block;

Correct path of ray in the air;

Correct angle of incidence.</td><td> 
</td></tr>
<tr><td colspan="2">1 (a)(ii) Explain why the ray refracts.</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>Glass is denser than air ORA;
Speed of light is slower in glass ORA.</td><td></td></tr>
<tr><td colspan="2">1 (b) Calculate the sine of the incident angle θ_i.</td></tr>
<tr><td>Answer</td><td>Guidance</td></tr>
<tr><td>If answer = 0.7 award 2 marks

Recall of n sin r = sin i;

Substitution and calculation 1.4 x 0.5 = 0.7.</td><td></td></tr>
</table>

Science10RR5

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10RR51a		2			10.8.15 Explain the use of lenses in microscopes and telescopes	2
Science10RR51b		1			10.4.7 Calculate the magnification and power of a convex spherical lens.	1
Science10RR51ci		3			10.4.6 Using the lens formula calculate object distance, image distance and focal length of a convex spherical lens.	3
Science10RR51cii		3				3
Science10RR51d	4				10.8.14 Explain how sight defects can occur (long and short sightedness) and how they can be corrected.	4
Total marks	4	9				**13**

Item purpose

The question assesses the learner's ability to identify the position of the object when placed in front of a convex lens.

Question(s)

1 Convex lenses can be used to magnify images.

1 (a) Give the names of **two** devices that use convex lenses.

(2 marks)

1 (b) The height of an object A, H_A is 4 cm.

The height of the image of object A, H_B is also 4 cm.

Calculate the magnification *M* of the lens.

(1 marks)

1 (c)(i) The focal length *f* of a convex lens is 20 cm.

The lens forms an image of an object at a distance v = 50 cm.

Using the lens equation:

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

calculate the distance u of the object from the lens.

(3 marks)

1 (c)(ii) Describe the nature of the image produced.

(3 marks)

1 (d) Eye defects affect many people.

Discuss eye defects, their causes and how they may be corrected.

(4 marks)

(Total marks 13)

Mark scheme

1 (a) Give the names of two devices that use convex lenses.	
Answer	Guidance
Any **two** from: Telescope; Microscope; Camera; Magnifying glass;	
1 (b) Calculate the magnification *M* of the lens.	
Answer	Guidance
1	
1 (c)(i) Use the lens equation to calculate the distance u of the object from the lens. 1 (c)(ii) Describe the nature of the image produced.	
Answer	Guidance
(i) If final answer with unit = 33cm award 3 marks Substitution: 1/20 = 1/50 + 1/u; Rearrange: 3/100 = 1/u; Answer u = 33 (ii) Real; Inverted / upside down; Magnified / larger than the object.	
1 (d) Eye defects affect many people. Discuss eye defects, their causes and how they may be corrected.	
Answer	Guidance
Indicative science Defects: • Long sightedness AW • Short sightedness AW	

• Cataracts AW Causes: • Change in lens shape • Change in eye shape • Change in position of lens • Exposure to UV / light • Genetic predisposition Corrections • Spectacles / glasses / contact lenses • Surgery • Organ donation e.g., cornea	

Level of response

Level	Description	Marks
4	Clear well-structured explanation linking effects to causes or underpinning theory.	4
3	Clear description of relevant facts with some explanation relating effects to causes or underpinning theory.	3
2	Description of the basic facts but no link of effects to causes or underpinning theory.	2
1	Limited isolated descriptive points relevant to the topic	1
0	Nothing worthy of credit	0

Science10ST1

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10ST1	1				10.8.13 Explain how the human eye works to gather images.	1

Item purpose

This will assess the students' understanding of the working of the Human Eye.

Question(s)

1 Which statement about the human eye is correct?

A. Muscles in the iris change the size of the lens
B. Muscles in the iris change the size of the pupil
C. Muscles in the pupil change the size of the iris
D. Muscles in the pupil change the size of the lens

(1 mark)

Mark scheme

1 Which statement about the human eye is correct? A. Muscles in the iris change the size of the lens B. Muscles in the iris change the size of the pupil C. Muscles in the pupil change the size of the iris D. Muscles in the pupil change the size of the lens	
Answer	Guidance
B	

Science10PB2

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10PB2	1				10.3.32 Explain major environmental problems and their causes, impacts and solutions which can be implemented – desertification, deforestation, water deficit, waste production	1

Item purpose

The question assesses the students' learning and understanding about methods of conserving water.

Question(s)

1 Some environmental problems are listed.

1. Desertification
2. Deforestation
3. Waste production
4. Water deficit

1 (a) Which problems can be solved by irrigation?

A. 1 and 2 only
B. 1 and 3 only
C. 1 and 4 only
D. 2 and 4 only

(1 mark)

Mark scheme

1 Which problem can be solved by irrigation? A. 1 and 2 only B. 1 and 3 only C. 1 and 4 only D. 2 and 4 only	
Answer	Guidance
C	

Science10DP1

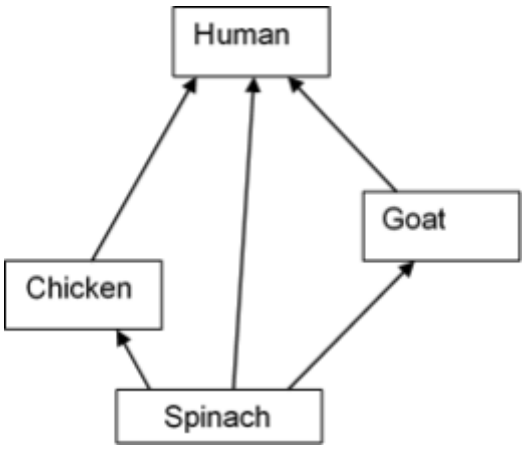
Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10DP1			1		10.5.19 Draw or interpret a food chain or food web.	1

Item purpose

The question assesses the students' understanding of the food chain.

Question(s)

1 A food web is shown.



1 (a) Using the information in the food web draws a food chain that has the most efficient transfer of energy to the human.

(1 mark)

Mark scheme

1 (a) Using the information in the food web draws a food chain that has the most efficient transfer of energy to the human.	
Answer	Guidance
Spinach → Human	Direction of arrow should be correct.

Science10AP6

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10AP61a			4		10.5.20 Plot and interpret graphs of changing energy use over time. 10.8.23 Explain the greenhouse effect and how human activities contribute to global warming through burning fossil fuels, agriculture and industry linked to the greenhouse effect of different atmospheric gases – methane and carbon dioxide.	4
Science10AP61b	2				10.8.24 Explain the importance of reducing fossil fuel usage and the global impact on the planet.	2
Science10AP61c	2				10.6.9 Explain how different forms of energy are created and used – fossil fuels, nuclear, solar energy, biogas, ethanol wood/biomass, wind, water and tidal and describe the advantages and disadvantages of each.	2
Total marks	4		4			**8**

Item purpose

The question assesses the application of scientific theories and concepts.

Question(s)

1 Electrical power is generated from different sources.

Fig. 1 shows how the percentage of power generated, in India, using energy from different sources is expected to change.

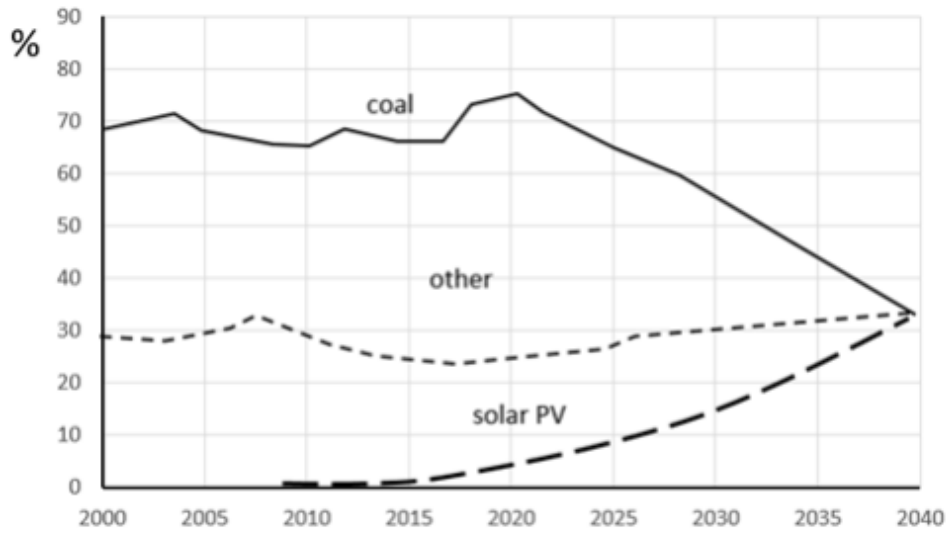


Fig. 1

1(a) Describe the trends in Fig.1 from 2020 to 2040. (4 marks)

1(b) Explain **one** adverse effect of burning coal on the environment. (2 marks)

1(c) Name **two** 'other' sources of energy that are used in electrical power generation. (2 marks)

(Total marks 8)

Mark scheme

1 (a) Describe the trends in Fig.1 from 2020 to 2040.	
Answer	Guidance
solar PV increasing; Coal decreasing; Other increasing; Detail e.g. to 30% /from 0% /from 75%.	
1 (b) Explain one adverse effect of burning coal on the environment.	
Answer	Guidance
Increased greenhouse effect / climate change / named consequence of climate change e.g. sea level rise; (due to) carbon dioxide / CO2	
1 (c) Name two 'other' sources of energy that are used in electrical power generation.	
Answer	Guidance
any two from: Wind / wave / geothermal / tidal / hydro (water) / biomass	

Science10DP5

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10DP51a	1				10.6.9 Explain how different forms of energy are created and used.	1
Science10DP51b		2		2	10.8.27 Explain the advantages and disadvantages of large dam projects.	4
Total marks	1	2		2		**5**

Item purpose

The question assesses the students' understanding of different sources of energy and their knowledge about large dams.

Question(s)

1 Industrialisation has led to an increasing demand for energy.

1 (a) Which source of energy is renewable?

A. Coal
B. Natural gas
C. Uranium
D. Water

(1 mark)

1 (b) Hydroelectric power plants help to meet the increasing demand for electrical energy.

Some people oppose the construction of large dams for environmental reasons.

One such dam is the Teri Dam on the river Ganga.

Give **four** reasons to justify opposition to this dam. (4 marks)

(Total marks 5)

Mark scheme

1 (a) Which source of energy is renewable? A. Coal B. Natural gas C. Uranium D. Water	
Answer	Guidance
D.	

1 (b) Hydroelectric power plants help to meet the increasing demand for electrical energy. Some people oppose the construction of large dams for environmental reasons. One such dam is the Teri Dam on the river Ganga. Give four reasons to justify opposition to this dam.	
Answer	Guidance
Indicative Science: • Loss of agricultural land • Loss of human habitation land • ecosystems are destroyed • submerged vegetation rots under anaerobic conditions and emits methane a green-house gas. • problem of displaced people. • high cost • money could be used for other things	

Level of response

Level	Description	Marks
4	Clear well-structured explanation linking effects to causes or underpinning theory.	4
3	Clear description of relevant facts with some explanation relating effects to causes or underpinning theory.	3
2	Description of the basic facts but no link of effects to causes or underpinning theory.	2
1	Limited isolated descriptive points relevant to the topic	1
0	Nothing worthy of credit	0

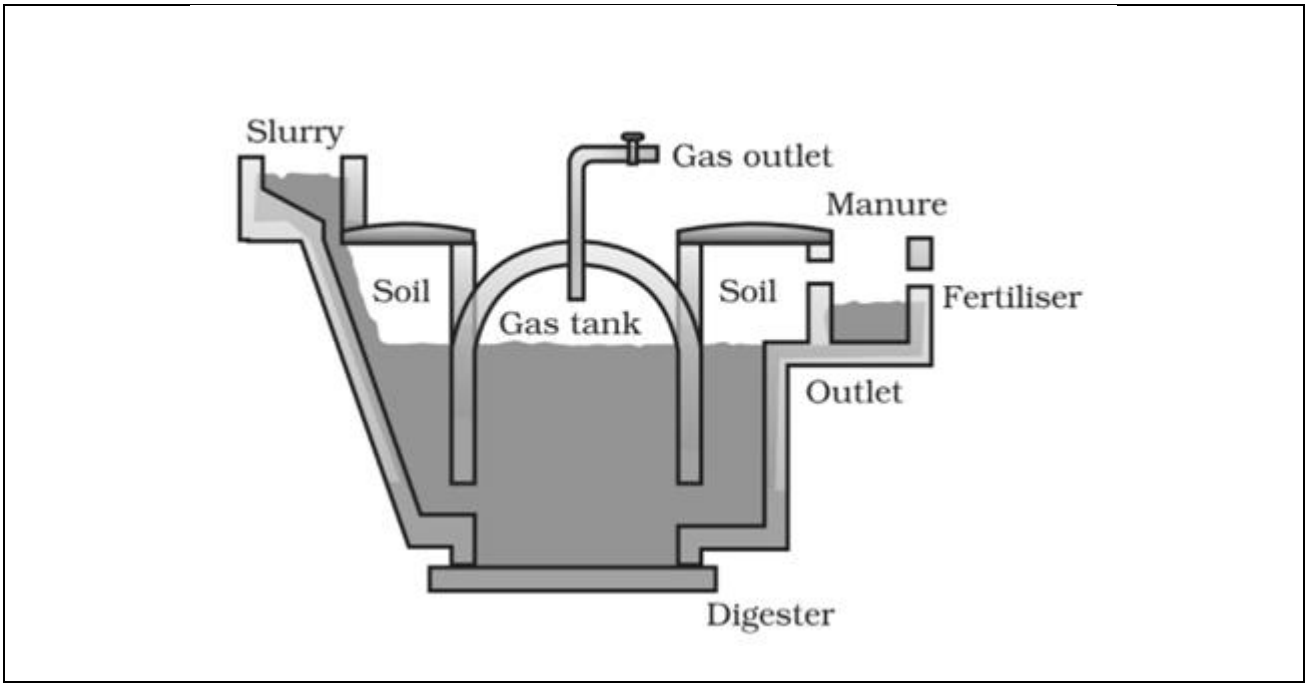
Science10YP1

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10YP1	1				10.6.9 Explain how different forms of energy are created and used-fossil fuels, nuclear, solar energy, biogas, ethanol, wood/biomass, wind, water and tidal and describe the advantages and disadvantages of each.	1

Item purpose

The question assesses the understanding of students regarding the main constituent of biogas.

Source



Source information: Textbook for class X Science, NCERT.

Question

1 What is the main constituent of biogas?

A. carbon dioxide

B. hydrogen

C. oxygen

D. methane

(1 mark)

Mark scheme

1 The main constituent of biogas is A. carbon dioxide B. hydrogen C. oxygen D. methane	
Answer	Guidance
D. methane	Accept if the student writes only D or methane or both Give 1 mark for the correct answer.

Science10ST2

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10ST2	1				10.6.9 Explain how different forms of energy are created and used – fossil fuels, nuclear, solar energy, biogas, ethanol wood/biomass, wind, water and **tidal** and describe the advantages and disadvantages of each.	1
Total marks	1					1

Item purpose

This will assess the students' understanding about tidal waves.

Question(s)

1 Define tidal energy. (1 mark)

(Total marks 1)

Mark scheme

1. Define tidal energy	
Answer	Guidance
Energy generated by the rise and fall of oceanic tides.	Accept the answer even if the student writes ----Rise and fall of Oceanic tides.

Science10ST5

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10ST51a	1				10.6.9 Explain how different forms of energy are created and used – fossil fuels, nuclear, solar energy, biogas, ethanol wood/biomass, wind, water and tidal.	1
Science10ST51b	4				10.8.27 Explain the advantages and disadvantages of large dam projects.	4
Total marks	5					5

Item purpose

The question assesses the students understanding on Hydro-electric power and also analyses the advantages and disadvantages of constructing Dams.

Question(s)

1 In order to produce hydro-electric power, Tehri dam is built on the Bhagirathi River

1 (a) Define hydro-electric power.

(1 mark)

1 (b) Explain **two** advantages and **two** disadvantages in view of the construction of dams

(4 marks)

(Total marks 5)

Mark scheme

1 (a) Define hydro-electric power.	
Answer	Guidance
The electricity produced from the Kinetic energy of the flowing water is called hydro-electric power. (1)	Kinetic energy of the flowing water should be mentioned.
1 (b) In order to produce electricity, Tehri dam is built on the Bhagirathi River. Explain two advantages and two disadvantages in view of the construction of dams.	
Answer	Guidance

Level of response

Level	Description	Marks
4	Clear well-structured explanation linking effects to causes or underpinning theory.	4
3	Clear description of relevant facts with some explanation relating effects to causes or underpinning theory.	3
2	Description of the basic facts but no link of effects to causes or underpinning theory.	2
1	Limited isolated descriptive points relevant to the topic	1
0	Nothing worthy of credit	0

Note: Two advantages and two disadvantages to be considered

Indicative content

Advantages of Constructing Dams:

- Hydroelectric power is cheap.
- The hydro power plant does not cause pollution.
- Hydroelectric power is a renewable source of energy.
- The construction of dams on rivers helps in controlling floods and irrigation.

Disadvantages of constructing Dams:

- The dams can be constructed only in a limited number of places.
- A large area of agricultural land is submerged in construction of dams.
- Due to the construction of dams on the rivers, the production of fish decreases rapidly.
  because the fish in the downstream area do not get sufficient nutrient materials.
- Large eco systems are destroyed when submerged under the water of dams.

Science10PB5

Item identity	AO1 marks	AO2 marks	AO3 marks	AO4 marks	Content Reference(s)	Marks
Science10PB51a	2				10.6.9 Explain how different forms of energy are created and used – fossil fuels, nuclear, solar energy, biogas, ethanol wood/biomass, wind, water and tidal and describe the advantages and disadvantages of each.	2
Science10PB51bi	2					2
Science10PB51bii	3					3
Total marks	2					**7**

Item purpose

The question assesses understanding of biomass.

Question(s)

1 Fossil fuels are used to provide energy.

1 (a) Name **two** fossil fuels.

(2 marks)

1 (b) Fossil fuels are formed from biomass.

1 (b)(i) Explain what is meant by the term biomass.

(2 marks)

1 (b)(ii) Describe the formation of fuels from biomass.

(3 marks)

(Total marks 7)

Mark scheme

1 (a) Name two fossil fuels.	
Answer	Guidance
Any **two** from: Coal; Oil / petroleum; Natural gas; Peat;	**ALLOW** gas / methane
1 (b)(i) Explain what is meant by the term biomass	
Answer	Guidance
(waste) organic matter / material from plants/animals; used as a fuel;	
1 (b)(ii) Describe the formation of fuels from biomass.	
Answer	Guidance
biomass is broken down; (by) microbes; in the absence of oxygen / anaerobic (digestion).	