

# CLASS 12 BIOLOGY – COMPLETE EXAM GUIDE

(Kid-friendly • Colorful mental images • Simple language • High-yield concepts)

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## CHAPTER 1: HUMAN HEALTH & DISEASE

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### 1. THEORY IN SIMPLE WORDS (WITH VISUALS)

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#### What is Health?

Health = “Body + Mind + Social Well-Being”

#### Causes of Disease

CAUSES OF DISEASE

Pathogens	Lifestyle	Genetics
(bacteria, virus etc.)	junk food, stress etc.	mutations

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#### Types of Diseases

##### 1. Infectious Diseases

Caused by pathogens.

Easy mnemonic → VBBPFH

(Virus, Bacteria, Protozoa, Prion, Fungi, Helminths)

##### 2. Non-infectious Diseases

- Diabetes
  - Cancer
  - Hypertension
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#### Malaria – Important for Exam

Organism: *Plasmodium* (vivax, falciparum, malariae, ovale)

Vector: female *Anopheles* mosquito

## Life cycle (Easy Diagram)

Human Liver → Human RBC → Mosquito → Human

### Symptoms:

Fever with chills (every 2–3 days), anemia.

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## ✿ AIDS

Virus: HIV

Cells destroyed: Helper T-cells (CD4)

### Transmission:

- 💉 Blood
- ❤️ Sexual contact
- 🤰 Mother → baby
- 🚫 NOT through touching/sharing food

### Prevention Mnemonic: AIDS = AID

- Avoid unprotected sex
  - Ignore shared needles
  - Donate blood safely
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## 😊 Allergy

When immune system overreacts to harmless substances (pollen, dust).

### Symptoms:

Sneezing, rashes, watery eyes.

### Test:

ELISA and skin prick test

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## /blue/ Immunity – SUPER IMPORTANT!

### Two main types:

#### IMMUNITY

INNATE (born <i>with</i> it)
- skin, tears, fever

ACQUIRED (developed)
Natural / Artificial
Active / Passive

## Memory Trick

### NAP-AAPA

- N – Natural Active
- A – Artificial Active
- P – Passive Natural
- A – Artificial Passive

Examples:

- Natural active → catching a disease
- Artificial active → vaccines
- Natural passive → mother's milk
- Artificial passive → antibodies injection

## Vaccines

Introduce a weakened/killed pathogen → body forms memory cells → immunity.

## Drug & Alcohol Abuse (High Yield)

Common drugs:

- Opioids (heroin)
- Cannabinoids
- Cocaine

Effects:

- Liver failure
- Hallucinations
- Addiction

Prevention:

- Proper counseling
- Avoid peer pressure

# KEY CONCEPTS, DEFINITIONS & TABLES

## Important Table – Pathogen vs Disease

Pathogen	Disease
Virus	AIDS, Dengue, Polio
Bacteria	TB, Cholera
Protozoa	Malaria
Fungi	Ringworm
Helminths	Ascariasis

## Quick Definitions

Term	Meaning
Antigen	Substance that triggers immune response
Antibody	Protein produced to neutralize antigens
Vaccine	Dead/weak pathogen to induce immunity
Allergy	Hypersensitive immune reaction
Zoonosis	Disease from animals to humans

## SOLVED NUMERICAL PROBLEMS

(There are few numericals in this chapter, mostly *data-based*.)

**Q1. A patient's blood test shows CD4 count = 150 cells/mm<sup>3</sup>. What disease stage does this indicate?**

Normal: 500–1500  
Below 200 → AIDS

**Answer:** The patient is in AIDS stage.

**Q2. Calculate vaccine efficacy:**

If 900 out of 1000 vaccinated people do not get the disease → efficacy?

**Step:**

$$\text{Efficacy} = (\text{Protected} / \text{Total}) \times 100$$

$$= (900/1000) \times 100 = 90\%$$

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## PREVIOUS YEARS' QUESTIONS (WITH SOLUTIONS)

### 1. Define innate immunity. (Repeated)

**Ans:** Natural defense present at birth (skin, phagocytes).

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### 2. Name the causative organism of malaria. (Every year)

**Ans:** *Plasmodium* (falciparum, vivax, malariae, ovale).

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### 3. Difference between active and passive immunity.

(Do table in exam!)

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### 4. Write symptoms of dengue.

Fever, rashes, bleeding, joint pain.

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## QUICK REVISION NOTES (1 PAGE)

- Health = physical + mental + social
  - Disease types = infectious / non-infectious
  - Malaria vector = female Anopheles
  - AIDS virus = HIV → destroys helper T-cells
  - Immunity types = innate & acquired
  - Vaccines → artificial active immunity
  - Allergy = hypersensitivity
  - Drug abuse dangers = addiction, liver damage
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## PREDICTED QUESTIONS

- ✓ Draw immunity chart
- ✓ Compare active vs passive immunity
- ✓ Explain malaria life cycle

- ✓ Write short note on AIDS
  - ✓ Causes of drug abuse
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## EXAM TIPS

- Write diagrams! They fetch marks.
  - Malaria/AIDS is repeated every year.
  - Use tables to compare topics → high scoring.
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## CHAPTER 2: STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION

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### THEORY IN SIMPLE WORDS

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#### Plant Breeding (Very Important)

Goal = improve crop quality & yield.

##### Steps (Mnemonic: ICSHR)

1. I – Collection of variability
  2. C – Cross breeding
  3. S – Selection
  4. H – Hybridisation
  5. R – Release of improved variety
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#### Single Cell Protein (SCP)

Protein from microbes → used as food.

Example:

- **Spirulina** (algae) → superfood
  - **Yeast** → bakery
  - **Fusarium** → mycoprotein
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#### Tissue Culture

Growing plant cells in lab.

Flowchart:

Explant → Sterilization → Nutrient Medium → Callus → Plantlet

## Micropagation

Fast multiplication of disease-free plants.

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## ★ Animal Husbandry

Includes management of:

- 🐄 Dairy (cows)
- 🐓 Poultry
- 🐑 Sheep
- 🐟 Fish (Aquaculture)

## ★ KEY TABLES

### Types of Breeding

Type	Meaning	Example
Inbreeding	Same breed mating	Jersey cow
Outbreeding	Different breeds	Cross-bred cows
Hybridisation	Superior hybrids	Heterosis

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## ★ SOLVED NUMERICALS

### Q1. If hybrid crop yields increased from 40 to 56 tonnes, find % increase.

$$\text{Increase} = 56 - 40 = 16$$

$$\% \text{ increase} = (16/40) \times 100 = 40\%$$

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### Q2. In tissue culture, 1 explant → 4 plantlets. In next round each makes 4 more. Total?

$$\text{First round} = 4$$

$$\text{Second round} = 4 \times 4 = 16$$

$$\text{Total} = 20 \text{ plantlets}$$

## PYQs

- Define tissue culture.
  - State heterosis.
  - Advantages of micropropagation.
  - What is SCP?
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## QUICK REVISION NOTES

- Steps of plant breeding = ICSHR
  - SCP examples: Spirulina, yeast
  - Tissue culture → micropropagation
  - Inbreeding increases homozygosity
  - Outcrossing prevents inbreeding depression
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## PREDICTED QUESTIONS

- ✓ Steps of tissue culture
  - ✓ Hybrid vigour
  - ✓ Single cell protein
  - ✓ Inbreeding depression
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## EXAM TIPS

- Draw tissue culture steps!
  - Keep definitions short and crisp.
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## CHAPTER 3: MICROBES IN HUMAN WELFARE

## THEORY IN SIMPLE WORDS

### Microbes are HELPERS!

They help in:

- Food (curd, bread, cheese)
  - Medicine (antibiotics)
  - Industry (fermentation)
  - Agriculture (biofertilizers)
  - Environment (sewage treatment)
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## ★ Microbes in Food

Lactobacillus → Curd

Yeast → Bread, beer

Mushrooms → Edible fungi

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## ★ Antibiotics

Penicillin from *Penicillium notatum*

Discovered by Alexander Fleming.

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## ★ Microbes in Sewage Treatment

Primary treatment → removes solids

Secondary → microbes digest organic matter

Tertiary → chlorine/UV

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## ★ Biofertilizers

Rhizobium → Nitrogen fixation in legumes

Cyanobacteria → paddy fields

Mycorrhiza → nutrient absorption

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## ★ KEY TABLES

### Microbe – Product – Application

Microbe	Product	Use
Lactobacillus	Lactic acid	Curd
Yeast	Ethanol	Alcohol

Microbe	Product	Use
Penicillium	Penicillin	Antibiotic
Rhizobium	Nitrogen	Soil fertility

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## SOLVED NUMERICALS

**Q1. If BOD decreases from 200 mg/L to 80 mg/L after treatment, % decrease?**

$$\text{Decrease} = 120$$

$$\% \text{ decrease} = (120/200) \times 100 = 60\%$$


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**Q2. 1 liter fermenter yields 10g penicillin. How much from 500 L?**

$$= 10 \times 500 = 5000 \text{ g}$$


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## PYQs

- What is BOD?
  - Name biofertilizers.
  - Write uses of Lactobacillus.
  - What is activated sludge?
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## QUICK REVISION NOTES

- Curd → Lactobacillus
  - Antibiotic → Penicillin
  - Sewage treatment → BOD ↓
  - Biofertilizers → Rhizobium, blue-green algae
  - Fermenters used for industrial production
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## PREDICTED QUESTIONS

- ✓ Define BOD
  - ✓ Role of microbes in food
  - ✓ Biofertilizers classification
  - ✓ Antibiotics examples
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## EXAM TIPS

- Always define → microbe + product + application
  - Mention Fleming for penicillin
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## FINAL ULTRA-QUICK REVISION PAGE (FOR NIGHT BEFORE EXAM)

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### HUMAN HEALTH & DISEASE

- Malaria = Plasmodium (mosquito)
  - AIDS = HIV destroys CD4 cells
  - Immunity = innate & acquired
  - Active vs passive immunity table important
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### FOOD PRODUCTION

- Plant breeding steps = ICSHR
  - SCP = Spirulina
  - Tissue culture → micropropagation
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### MICROBES IN WELFARE

- Curd = Lactobacillus
- Bread = Yeast
- Penicillin = Penicillium
- Biofertilizers = Rhizobium, BGA