

1) Simplify:  $(3x + 2)(x - 4) - (x + 2)^2$ .

- A)  $2x^2 - 6x - 8$
- B)  $x^2 - 6x - 8$
- C)  $2x^2 - 8x - 12$
- D)  $x^2 - 8x - 12$

2) Find the solution for  $x: (x+3)(x-5)=0$ .

- A)  $x = -3, 5$
- B)  $x = 3, -5$
- C)  $x = -3, -5$
- D)  $x = 3, 5$

3) Expand:  $(x+2)(2x-3)$ .

- A)  $2x^2 + x - 6$
- B)  $2x^2 - x - 6$
- C)  $2x^2 + 7x - 3$
- D)  $2x^2 - x + 3$

4. Solve the inequality:  $2x - 3 > 5$ .

- A)  $x > 2$
- B)  $x < 4$
- C)  $x > 4$
- D)  $x < 2$

5) Find the solution set for  $|x - 3| < 5$ .

- A)  $-2 < x < 8$
- B)  $-5 < x < 5$
- C)  $-3 < x < 3$
- D)  $-8 < x < 2$

6) Solve for  $x: x^2 - 4x + 3 \leq 0$ .

- A)  $1 \leq x \leq 3$
- B)  $x \leq 1$  or  $x \geq 3$
- C)  $x \geq 1$  or  $x \leq 3$
- D)  $1 \leq x < 3$

7) Find the remainder when  $f(x) = 2x^3 - 3x^2 + 4x - 5$  is divided by  $(x - 2)$ .

- A) -3
- B) 5
- C) -5
- D) 3

8) What is the remainder when  $f(x) = x^4 - 2x^3 + x + 6$  is divided by  $(x + 1)$ ?

- A) 4
- B) 6

- C) 2
- D) -2

9) Determine whether  $(x - 2)$  is a factor of  $f(x) = x^3 - 3x^2 + 2x - 4$ .

- A) Yes
- B) No
- C) Cannot be determined
- D) None of these

10) Find a factor of  $f(x) = x^3 + 2x^2 - x - 2$ .

- A)  $(x - 1)$
- B)  $(x + 1)$
- C)  $(x + 2)$
- D)  $(x - 2)$

11) Simplify:  $\log_3 27 + \log_3 \frac{1}{9}$ .

- A) 0
- B) 1
- C) 2
- D) -1

12) If  $\log_2 x = 3$ , find  $x$ .

- A) 6
- B) 8
- C) 9
- D) 10

13) Simplify:  $(2 + 3i) + (4 - i)$ .

- A)  $6 + 2i$
- B)  $6 - 2i$
- C)  $-2 + 2i$
- D)  $-6 + 2i$

14) Find the product:  $(2 + i)(2 - i)$ .

- A) 5
- B) -5
- C)  $4 + 2i$
- D)  $4 - 2i$

15) Find the coefficient of  $x^2$  in the expansion of  $(2x + 3)^3$ .

- A) 24
- B) 36
- C) 12
- D) 18

## XPERT Mathematics Competition – Sample Exam for Grade 11 and 12

**16) Find the constant term in the expansion of  $(x+2)^4$ .**

- A) 16
- B) 32
- C) 64
- D) 128

**17) Solve the equation:  $2\sin^2(x) - \sin(x) - 1 = 0$**

- A)  $x=0, \pi/2$
- B)  $x=\pi/6, \pi/3$
- C)  $x=\pi/6, 5\pi/6$
- D)  $x=5\pi/6, 3\pi/2$

**18) Find the sum of the first 10 terms of the arithmetic sequence: 3,7,11,...**

- A) 175
- B) 185
- C) 195
- D) 205

**19) What is the sum of the geometric series  $2+4+8+\dots$  up to 6 terms?**

- A) 126
- B) 128
- C) 130
- D) 132

**20) Solve for x:  $2x^3 - 5x^2 + 4x - 1 = 0$  has  $x=1$  as a root. Find the other roots.**

- A)  $x=1, 2$
- B)  $x=-1, 2$
- C)  $x=1, 3$
- D)  $x=-1, 3$

**21) Simplify:  $(1+2i)(3-4i)$ .**

- A)  $11-2i$
- B)  $-11+2i$
- C)  $11+10i$
- D)  $-11-10i$

**22) Find the modulus of the complex number  $3+4i$ .**

- A) 5
- B) 7
- C) 25
- D) 4

**23) Evaluate:  $\sum_{n=1}^5 (2n - 1)$ .**

- A) 15
- B) 25

- C) 10
- D) 30

**24) How many ways can 5 students sit in a row of 5 chairs?**

- A) 20
- B) 60
- C) 120
- D) 24

**25) A committee of 3 people is to be selected from a group of 7. How many different committees can be formed?**

- A) 35
- B) 21
- C) 42
- D) 49

**26) Solve for x:  $e^{2x} - 5e^x + 6 = 0$ .**

- A)  $x=\ln(2), \ln(3)$
- B)  $x=\ln(3), \ln(5)$
- C)  $x=2, 3$
- D)  $x=0, 1$

**27) Find the area of a triangle with vertices at  $(0,0), (4,0), (4,3)$ .**

- A) 6
- B) 8
- C) 12
- D) 10

**28) Solve the inequality:  $x^2 - 4x + 3 > 0$ .**

- A)  $x < 1$  or  $x > 3$
- B)  $x > 1$  and  $x < 3$
- C)  $x < 1$  and  $x > 3$
- D)  $x > 1$  or  $x < 3$

**29) Simplify:  $\log_5(25) - \log_5(5)$ .**

- A) 0
- B) 1
- C) 2
- D) 3

**30) Solve for x:  $x^3 + 2x^2 - x - 2 = 0$ .**

- A)  $x=-2, 1, -1$
- B)  $x=2, -1, 1$
- C)  $x=-2, -1, 1$
- D)  $x=-2, 1, 2$