

# CHALLENGING FACTORIZATION QUESTIONS

CANSU OLCE

A STAR MATHS ([www.astarmaths.com.au](http://www.astarmaths.com.au))

1. Factorise  $3x^2 - 4x$ .

2. Factorise  $6x^2y - 8x^3y^2$ .

3. Factorise  $(x - y)x - x + y$ .

4. Factorise  $4x + 4y - ax - ay$

5. Factorise  $(a - 3)(a + 3) - 3(a - 3)$ .

6. Factorise  $2(a - 1) - (a - 1)^2$ .

7.  $a + b = 6$   
 $a^2 + ab + 6b = ?$

8.  $xy + yz = 4$   
 $x + z = 2$   
Find  $x + y + z$ .

9. Factorise  $x(x - y) - x^2(y - x)$ .

10. Factorise  $4x^2 - 9$ .

11.  $201^2 - 199^2 = 4m$   
 $m = ?$

12.  $4x^2 - y^2 = 7$   
 $2x + y = 7$   
Find  $y$ .

13. Factorise  $(x - 2y)^2 - (2x - y)^2$ .

14. Factorise  $1 - (m - 2)^2$ .

15.  $a = 25^2 - 24^2$   
 $a - b = 36$   
 $b = ?$

16. Factorise  $x^4 - y^2$ .

17.  $x - y = y - z = 6$   
Find  $x^2 + z^2 - 2y^2$ .

18.  $x - \frac{1}{x} = 7$   
 $x^2 + \frac{1}{x^2} = ?$

19. Factorise  $x^2 + x(b - a) - ab$ .

20.  $2^x + 2^{-x} = a$   
Find  $2^{2x} + 2^{-2x}$  in terms of  $a$ .

21.  $x = 3 - \sqrt{2}$   
 $x^2 - 6x + 4 = ?$

22.  $x^2 - 2x + 2 = 0$   
 $x + \frac{2}{x} = ?$

23.  $x^2 - 4x - 6 = 0$   
 $x^2 + \frac{36}{x^2} = ?$

24.  $a \times b > 0$   
 $3a^2 + ab = 2b^2$

Find  $\frac{a}{b}$ .

25.  $(x - 3)^2 + (2x - y)^2 = 0$   
 $x + y = ?$

26.  $9^a + 2 \times 6^a + 4^a = 25$   
 $2^a + 3^a = ?$

27. Factorise  $x^2 - 4xy + 4y^2 - 4$ .

28. If  $(x - a)(x + 3) = x^2 + x - 6$ , find  $a$ .

29.  $a + b - c = 4$   
 $ab - bc - ac = -2$   
Find  $a^2 + b^2 + c^2$ .

30. If  $(x - a)(x + 4) + 9 = (x + 1)^2$ , find a.

31. If  $\frac{x^2 - ax - 6}{x - 3} = x + 2$ , find a.

32. Factorise  $x^3 - 8$ .

33.  $x + y = 5$   
 $xy = 4$   
 $x^3 + y^3 = ?$

34.  $x - \frac{1}{x} = 4$   
 $x^3 - \frac{1}{x^3} = ?$

35.  $a = -2$   
 $b = -12$   
 $a^3 - 3a^2b + 3ab^2 - b^3 = ?$

36.  $a(a + b)^2 = 64$   
 $b(a + b)^2 = 61$   
 $a + b = ?$

37. Simplify  $\frac{3a^2 - ab}{3ab - b^2}$

38. Simplify  $\frac{18 - 2a^2}{3a + 9}$

39. Simplify  $\frac{1 - \frac{2}{a}}{2 - a}$

40. Simplify  $\frac{3a + b}{a - 2b} + \frac{4a + 6b}{4b - 2a}$

41. Simplify  $\frac{a^2 + \frac{1}{a}}{a - 1 + \frac{1}{a}}$

42. Simplify  $(\frac{27}{x^2} + x) \div (x^2 + \frac{27}{x})$

43. Simplify  $\frac{x^2+5x-14}{7-x^2-6x} \times \frac{x^3+4x^2-5x}{x^2+3x-10}$

44.  $\frac{1}{a-1} + \frac{2}{a+1} + \frac{4}{a^2-1} = ?$

45.  $a - \sqrt{a} = 5$   
 $a - \frac{5}{\sqrt{a}} = ?$

ANSWER KEY

1.  $x(3x - 4)$
2.  $2x^2y(3 - 4xy)$
3.  $(x - y)(x - 1)$
4.  $(x + y)(4 - a)$
5.  $a(a - 3)$
6.  $(a - 1)(3 - a)$
7. 36
8. 4
9.  $x(x - y)(1 + x)$
10.  $(2x - 3)(2x + 3)$
11. 200
12. 3
13.  $-3(x + y)(x - y)$
14.  $(3 - m)(m - 1)$
15. 13
16.  $(x^2 - y)(x^2 + y)$
17. 72
18. 51
19.  $(x + b)(x - a)$
20.  $a^2 - 2$
21. -3
22. 2
23. 28
24.  $2/3$
25. 9
26. 5
27.  $4(x(x - y) + (y - 1)(y + 1))$
28. 2
29. 20
30. 2
31. 1
32.  $(x - 2)(x^2 + 2x + 4)$
33. 65
34. 76
35.  $10^3$
36. 5
37.  $a/b$
38.  $\frac{2}{3}(3 - a)$
39.  $-\frac{1}{a}$
40. 1
41.  $a + 1$
42.  $1/x$
43.  $-x$
44.  $\frac{3}{a^2-1}$
45. 6