

ALGEBRA – CHALLENGING QUESTIONS

1. Distribute and simplify the following  $3(x + 4) + 2(5 - x)$ .
2. Simplify  $(a + b + c)(a + b - c)$ .
3. Find the value of:  $x^2 - 1/5$  at  $x = -1$ .
4. What is the value of  $x^2 + y^2 - 10$  at  $x = 0$  and  $y = 0$ ?
5. Find the areas of rectangles with the following pairs of monomials as their lengths and breadths respectively:  
 $(p, q)$ ;  $(10m, 5n)$ ;  $(20x^2, 5y^2)$ ;  $(4x, 3x^2)$ ;
6. Find  $(2x + 3y)^2$  using algebraic identities.
7. Find the volume of cuboid whose dimensions are  $(x^2 - 2)$ ;  $(2x + 4)$  and  $(x - 3)$ .
8. Using suitable identities find  $(xy + 3p)^2$ .
9. Use a suitable identity to get each of the following products.
  - a)  $(p - 11)(p + 11)$
  - b)  $(2y + 5)(2y - 5)$
  - c)  $(12a - 9)(12a + 9)$
  - d)  $(2a - 1/2)(2a + 1/2)$
  - e)  $(1.1m - 0.4)(1.1m + 0.4)$
  - f)  $(a^2 + b^2)(-a^2 + b^2)$
  - g)  $(6x - 7)(6x + 7)$
  - h)  $(-a/2 + c/2)(-a/2 - c/2)$
  - i)  $[(p/8) + (3q/4)][(p/8) - (3q/4)]$
  - j)  $(3a + 9b)(3a - 9b)$
  - k)  $2(a - 9)^2$
  - l)  $5(xy - 3z)^2$
  - m)  $(6x + 5y)^2$
  - n)  $36[(3p/2) + (2q/3)]^2$
  - o)  $(x - 0.5y)^2$
  - p)  $(2xy - 5y)^2$
10. Simplify the following
  - (i)  $(x^2 - y^2)^2 + 4x^2y^2$
  - (ii)  $(p + q)^2 - (p - q)^2 + p^2q^2$
  - (iii)  $(2m - 8n)^2 + (2m + 8n)^2$
  - (iv)  $(4m + 5n)^2 + (5m + 4n)^2 + (4m + 5n)(4m - 5n)$
  - (v)  $(.5p - 1.5q)^2 - (.5p + 1.5q)^2 + p^2q^2$

(vi)  $(ab - bc)^2 + 2ab^2c$

(vii)  $(m^2 - n^2m)^2 + 2m^3n^2$

11. Using identities, evaluate.

a)  $91^2$

b)  $89^2$

c)  $202^2$

d)  $999^2$

e)  $1.2^2$

f)  $397 \times 403$

g)  $48 \times 52$

h)  $5.1^2$

(i)  $61^2 - 59^2$

j)  $11.1^2 - 9.9^2$

(k)  $503 \times 504$

(l)  $2.1 \times 2.2$

(m)  $103 \times 98$

(n)  $9.7 \times 9.8$

(o)  $729^2 - 271^2$

12.

1. Numerical coefficient of  $8x^3yz^2$  is \_\_\_\_\_

2. Monomial is a \_\_\_\_\_

3. Write like terms from  $2x^2, 2x, 2x^3, -5x, 11x^4$

4. Write numerical coefficient of  $.3x^3yza^2$

5. Find area of rectangle with sides  $3x$  and  $5y$

6. Factorise  $3xy + 9x^2y^3z$ . Divide  $7x^2y^2z^2 \div 21xyz$

8. Subtract  $5x^2 - 4y^2 + 6y - 3$  from  $7x^2 - 4xy + 8y^2 + 5x - 3y$ .

9. Add  $4y(3y^2 + 5y - 7)$  and  $2(y^3 - 4y^2 + 5)$

10. Simplify  $(a + b)(2a - 3b + c) - (2a - 3b)c$ .

11. Simplify  $(a + b + c)(a + b - c)$

12. find the products. (i)  $(2a^2 + 9)(2a^2 + 5)$  (ii)  $(0.4p - 0.5q)^2$

13. Simplify.  $(m^2 - n^2m)^2 + 2m^3n^2$

14. Evaluate (i)  $998^2$  (ii)  $297 \times 303$  (iii)  $(1.02)^2 - (0.98)^2$

15. Find the value of  $x^2 + y^2$  if  $x + y = 12$  and  $xy = 14$

16. Find the value using algebraic formula i]  $93 \times 94$  ii]  $7042$

17. Find value of  $x^2 + y^2$  if  $x = 3, Y = -3$ .

18. By division show that  $x-1$  is factor of  $x^3-1$
19. Factorize:  $25-a^2-b^2-2ab$
20. Subtract:  $3a(a+b+c) - 2b(a-b+c)$  from  $4c(-a+b+c)$
21. If  $(x + 1/x) = 4$ , Find the value of  $(x^2 + 1/x^2)$  and  $(x^4 + 1/x^4)$
22. If  $(x - 1/x) = 3$ . Find the value of  $(x^3 + 1/x^3)$
23. Find the remainder obtained by dividing  $x^3 + 3x^2 - 5x + 4$  by  $x + 1$
24. Evaluate using algebraic identities  $(54)^2, (78)^2, (999)^2$
25. . If  $x - y = 7$ ,  $xy = 9$  Find the value of  $x^2 + Y^2$
26. If  $x + y = 12$ ,  $xy = 27$  Find the value of  $x^3 + Y^3$
27. If  $a^2 + b^2 + c^2 = 20$ ,  $a + b + c = 6$  find  $ab + bc + ca$
28. If  $(x^2 + 1/x^2) = 83$ . find  $(x^3 - 1/x^3)$
29. What must be subtracted from  $4p^2 - 2pq - 6q^2 - r + 5$  to get  $-p^2 + pq - 8q^2 - 2r + 5$
30. Divide (i)  $x^3 - 1$  by  $x - 1$  (ii)  $7 + 15x - 13x^2 + 5x^3$  by  $4 - 3x + x^2$
31. Evaluate (i)  $1.5^3 - 0.93 - 0.63$  (ii)  $(a - b)^3 + (a + b)^3$  (iii)  $(x + 2y - 3z)^2 + (x - 2y + 3z)^2$
32. . If  $(x^4 + 1/x^4) = 47$  find the value of  $(x^3 + 1/x^3)$
33. Find the product of  
 (i)  $(x^4 + 1/x^4)$  and  $(x + 1/x)$   
 (ii)  $(2x^2 + 3x - 7)(3x^2 - 5x - 4)$
34. Two adjacent side of a rectangle are  $5x^2 - 3y^2$  and  $x^2 - 2xy$  Find its perimeter
35. The perimeter of of a triangle is  $6p^2 - 4p + 9$  and two of its adjacent side are  $p^2 - 2p + 1$  and  $3p^2 - 5p + 3$ . Find third side of triangle.