ADVANCED OLYMPIAD FOUNDATION

MODEL QUESTION PAPER

International Mathematics Olympiad

CLASS:9TH

Time Duration: 1 Hour

IMO

Total Marks: 60

Instructions:

- Each question carries 2 marks.
- Answer all questions.
- There is no negative marking.

Section A:

Algebra (10 Questions, 20 Marks)

1. Solve for \(x \) in the equation \(2x + 5 = 15 \).
   a) 5
   b) 7
   c) 8
   d) 10
   Answer: a) 5

2. Simplify: \(3x^2 - 4x + 1 \) when \(x = 2 \).
   a) 5
   b) 9
   c) 11
   d) 13
   Answer: b) 9

3. Factorize: \(x^2 + 6x + 9 \).
   a) \((x + 3)^2 \)
   b) \((x - 3)^2 \)
   c) \((x + 2)(x + 4) \)
   d) \((x - 2)(x - 4) \)
   Answer: a) \((x + 3)^2 \)

4. Solve the inequality: \(2x - 3 < 5 \).
   a) \(x < 4 \)
   b) \(x > 4 \)
   c) \(x < 1 \)
   d) \(x > 1 \)
   Answer: a) \(x < 4 \)

5. If \(a + b = 10 \) and \(ab = 24 \), find \(a^2 + b^2 \).

a) 76
b) 80
c) 84
d) 88
Answer: c) 84

6. Solve the equation: $3^{x+1} = 27$.
a) 1
b) 2
c) 3
d) 4
Answer: b) 2

7. Expand: $(x - 2)(x + 3)$.
a) $x^2 - x - 6$
b) $x^2 + x - 6$
c) $x^2 - x + 6$
d) $x^2 + x + 6$
Answer: a) $x^2 + x - 6$

8. Simplify: $\frac{3x^2 - 5x + 2}{x - 1}$.
a) $3x - 2$
b) $3x - 1$
c) $3x + 2$
d) $3x + 1$
Answer: a) $3x - 2$

9. Solve for x in the equation $\frac{x}{3} = 7$.
a) 14
b) 17
c) 21
d) 24
Answer: c) 21

10. If $x - y = 5$ and $x + y = 9$, find x and y.
a) $x = 7, y = 2$
b) $x = 6, y = 1$
c) $x = 8, y = 3$
d) $x = 5, y = 0$
Answer: a) $x = 7, y = 2$

Section B:

Geometry (10 Questions, 20 Marks)

11. Find the perimeter of a rectangle with length 12 cm and width 8 cm.
a) 32 cm

b) 40 cm
c) 48 cm
d) 56 cm
Answer: b) 40 cm

12. Calculate the area of a circle with radius \(5 \) cm.
a) \(25\pi \) sq cm
b) \(50\pi \) sq cm
c) \(75\pi \) sq cm
d) \(100\pi \) sq cm
Answer: a) \(25\pi \) sq cm

13. What is the sum of the interior angles of a pentagon?
a) 360 degrees
b) 450 degrees
c) 540 degrees
d) 720 degrees
Answer: c) 540 degrees

14. Calculate the volume of a cylinder with radius \(3 \) cm and height \(8 \) cm.
a) \(72\pi \) cubic cm
b) \(108\pi \) cubic cm
c) \(144\pi \) cubic cm
d) \(216\pi \) cubic cm
Answer: b) \(108\pi \) cubic cm

15. Find the area of a triangle with base \(10 \) cm and height \(12 \) cm.
a) 60 sq cm
b) 72 sq cm
c) 80 sq cm
d) 96 sq cm
Answer: b) 60 sq cm

16. Calculate the surface area of a rectangular prism with dimensions \(4 \) cm, \(5 \) cm, and \(6 \) cm.
a) 92 sq cm
b) 104 sq cm
c) 120 sq cm
d) 156 sq cm
Answer: c) 148 sq cm

17. What is the perimeter of a regular hexagon with each side measuring \(7 \) cm?
a) 28 cm
b) 35 cm
c) 42 cm
d) 49 cm

Answer: c) 42 cm

18. Calculate the area of a trapezoid with bases \(6 \) cm and \(10 \) cm, and height \(8 \) cm.
a) 56 sq cm
b) 64 sq cm
c) 72 sq cm
d) 80 sq cm
Answer: b) 64 sq cm

19. Find the circumference of a semicircle with diameter \(12 \) cm.
a) \(6\pi \) cm
b) \(9\pi \) cm
c) \(12\pi \) cm
d) \(18\pi \) cm
Answer: c) \(12\pi \) cm

20. Calculate the area of a rhombus with diagonals \(12 \) cm and \(16 \) cm.
a) 72 sq cm
b) 96 sq cm
c) 120 sq cm
d) 144 sq cm
Answer: b) 96 sq cm