

FREE PRACTICE PACK · EDITION 1

Class 12 Science Olympiad practice

16 original questions + explained answers

For students preparing for SOF ISO.

Inside this pack

Eight topic-practice questions and an eight-question, 25-minute mini-mock.

Topics selected for practice

- Electricity, magnetism and optics
- Modern physics and semiconductors
- Solutions, electrochemistry and kinetics
- Biology option

How to use it

Try the practice first. Complete the mini-mock in one sitting. Check the explanations, mark mistakes, and retry them the next day.

This pack covers selected topics. It is original BodhiScore material, independent of SOF, and is not an official paper or a full-length exam. Check the official syllabus for the complete scope.

Topic practice

Work through these eight questions without a timer. Explain your choice before checking the solutions.

1. Electricity, magnetism and optics

A 12 ohm resistor is connected to 24 V. What current flows?

- | | |
|-----------------|-----------------|
| A. 12 A | B. 288 A |
| C. 0.5 A | D. 2 A |
-

2. Modern physics and semiconductors

A photon has frequency 6×10^{14} Hz. Using $h = 6.6 \times 10^{-34}$ Js, what is its energy?

- | | |
|------------------------------------|-----------------------------------|
| A. 3.96×10^{-20} J | B. 6.6×10^{-20} J |
| C. 3.96×10^{-19} J | D. 1.1×10^{-19} J |
-

3. Solutions, electrochemistry and kinetics

A first-order reaction has rate constant 0.2 s^{-1} . What is its half-life?

- | | |
|------------------|-----------------|
| A. 3.47 s | B. 5.0 s |
| C. 0.2 s | D. 1.0 s |
-

Topic practice (continued)

4. Biology option

In a DNA double helix, adenine pairs with which base?

- | | |
|--------------------|-------------------|
| A. Cytosine | B. Guanine |
| C. Thymine | D. Uracil |
-

5. Electricity, magnetism and optics

A 0.2 m wire carries 5 A perpendicular to a 0.4 T magnetic field. What magnetic force acts on it?

- | | |
|------------------|-----------------|
| A. 0.04 N | B. 0.4 N |
| C. 1 N | D. 4 N |
-

6. Modern physics and semiconductors

A semiconductor diode is forward biased. What is its usual effect on current?

- A.** It blocks all current
 - B.** It converts current to mass
 - C.** It becomes an insulator at once
 - D.** It allows substantial current after the threshold
-

Topic practice (continued)

7. Solutions, electrochemistry and kinetics

How many moles of solute are in 0.5 L of a 2 mol/L solution?

- | | |
|-----------------|--------------------|
| A. 4 mol | B. 0.25 mol |
| C. 1 mol | D. 2 mol |
-

8. Biology option

Which enzyme joins Okazaki fragments during DNA replication?

- | | |
|--------------------|----------------------|
| A. Catalase | B. DNA ligase |
| C. Amylase | D. Lipase |
-

Timed mini-mock

Set a 25-minute timer for these eight questions. Score 1 point per correct answer; there is no penalty for an incorrect answer. This is BodhiScore's practice scoring.

9. Electricity, magnetism and optics

An object is 30 cm from a converging lens with focal length 10 cm. Using $1/f = 1/u + 1/v$ with positive distances, find image distance.

- | | |
|-----------------|-----------------|
| A. 20 cm | B. 30 cm |
| C. 10 cm | D. 15 cm |
-

10. Modern physics and semiconductors

A radioactive sample has half-life 4 hours. What fraction remains after 12 hours?

- | | |
|----------------|---------------|
| A. 1/4 | B. 1/8 |
| C. 1/16 | D. 1/2 |
-

11. Solutions, electrochemistry and kinetics

For a spontaneous galvanic cell, which sign does its standard cell potential have?

- | | |
|-----------------------|--------------------------|
| A. Always zero | B. It has no sign |
| C. Positive | D. Negative |
-

Timed mini-mock (continued)

12. Biology option

A heterozygous individual Aa forms gametes. What fraction carry A?

- | | |
|-----------------|-----------------|
| A. $1/4$ | B. $1/2$ |
| C. 1 | D. 0 |
-

13. Electricity, magnetism and optics

A transformer has 500 primary turns and 100 secondary turns. If primary voltage is 220 V, what is secondary voltage for an ideal transformer?

- | | |
|-------------------|-----------------|
| A. 44 V | B. 220 V |
| C. 1,100 V | D. 22 V |
-

14. Modern physics and semiconductors

A photon has energy 3 eV. What is its energy in joules? Use $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$.

- | | |
|---|---|
| A. $4.8 \times 10^{-19} \text{ J}$ | B. $6.0 \times 10^{-19} \text{ J}$ |
| C. $1.6 \times 10^{-19} \text{ J}$ | D. $3.0 \times 10^{-19} \text{ J}$ |
-

Timed mini-mock (continued)

15. Solutions, electrochemistry and kinetics

A reaction rate doubles when reactant concentration doubles. What is its order in that reactant?

- | | |
|------------------|-----------------|
| A. Second | B. Third |
| C. Zero | D. First |
-

16. Biology option

In a population at Hardy-Weinberg equilibrium, $p=0.7$ and $q=0.3$. What fraction is expected to be heterozygous?

- | | |
|----------------|----------------|
| A. 0.42 | B. 0.49 |
| C. 0.09 | D. 0.21 |
-

Answers and explanations

Check why the answer works, then retry any question you missed.

1. D - 2 A

Ohm's law gives $I = V/R = 24/12 = 2$ A.

2. C - 3.96×10^{-19} J

$E = hf = 6.6 \times 10^{-34} \times 6 \times 10^{14} = 3.96 \times 10^{-19}$ J.

3. A - 3.47 s

$t_{1/2} = 0.693/k = 0.693/0.2 = 3.465$ s, about 3.47 s.

4. C - Thymine

In DNA, adenine pairs with thymine.

5. B - 0.4 N

$F = BIL = 0.4 \times 5 \times 0.2 = 0.4$ N.

6. D - It allows substantial current after the threshold

Forward bias lowers the junction barrier, allowing current to flow.

7. C - 1 mol

$n = CV = 2 \text{ mol/L} \times 0.5 \text{ L} = 1 \text{ mol}$.

8. B - DNA ligase

DNA ligase seals breaks between adjacent DNA fragments.

9. D - 15 cm

$1/v = 1/10 - 1/30 = 1/15$, so $v = 15$ cm.

Answers and explanations (continued)

10. B - $1/8$

Twelve hours is three half-lives, leaving $(1/2)^3 = 1/8$.

11. C - Positive

A spontaneous cell reaction has positive standard cell potential and negative delta G.

12. B - $1/2$

The two alleles segregate equally, so half of the gametes carry A.

13. A - 44 V

$V_s/V_p = N_s/N_p = 100/500$, giving $V_s = 44$ V.

14. A - 4.8×10^{-19} J

$3 \times 1.6 \times 10^{-19} = 4.8 \times 10^{-19}$ J.

15. D - First

Rate proportional to concentration to power 1 indicates first order.

16. A - 0.42

Heterozygote frequency is $2pq = 2 \times 0.7 \times 0.3 = 0.42$.

Topic scope checked against SOF syllabus: [SOF ISO Class 12 syllabus](#)