

FREE PRACTICE PACK · EDITION 1

Class 11 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

- Mechanics and thermal physics
- Waves and oscillations
- Atoms, bonding and equilibrium
- 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. Mechanics and thermal physics

A 2 kg object moving at 3 m/s has what kinetic energy?

- | | |
|---------------|----------------|
| A. 9 J | B. 18 J |
| C. 3 J | D. 6 J |
-

2. Waves and oscillations

A spring-mass oscillator has period 2 s. What is its frequency?

- | | |
|-------------------|------------------|
| A. 2 Hz | B. 4 Hz |
| C. 0.25 Hz | D. 0.5 Hz |
-

3. Atoms, bonding and equilibrium

How many moles are in 18 g of water? (Molar mass = 18 g/mol.)

- | | |
|-------------------|------------------|
| A. 2 mol | B. 18 mol |
| C. 0.5 mol | D. 1 mol |
-

Topic practice (continued)

4. Biology option

A cell placed in a hypotonic solution gains water. What process explains this?

- A. Transpiration
 - B. Diffusion of proteins
 - C. Osmosis
 - D. Active transport only
-

5. Mechanics and thermal physics

A 10 N force acts on a 2 kg object. What is its acceleration if this is the net force?

- A. 2 m/s^2
 - B. 5 m/s^2
 - C. 10 m/s^2
 - D. 20 m/s^2
-

6. Waves and oscillations

A wave has frequency 50 Hz and wavelength 4 m. What is its speed?

- A. 200 m/s
 - B. 400 m/s
 - C. 12.5 m/s
 - D. 54 m/s
-

Topic practice (continued)

7. Atoms, bonding and equilibrium

For $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$, what happens to equilibrium if pressure is increased at constant temperature?

- A.** It shifts toward NH_3
 - B.** It shifts toward N_2 and H_2
 - C.** It does not shift
 - D.** The reaction stops
-

8. Biology option

Which organelle is the primary site of aerobic ATP production?

- A.** Golgi body
 - B.** Lysosome
 - C.** Mitochondrion
 - D.** Ribosome
-

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. Mechanics and thermal physics

A 0.5 kg ball is raised by 4 m. Use $g=10 \text{ m/s}^2$. How much gravitational potential energy is gained?

- | | |
|----------------|----------------|
| A. 2 J | B. 10 J |
| C. 20 J | D. 40 J |
-

10. Waves and oscillations

A sound wave travels at 340 m/s with frequency 170 Hz. What is its wavelength?

- | | |
|-----------------|-----------------|
| A. 170 m | B. 510 m |
| C. 0.5 m | D. 2 m |
-

11. Atoms, bonding and equilibrium

What is the pH of a 0.001 mol/L strong acid, assuming complete dissociation?

- | | |
|-------------|--------------|
| A. 3 | B. 11 |
| C. 1 | D. 2 |
-

Timed mini-mock (continued)

12. Biology option

An enzyme's active site changes shape at very high temperature. What is the likely effect?

- A.** Nothing changes
 - B.** Its activity decreases because it is denatured
 - C.** It becomes a carbohydrate
 - D.** It makes unlimited product
-

13. Mechanics and thermal physics

A 4 kg block slides at constant speed while a 6 N force pulls it. What is the friction force?

- | | |
|----------------|---------------|
| A. 4 N | B. 6 N |
| C. 24 N | D. 0 N |
-

14. Waves and oscillations

A pendulum completes 20 oscillations in 40 s. What is its period?

- | | |
|-----------------|-----------------|
| A. 20 s | B. 800 s |
| C. 0.5 s | D. 2 s |
-

Timed mini-mock (continued)

15. Atoms, bonding and equilibrium

How many molecules are in 0.5 mol of a substance? Use Avogadro constant $6.0 \times 10^{23} \text{ mol}^{-1}$.

- | | |
|--------------------------------|--------------------------------|
| A. 12×10^{23} | B. 3.0×10^{23} |
| C. 6.0×10^{23} | D. 1.2×10^{24} |
-

16. Biology option

In a monohybrid cross $Aa \times Aa$, what fraction of offspring is expected to be aa ?

- | | |
|-----------------|-----------------|
| A. $3/4$ | B. 0 |
| C. $1/4$ | D. $1/2$ |
-

Answers and explanations

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

1. A - 9 J

Kinetic energy = $(1/2)mv^2 = 0.5 \times 2 \times 9 = 9 \text{ J}$.

2. D - 0.5 Hz

Frequency is the reciprocal of period: $1/2 = 0.5 \text{ Hz}$.

3. D - 1 mol

Moles = mass/molar mass = $18/18 = 1 \text{ mol}$.

4. C - Osmosis

Water moves across a selectively permeable membrane by osmosis.

5. B - 5 m/s²

Newton's second law gives $a=F/m=10/2=5 \text{ m/s}^2$.

6. A - 200 m/s

Wave speed $v=f \lambda=50 \times 4=200 \text{ m/s}$.

7. A - It shifts toward NH₃

Higher pressure favours the side with fewer gas moles: 2 rather than 4.

8. C - Mitochondrion

Mitochondria produce most ATP through aerobic respiration.

9. C - 20 J

$mgh=0.5 \times 10 \times 4=20 \text{ J}$.

Answers and explanations (continued)

10. D - 2 m

Wavelength = speed/frequency = $340/170 = 2$ m.

11. A - 3

$[H^+] = 10^{-3}$ mol/L, so pH = 3.

12. B - Its activity decreases because it is denatured

High heat can alter an enzyme's shape, reducing substrate binding.

13. B - 6 N

Constant speed means zero net force, so friction balances the 6 N pull.

14. D - 2 s

Period = total time/oscillations = $40/20 = 2$ s.

15. B - 3.0×10^{23}

$0.5 \times 6.0 \times 10^{23} = 3.0 \times 10^{23}$ molecules.

16. C - 1/4

The four equally likely combinations include one aa, giving 1/4.

Topic scope checked against SOF syllabus: [SOF ISO Class 11 syllabus](#)