

Class 10 Science: Competency Practice - Student copy

6 questions | 16 marks | Explain, calculate and interpret

Name: _____ Class / section: _____ Date: _____

Answer every question. Show relationships, calculations and reasoning where asked. Data labelled hypothetical is supplied for this classroom task.

Question 1 - 2 marks

A pupil changes MgO to MgO_2 to balance $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$. Explain the mistake and write the correctly balanced equation.

Question 2 - 3 marks

A clean iron nail is placed in blue copper sulphate solution. A reddish-brown coating forms and the blue colour fades towards pale green. Identify the coating, explain the change and write a balanced equation.

Question 3 - 3 marks

Two 6-ohm resistors are connected in parallel across a 6 V supply. Find the current in each branch, the total current, and the equivalent resistance. Show the relationships you use.

Question 4 - 2 marks

A plant is destarched and part of a leaf is covered with opaque paper before exposure to sunlight. After a teacher carries out the starch test, only the exposed part turns blue-black. What does this suggest? Why was destarching needed?

Question 5 - 3 marks

Two classroom soil samples have pH values 4.5 and 8.0. Which sample could be treated with powdered limestone to reduce acidity? Explain why, and why the same treatment is unsuitable for the other sample.

Question 6 - 3 marks

A hypothetical classroom dataset gives pesticide concentrations in a food chain: algae 0.02 mg/kg, small aquatic animals 0.2 mg/kg, small fish 2 mg/kg, and large fish 20 mg/kg. Describe the pattern, name the process it illustrates and explain how a persistent pesticide can produce this pattern.

Class 10 Science: Competency Practice - Teacher key

6 questions | 16 marks | Explain, calculate and interpret

Award one mark for each numbered point below. Accept equivalent scientifically correct wording and valid methods. The final point may contain a linked calculation or conclusion.

Question 1 - 2 marks

1. Changing a chemical formula changes the substance; balance by changing coefficients only.
2. $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$. There are two magnesium atoms and two oxygen atoms on each side.

Question 2 - 3 marks

1. The coating is copper deposited on the nail.
2. Iron displaces copper because iron is more reactive; iron(II) sulphate forms in solution.
3. $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$.

Question 3 - 3 marks

1. Each branch has 6 V across it, so $I = V/R = 6/6 = 1\text{ A}$ in each branch.
2. Total current = $1 + 1 = 2\text{ A}$.
3. Equivalent resistance = $V/I(\text{total}) = 6/2 = 3\text{ ohms}$.

Question 4 - 2 marks

1. The exposed part produced starch while the covered part did not, supporting the need for light in photosynthesis under these conditions.
2. Destarching removes previously stored starch so that the result can be related to the treatment.

Question 5 - 3 marks

1. Choose the pH 4.5 sample, which is acidic.
2. Calcium carbonate in limestone reacts with acid and can reduce the soil acidity.
3. The pH 8.0 sample is alkaline; adding a material used to reduce acidity does not address that condition.

Question 6 - 3 marks

1. Concentration increases at successive trophic levels; the large fish have the highest value.
2. The increasing concentration along the food chain illustrates biomagnification.
3. Persistent pesticides may remain in organisms and pass to predators through feeding; repeated intake from contaminated prey can increase their concentration.