

FREE PRACTICE PACK · EDITION 1

Class 11 Mathematics Olympiad practice

16 original questions + explained answers

For students preparing for SOF IMO.

Inside this pack

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

Topics selected for practice

- Functions and algebra
- Trigonometry and coordinate geometry
- Sequences and calculus foundations
- Probability and statistics

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. Functions and algebra

For $f(x)=x^2-3x$, find $f(4)-f(1)$.

A. 6

B. 9

C. 12

D. 3

2. Trigonometry and coordinate geometry

A line has slope -2 and passes through (1, 5). What is its y-intercept?

A. 7

B. -2

C. 3

D. 5

3. Sequences and calculus foundations

An arithmetic sequence has first term 5 and common difference 3. Find the 12th term.

A. 35

B. 38

C. 41

D. 44

Topic practice (continued)

4. Probability and statistics

A fair coin is tossed 4 times. What is the probability all tosses show tails?

- | | |
|------------------|------------------|
| A. $1/32$ | B. $1/4$ |
| C. $1/8$ | D. $1/16$ |
-

5. Functions and algebra

Solve $x^2 - 4x + 1 = 0$.

- | | |
|-----------------------------|-----------------------------|
| A. $4 \pm \sqrt{15}$ | B. $2 \pm \sqrt{5}$ |
| C. $2 \pm \sqrt{3}$ | D. $-2 \pm \sqrt{3}$ |
-

6. Trigonometry and coordinate geometry

What is $\sin(30 \text{ degrees}) + \cos(60 \text{ degrees})$?

- | | |
|-------------|----------------------|
| A. 0 | B. $1/2$ |
| C. 1 | D. $\sqrt{3}$ |
-

7. Sequences and calculus foundations

For $s(t)=t^2+2t$, what is the average rate of change from $t=1$ to $t=3$?

- | | |
|-------------|-------------|
| A. 8 | B. 4 |
| C. 5 | D. 6 |
-

Topic practice (continued)

8. Probability and statistics

A data set is 2, 3, 3, 7, 10. What is its median?

A. 3

B. 5

C. 7

D. 2

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. Functions and algebra

If $\log_{10}(x)=2.5$, what is x ?

A. $\sqrt{10}$

B. $100\sqrt{10}$

C. 250

D. 1,000

10. Trigonometry and coordinate geometry

A circle is centred at the origin and has radius 5. Which point lies on it?

A. (0,4)

B. (2,2)

C. (3,4)

D. (1,5)

11. Sequences and calculus foundations

Differentiate $f(x)=3x^2-4x+1$.

A. x^3-2x^2+x

B. $6x-4$

C. $3x-4$

D. $6x+1$

Timed mini-mock (continued)

12. Probability and statistics

A bag has 3 red and 2 blue tokens. Two are drawn without replacement. What is the probability both are red?

- | | |
|-------------------|------------------|
| A. $\frac{3}{10}$ | B. $\frac{2}{5}$ |
| C. $\frac{3}{5}$ | D. $\frac{1}{5}$ |
-

13. Functions and algebra

If $x+y=8$ and $xy=12$, find x^2+y^2 .

- | | |
|-------|-------|
| A. 28 | B. 40 |
| C. 52 | D. 64 |
-

14. Trigonometry and coordinate geometry

A point moves from (2, -1) to (8, 7). What is the slope of the line joining them?

- | | |
|------------------|------------------|
| A. 1 | B. 2 |
| C. $\frac{3}{4}$ | D. $\frac{4}{3}$ |
-

Timed mini-mock (continued)

15. Sequences and calculus foundations

For $f(x)=x^2$, estimate the derivative at $x=2$ using the symmetric difference $[f(2+h)-f(2-h)]/(2h)$. What value results for any nonzero h ?

- | | |
|-------------------|----------------|
| A. $4+h^2$ | B. 2 |
| C. 4 | D. $4h$ |
-

16. Probability and statistics

A fair die is rolled twice. What is the probability the sum is 9?

- | | |
|------------------|-----------------|
| A. $1/6$ | B. $1/4$ |
| C. $5/18$ | D. $1/9$ |
-

Answers and explanations

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

1. A - 6

$f(4)=4$ and $f(1)=-2$, so $f(4)-f(1)=6$.

2. A - 7

Using $y=mx+b$: $5=-2(1)+b$, so $b=7$.

3. B - 38

$a_{12} = 5 + 11 \times 3 = 38$.

4. D - 1/16

Each toss has probability $1/2$ of tails, so $(1/2)^4 = 1/16$.

5. C - 2 +/- sqrt(3)

The quadratic formula gives $(4 \pm \sqrt{16-4})/2 = 2 \pm \sqrt{3}$.

6. C - 1

Both values are $1/2$, so the sum is 1.

7. D - 6

$s(3)=15$ and $s(1)=3$; $(15-3)/(3-1)=6$.

8. A - 3

The middle of the five ordered observations is 3.

9. B - $100\sqrt{10}$

$x=10^{2.5}=100\sqrt{10}$.

Answers and explanations (continued)

10. C - (3,4)

$3^2+4^2=25$, so (3,4) is 5 units from the origin.

11. B - $6x-4$

Using the power rule, $f'(x)=6x-4$.

12. A - $3/10$

$(3/5)(2/4)=6/20=3/10$.

13. B - 40

$(x+y)^2 - 2xy = 64 - 24 = 40$.

14. D - $4/3$

Slope = $(7-(-1))/(8-2)=8/6=4/3$.

15. C - 4

The numerator is $(2+h)^2-(2-h)^2=8h$; dividing by $2h$ gives 4.

16. D - $1/9$

Four ordered pairs sum to 9 out of 36, giving $1/9$.

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