

Guidelines for CBSE Proficiency Test in Science – 2011

This document provides some general guidelines for the CBSE Proficiency Test in Science to be held in May-June, 2011. It aims to introduce the test to interested students and explains the format of the question paper.

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General information

- The CBSE Proficiency Test in Science aims to test higher level competencies in the subject which include
 - knowledge of the facts/laws/concepts/principles of the subject and appreciation of their inter-relationship,
 - ability to apply the above knowledge to understand relevant daily life situations,
 - ability to apply the above knowledge to new and unfamiliar situations,
 - ability to solve problems requiring the application of the above knowledge,
 - ability to interpret numerical data, graphs, etc., and
 - ability to understand experimental and measurement aspects of Science.
- The content level will be defined by the prescribed CBSE class IX and class X syllabus. The recommended textbooks for this content are NCERT Science textbooks for classes IX and X.
- The questions in the test will not be based merely on recall of information given in the textbooks, and several of them may be unconventional.
- The maximum marks for the test will be 100 and the test will have a duration of two and half hours.
- The question paper will be fully objective in nature; answers will be machine-gradable. The paper will consist of multiple choice questions (MCQs), numerical questions and column matching questions as illustrated by the sample questions given below. There will be negative marking for wrong answers to the multiple choice questions only.
- The total number of questions is NOT indicated by the number of questions in the sample given here.
- The distribution of marks among different types of questions is NOT indicated by the number of questions of each type in the sample given here.

PROFICIENCY TEST IN SCIENCE (Sample questions)

This is a sample question paper. It illustrates the different types of questions to be expected in the actual Proficiency Test in Science and the methods of indicating the answers on the Answersheet. It DOES NOT reflect the distribution of marks among different types or the total number of questions in the actual test.

General Instructions

- All questions are compulsory.
- The questions are divided into three sections:
 1. **Section I:** Questions 1 to 9 are **Multiple Choice Questions**. Each multiple choice question has four options out of which only ONE option is correct. Each correct answer earns a credit of 2 marks. A wrong answer carries a penalty of $-\frac{2}{3}$ mark.
 2. **Section II:** Questions 10 to 12 are **Numerical Questions**. Each correct answer earns a credit of 4 marks. There is no negative marking for these questions.
 3. **Section III:** Questions 13 to 15 are **Column-matching Questions**. In these questions, there are 3 items in the left column (Column I) and 6 options in the right column (Column II). You have to match each item in Column I with ALL the correct options in Column II. For each item in Column I, you earn 2 marks if all correct matches in Column II are indicated, and no incorrect matches are indicated. There is no negative marking for these questions.
- For all types, an unanswered question earns no mark.

Instructions for writing on the Answersheet

- Use an HB pencil to fill the Answersheet. DO NOT USE A PEN.
- If you want to change an entry after filling a bubble, erase the filled bubble cleanly and fill in the new bubble of your choice.
- Apart from filling in bubbles for answers and roll number, do not write anything else on the Answersheet. You will be provided extra space in the question paper for rough work.
- Roll Number: The following example illustrates the correct way of writing your Roll Number.

Example:

Suppose your roll number is **2093184**.

Write it out in the box provided at the top of the grid in the Answersheet. Then for every digit in the roll number, fill in the appropriate bubble in the corresponding column, as shown.

Roll Number

2	0	9	3	1	8	4
0	0	0	0	0	0	0
1	1	1	1	1	1	1
2	2	2	2	2	2	2
3	3	3	3	3	3	3
4	4	4	4	4	4	4
5	5	5	5	5	5	5
6	6	6	6	6	6	6
7	7	7	7	7	7	7
8	8	8	8	8	8	8
9	9	9	9	9	9	9

Instructions for writing on the Answersheet (contd.)

- Multiple Choice Questions: The following example illustrates the correct way of answering a Multiple Choice Question.

Example:

6. The disease cholera is caused by
 (A) a virus. (B) a protozoan microbe. (C) a bacterium. (D) a fungus.

Answer: The answer to this question is option (C). You have to mark it on the Answersheet as shown.

A	B	C	D
6.	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

- Numerical Questions: The following example illustrates the correct way of answering a Numerical Question.

Example:

11. An ant crawls the distance of 1.5 m between its nest and a crystal of sugar in 2 minutes, travelling at uniform speed in a straight line. What is its speed in metres per hour?

Answer: The answer is 45. You have to indicate the answer by filling the bubble containing “5” in the right column, and the bubble containing “4” in the left column of the grid in the Answersheet, as shown.

11.	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input checked="" type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input checked="" type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>

Note: The answer to every Numerical Question is an integer between 0 and 99. If the answer is a single digit, for example, 5, enter it as “05”.

- Column-matching Questions: The following example illustrates the correct way of answering a Column-matching question.

Example:

14. Column I below lists three atoms. Column II lists some properties of atoms. For each item in Column I, match ALL the correct options in Column II.

Column I

- (i) Hydrogen atom
- (ii) Tritium atom
- (iii) Helium atom

Column II

- (A) Has only one proton.
- (B) Does not have any electron.
- (C) Has two neutrons.
- (D) Has a valency of 1.
- (E) Is electrically neutral.
- (F) Has a partially filled electronic shell.

Answer: The correct matches for this question are:

- (i): (A), (D), (E), (F)
- (ii): (A), (C), (D), (E), (F)
- (iii): (C), (E)

You have to indicate the answer as shown.

14.		A	B	C	D	E	F
	i	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
	ii	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
	iii	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

Section I: Multiple Choice questions

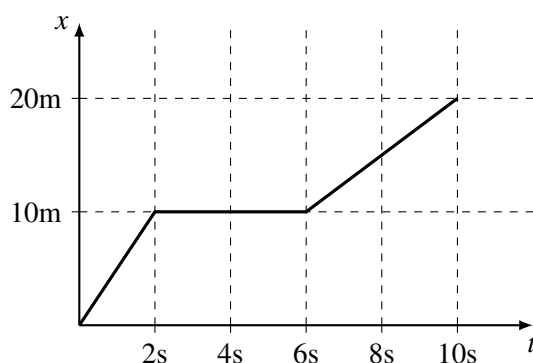
This section contains 9 questions.

For questions 1 to 9 only one of the four options is correct. You have to indicate your answer by filling the appropriate bubble in the Answersheet. A correct answer will earn 2 marks, a wrong answer will earn $(-\frac{2}{3})$ mark, and an unattempted question will earn 0 mark.

1. There are several microorganisms like amoebae and bacteria that live in water and use oxygen. Choose the option that describes the process by which oxygen enters the cell through the plasma membrane.
 - (A) The plasma membrane selectively takes in oxygen into the cell. This process needs energy.
 - (B) The plasma membrane selectively takes in oxygen into the cell. This process does not need energy.
 - (C) Oxygen enters into the cell from the surrounding water by diffusion. This process does not need any energy.
 - (D) Oxygen enters into the cell from the surrounding water by diffusion. This process needs energy.
2. Select the option that gives the size of the components in a cell in an increasing order.
 - (A) ribosome, mitochondria, nucleus, ATP
 - (B) ATP, ribosome, mitochondria, nucleus
 - (C) mitochondria, ribosome, ATP, nucleus
 - (D) ATP, mitochondria, ribosome, nucleus
3. Select the correct statement about viruses.
 - (A) Viruses consume host cells by ingestion.
 - (B) Viruses depend on the host cells for respiration.
 - (C) Viruses reproduce outside the host cells and spread infection to other host cells.
 - (D) Viruses do not have any metabolic process occurring within themselves.
4. There are two samples of 2 g each of hydrogen and helium gases. Which of the following statements is true?
 - (A) Number of moles of hydrogen is the same as that of helium.
 - (B) Number of moles of hydrogen is double that of helium.
 - (C) Number of moles of hydrogen is half that of helium.
 - (D) Number of moles of hydrogen is four times that of helium.
5. A student needed to find out the polarity (+ or –) of the two terminals of a battery coming out of a device. She made a setup by placing the two wires inside water (with little lemon added) in a glass and checked if gases were bubbling out from the wire ends. Which of the following is correct?
 - (A) The wire end with higher quantity of gas bubbles is the negative terminal.
 - (B) The wire end with higher quantity of gas bubbles is the positive terminal.
 - (C) The wire end with no gas coming out is the negative terminal.
 - (D) The wire end with no gas coming out is the positive terminal.

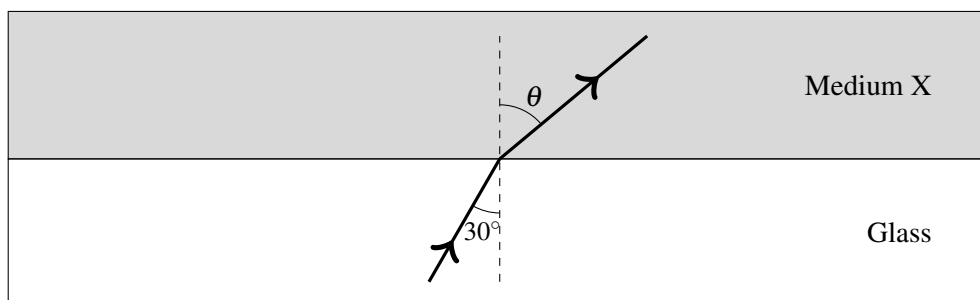
6. One day, a chemist put two different reacting gases P and Q in a balloon, sealed it properly and went home. Next morning, she found that the balloon has shrunk in volume. Assuming that a reaction of the type $pP + qQ = rR + sS$ has taken place, where the products R and S are also gases, which of the following statements is true?
- (A) The relation $(r + s) > (p + q)$ is satisfied.
- (B) The relation $(r + s) < (p + q)$ is satisfied.
- (C) The relation $(r + s) = (p + q)$ is satisfied because of conservation of mass.
- (D) There is no restriction on the values of p, q, r, s .

7. The displacement (in m) versus time (in s) graph for a car on a straight road is shown below:



Which of the following statements is true?

- (A) The car is stationary throughout between $t = 4$ s and $t = 8$ s.
- (B) The car has positive uniform acceleration between $t = 6$ s and $t = 10$ s.
- (C) The car moves with uniform speed of 2.5 m s^{-1} between $t = 2$ s and $t = 6$ s.
- (D) The speed of the car at $t = 1$ s is double its speed at $t = 8$ s.
8. Figure below shows a ray of light in a glass slab incident on the interface between the slab and another medium X. The angle of incidence is 30° and the angle of refraction is θ where $\sin \theta = \frac{5}{8}$.



If the absolute refractive index of glass is 1.5 and the speed of light in vacuum is $3 \times 10^8 \text{ m s}^{-1}$, what is the speed of light in medium X?

- (A) $2.5 \times 10^8 \text{ m s}^{-1}$.
- (B) $3.0 \times 10^8 \text{ m s}^{-1}$.
- (C) $1.88 \times 10^8 \text{ m s}^{-1}$.
- (D) $1.25 \times 10^8 \text{ m s}^{-1}$.

9. A deep well has water at a depth of 80 m below the top of the well. A stone is dropped from the top. If the speed of sound in air is 320 m s^{-1} and the acceleration due to gravity, $g = 10 \text{ m s}^{-2}$, then the splash of the stone hitting the water is heard
- (A) 3.75 s later. (B) 4.25 s later. (C) 8.25 s later. (D) 4.50 s later.

Section II: Numerical questions

This section contains 3 questions.

For questions 10 to 12 the answer is an integer between 0 and 99. You have to indicate the answer by filling bubbles in the appropriate grid provided in the Answersheet. Each question carries 4 marks.

10. Haemophilia or bleeder's disease is a condition which prevents formation of factor VIII, an important blood clotting factor. The gene for factor VIII is carried on the X chromosome. This gene can appear in two forms – normal (dominant) and mutant (recessive). Thus, a female with genotype $X^H X^h$ carries one copy of normal gene (H) and one mutant (h). She is called a carrier. Such a woman marries a normal male ($X^H Y$). What is the probability that their first child will be a normal son? Express the answer in percentage.
11. The pH of an acid solution is related to the concentration c of the H^+ ion by the relation $c = 10^{-x}$, where x is the pH value. 10 ml of an HCl solution of pH value $x = 2$ is diluted with water to get a final volume of 100ml. Calculate the pH value of the final solution.
12. The weight of an empty glass is 1 N. When completely filled with water, the glass weighs 4 N. If you now throw the water away and fill the glass partly with sand, the weight becomes 4 N. If the rest of the glass is now filled up with water, the weight becomes 6 N. What is the relative density of sand?

Section III: Column-matching questions

This section contains 3 questions.

*For questions 13 to 15 you have to match the options in Column II for each item in Column I. You have to indicate the matches by filling bubbles in the appropriate grid provided in the Answersheet. If **all correct options are matched, and no incorrect option is matched**, each item in Column I earns 2 marks.*

13. For each item in Column I, match ALL the correct options in Column II.

Column I

- (i) Thyroxin
- (ii) Auxin
- (iii) Adrenalin

Column II

- (A) Plant growth
- (B) Iodine
- (C) Goitre
- (D) Fight or flight
- (E) Hormone
- (F) Enzyme

14. Some chemical reactions are listed in Column I below. Column II lists some properties of chemical reactions. For each item in Column I, match ALL the correct options in Column II.

Column I

- (i) $C(s) + O_2(g) = CO_2(g)$
- (ii) $2HgO(s) = 2Hg(s) + O_2(g)$
- (iii) $NaOH(s) + HCl(l) = NaCl(s) + H_2O(l)$

Column II

- (A) Neutralisation reaction
- (B) Exothermic reaction
- (C) Decomposition reaction
- (D) Endothermic reaction
- (E) Combination reaction
- (F) Double displacement reaction

15. A ball of mass m is thrown vertically upwards with a certain initial speed, u , so that it reaches a maximum height of h . Assume that the acceleration due to gravity is g and that there is no air resistance. Then, for each item in Column I, match ALL the correct options in Column II.

Column I

- (i) The ball is travelling upwards.
- (ii) The ball is at the highest point.
- (iii) The ball is travelling downwards.

Column II

- (A) Total energy (kinetic + potential) is constant = mgh .
- (B) Total energy (kinetic + potential) is constant = $mgh + \frac{1}{2}mu^2$.
- (C) Acceleration is directed downwards and constant.
- (D) Velocity and acceleration are in the same direction.
- (E) The force on the ball is zero.
- (F) Both velocity and acceleration are zero.

END OF QUESTIONS

PROFICIENCY TEST IN SCIENCE

ANSWER SHEET (for sample questions)

This is a sample Answersheet designed for marking the answers to the sample questions given earlier in this document. The actual Answersheet provided in the Proficiency Test may look different.

Instructions:

1. Use an HB pencil to fill this sheet. **DO NOT USE A PEN.**
2. Refer to the instructions on the question paper for filling in your roll number and the answers to the questions.
3. If you want to change an answer after filling a bubble, erase the filled bubble cleanly and fill in the new bubble of your choice.
4. Apart from filling in bubbles for answers and roll number, do not write anything else on the Answersheet.
5. Take extra care to ensure that your Roll Number is correctly filled out in the grid.

A B C D

1.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10.

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

11.

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

12.

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

13.

	A	B	C	D	E	F
i	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iii	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14.

	A	B	C	D	E	F
i	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iii	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15.

	A	B	C	D	E	F
i	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iii	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Roll Number

0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9

Solutions to sample questions

1. C
2. B
3. D
4. B
5. A
6. B
7. D
8. A
9. B
10. 25
11. 3
12. 3
13.
 - i. B C E
 - ii. A E
 - iii. D E
14.
 - i. B E
 - ii. C D
 - iii. A B F
15.
 - i. A C
 - ii. A C
 - iii. A C D