MATHS

BOOKS - NAND LAL PUBLICATION

ALGEBRAIC EXPRESSIONS AND IDENTITIES

Example

1. Subtract $5ab - 7a - 4b$ from $9ab - 8a + 5b$

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Try These

1. Find the value of the expression $2y - 5,$ for the given values of y i.e., $y = 2, 5 - 3, 0, \frac{5}{2}, \frac{-7}{3}$

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2. Give five examples of expressions containing one variable and five examples of expression containing two variables.

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3. Show on the number line $x, x - 4, 2x + 1, 3x - 2.$

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4. Classify the following polynomials as monomials, binomials, trinomials $-x+5, x+y+z, y+z+100, ab-ac, 117$

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5. Construct:

3 binomials with only x as a varialble.

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6. Construct:

3 binomials with x and y as variables.

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7. Construct:

3 monomials with x and y as variables.

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8. Construct:

2 polynomials with 4 or more terms.

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9. Write two terms which are like

7xy

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10. Write two terms which are like

$4mn^2$

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11. Write two terms which are like :

2l.

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12. Can you think of two more such situations., where we may need to multiply algebraic compressions ?

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13. Find $4x \times 5y \times 7z$

First find $4x \times 5y$ and multiple it by 7z

or first find $5y \times 7z$ and multiply it by 4x

Is the result the same ? What do oyu observe ?

Does the order in which you carry out the multiplication matter ?

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14. Obtain the product of

$2x(3x + 5xy)$

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15. Obtain the product of

$a^2(2ab - 5c)$

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16. Find the product:

$\left(4p^2 + 5p + 7\right) \times 3p.$

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17. Verify identify(IV) for a =2,b=3,x=5.

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18. Consider,the special case of identity (iv) with a=b,what do you get?Is it related to Identity(i)?

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19. Consider,the special case of identity (iv) with a=-c and b = -c.What do you get ?Is it related to Identity(ii)?

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20. Consider the special case of identity(iv) with b=-a.What do you get ?Is it related to identity(iii)?

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Exercise 9 1

1. Identify the terms, their coefficients for each of the expression.

$5xyz^2 - 3zy.$

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2. Identify the terms, their coefficients for each of the following expressions: $1 + x + x^2$

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3. Identify the terms, their coefficients for each of the following expressions: $4x^2y^2 - 4x^2y^2z^2 + z^2$

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4. Identify the terms, their coefficients for each of the following expressions: 3 – pq + qr – rp

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5. Identify the terms, their coefficients for each of the following expressions: $\frac{x}{2} + \frac{y}{2} - xy$

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6. Identify the terms, their coefficients for each of the following expressions: 0.3a – 0.6ab + 0.5b

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7. Add the following: ab – bc, bc – ca, ca – ab

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8. Add the following: a – b + ab, b – c + bc, c – a + ac

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9. Classify the polynomials as monomlals, binomials, trinomials.

Whish polynomials do not fit in any these three categories ?

Add the

$2p^2q^2 - 3pq + 4, 5 + 7pq - 3p^2q^2$

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10. Classify the polynomials as monomlals, binomials, trinomials. Whish polynomials do not fit in any these three categories ?

Add the

$l^2 + m^2, n^2, n^2 + l^2, 2lm + 2mn + 2nl$

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11. Subtract 4a – 7ab + 3b + 12 from 12a – 9ab + 5b – 3

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12. Subtact $3xy + 5yz - 7x$ from $5xy - 2yz - 2zx + 10xyz$

solving using column method, we have.

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13. Subtract $4p^2q - 3pq + 5pq^2 - 8p + 7q - 10$ from $18 - 3p - 11q + 5pq - 2pq^2 + 5p^2q$

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Exercise 9 2

1. Find the product of the following pairs of monomials: 4, 7p

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2. Find the product of the following pairs of monomials.

4,3p

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3. Find the product of the following pairs of monomials: – 4p, 7pq

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4. Find the product of the following pairs of monomials: $4p^3$, – 3p

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5. Find the product of the following pairs of monomials: 4p, 0

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6. Find the areas of rectangles with the following pairs of monomials as their lengths and breadths espectively. $(p, q), (10m, 5n), (20x^2, 5y^2), (4x, 3x^2), (3mn, 4np)$

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7. Find the areas of rectangles with the following pairs of monomials as their lengths and breadths espectively. $(p, q), (10m, 5n), (20x^2, 5y^2), (4x, 3x^2), (3mn, 4np)$

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8. Find the areas of rectangles with the following pairs of monomials as their lengths and breadths espectively. $(p, q), (10m, 5n), (20x^2, 5y^2), (4x, 3x^2), (3mn, 4np)$

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9. Find the areas of rectangles with the following pairs of monomials as their lengths and breadths espectively. $(p, q), (10m, 5n), \left(20x^2, 5y^2\right), \left(4x, 3x^2\right), (3mn, 4np)$

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10. Find the areas of rectangles with the following pairs of monomials as their lengths and breadths espectively. $(p, q), (10m, 5n), \left(20x^2, 5y^2\right), \left(4x, 3x^2\right), (3mn, 4np)$

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11. Obtain the volume of rectangular boxes with the following length, breadth and height respectively: $5a$, $3a^2$, $7a^4$

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12. Obtain the volume of rectangular boxes with the following length, breadth and height respectively: 2p, 4q, 8r

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13. Obtain the volume of rectangular boxes with the following length, breadth and height respectively: xy, $2x^2y$, $2xy^2$

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14. Obtain the volume of rectangular boxes with the following length, breadth and height respectively: a, 2b, 3c

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15. Obtain the product of : xy, yz, zx

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16. Obtain the product of : $a, -a^2, a^3$

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17. Obtain the product of : $2, 4y, 8y^2, 16y^3$

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18. Obtain the product of : a, 2b, 3c, 6abc

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19. Obtain the product of : m, – mn, mnp

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Exercise 9 3

1. Carry out the multiplication of the expressions in each of the following pairs : 4p, q + r

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2. Carry out the multiplication of the expressions in each of the following pairs : ab, a – b

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3. Carry out the multiplication of the expressions in each of the following pairs : $a + b$, $7a^2b^2$

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4. Carry out the multiplication of the expressions in each of the following pairs : $a^2 - 9$, $4a$

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5. Carry out the multiplication of the expressions in each of the following pairs : pq + qr + rp, 0

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6. Find the product: $\left(a^2\right) \times \left(2a^{22}\right) \times \left(4a^{26}\right)$

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7. Find the product: $\left(\frac{2}{3}xy\right) \times \left(\frac{-9}{10}x^2y^2\right)$

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8. Find the product: $\left(\frac{10}{3}pq^3\right) \times \left(\frac{6}{5}p^3q\right)$

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9. The product of $x \times x^2 \times x^3 \times x^4$ is :

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10. Simplify : $3x(4x - 5) + 3$ and find its value for $(i)x = 3, (ii)x = \frac{1}{2}$

(i) Put x =3,$we have (ii) Put$x = (1)/(2)`

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11. Siplify $a\left(a^2 + a + 1\right) + 5$ and find its value for (i) $a = 0, (ii)a = 1, (iii)a = -1$

(i) Put a =0, we have

(ii) Put $a = 1,$ we have

(iii) Put $a = -1,$ we have

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12. Add: p (p – q), q (q – r) and r (r – p)

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13. Add: 2x (z – x – y) and 2y (z – y – x)

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14. Subtract: 3l (l – 4 m + 5 n) from 4l (10 n – 3 m + 2 l)

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15. Subtract: $3a\,(a + b + c) - 2b\,(a - b + c)$ from $4c\,(-a + b + c)$

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Exercise 9 4

1. Multiply the binomials : $(2x + 5)$ and $(4x - 3)$

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2. Multiply the binomials : $(y - 8)$ and $(3y - 4)$

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3. Multiply the binomials : (2.5l – 0.5m) and (2.5l + 0.5m)

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4. Multiply the binomials : (a + 3b) and (x + 5)

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5. Multiply the binomials : $\left(2pq + 3q^2\right)$ and $\left(3pq - 2q^2\right)$

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6. Multiply the binomials : $\left(\frac{3}{4}a^2 + 3b^2\right)$ and $4\left(a^2 + \frac{2}{3}b^2\right)$

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7. Find the product : (5 – 2x) (3 + x)

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8. Find the product : (x + 7y) (7x – y)

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9. Find the product : $\left(a^2+b\right)\left(a+b^2\right)$

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10. Find the product : $\left(p^2-q^2\right)(2p+q)$

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11. Simplify : $\left(x^2-5\right)(x+5)+25$

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12. Simplify : $\left(a^2+5\right)\left(b^3+3\right)+5$

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13. Simplify : $\left(t+s^2\right)\left(t^2-s\right)$

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14. Simplify : (a + b) (c – d) + (a – b) (c + d) + 2 (ac + bd)

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15. Simplify : (x + y)(2x + y) + (x + 2y)(x – y)

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16. Simplify

$(x + y)(x^2 + xy + y^2)$

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17. Simplify : (1.5x – 4y)(1.5x + 4y + 3) – 4.5x + 12y

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18. Simplify : (a + b + c)(a + b – c)

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Exercise 9 5

1. Use a suitable identity to get each of the following products :

$(x + 3)(x + 3)$

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2. Use a suitable identity to get each of the following products

: $(2y + 5)(2y + 5)$

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3. Use a suitable identity to get each of the following products

: $(2a - 7)(2a - 7)$

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4. Use a suitable identity to get each of the following products : $\left(3a - \frac{1}{2}\right)\left(3a - \frac{1}{2}\right)$

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5. Use a suitable identity to get each of the following products : (1.1m – 0.4) (1.1m + 0.4)

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6. Use a suitable identity to get each of the following products : $\left(a^2 + b^2\right)\left(-a^2 + b^2\right)$

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7. Use a suitable identity to get each of the following products :

(6x – 7) (6x + 7)

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8. Use a suitable identity to get each of the following products

: (– a + c) (– a + c)

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9. Use a suitable identity to get each of the following products

: $\left(\frac{x}{2}+\frac{3y}{4}\right)\left(\frac{x}{2}+\frac{3y}{4}\right)$

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10. Use a suitable identity to get each of the following products : (7a – 9b) (7a – 9b)

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11. Use the identity $(x + a)(x + b) = x^2 + (a + b)x + ab$ to find the following products: (x + 3) (x + 7)

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12. Use the identity $(x + a)(x + b) = x^2 + (a + b)x + ab$ to find the following products: (4x + 5) (4x + 1)

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13. Use the identity $(x + a)(x + b) = x^2 + (a + b)x + ab$ to find the following products: (4x + 5) (4x – 1)

Watch Video Solution

14. Use the identity $(x + a)(x + b) = x^2 + (a + b)x + ab$ to find the following products: (4x + 5) (4x – 1)

Watch Video Solution

15. Use the identity $(x + a)(x + b) = x^2 + (a + b)x + ab$ to find the following products: (2x + 5y) (2x + 3y)

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16. Use the identity $(x+a)(x+b) = x^2 + (a+b)x + ab$ to find the following products: $\left(2a^2+9\right)\left(2a^2+5\right)$

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17. Use the identity $(x+a)(x+b) = x^2 + (a+b)x + ab$ to find the following products: (xyz – 4) (xyz – 2)

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18. Find the following squares by using the identities : $(b-7)^2$

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19. Find the following squares by using the identities : $(xy + 3z)^2$

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20. Find the following squares by using the identities : $(6x^2 - 5y)^2$

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21. Find the following squares by using the identities : $\left(\frac{2}{3}m + \frac{3}{2}n\right)^2$

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22. Find the squares by using the identities.

$(0.4 - 0.5q)^2$

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23. Find the following squares by using the identities :

$(2xy + 5y)^2$

Watch Video Solution

24. Simplify : $\left(a^2 - b^2\right)^2$

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25. Simplify : $(2x + 5)^2 - (2x - 5)^2$

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26. Simplify : $(7m-8n)^2+(7m+8n)^2$

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27. Simplify : $(4m+5n)^2+(5m+4n)^2$

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28. Simplify

$(2.5p-1.5q)^2-(1.\ 5p-25q)^2$

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29. Simplify : $(ab + bc)^2 - 2ab^2c$

Watch Video Solution

30. Simplify : $\left(m^2 - n^2m\right)^2 + 2m^3n^2$

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31. Show that: $(3x + 7)^2 - 84x = (3x - 7)^2$

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32. Show that: $(9p - 5q)^2 + 180pq = (9p + 5q)^2$

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33. Show that: $\left(\frac{4}{3}m - \frac{3}{4}n\right)^2 + 2mn = \frac{16}{9}m^2 + \frac{9}{16}n^2$

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34. Show that: $(4pq + 3q)^2 - (4pq - 3q)^2 = 48pq^2$

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35. Show that: (a – b) (a + b) + (b – c) (b + c) + (c – a) (c + a) = 0

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36. Using identities, evaluate: 71^2

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37. Using identities, evaluate: 99^2

Watch Video Solution

38. Using identities, evaluate: 102^2

Watch Video Solution

39. Using identities, evaluate: 998^2

Watch Video Solution

40. Using identities, evaluate: 5.2^2

Watch Video Solution

41. Using identities, evaluate: 297×303

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42. Using identities, evaluate: 78×82

Watch Video Solution

43. Using identities, evaluate: 8.9^2

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44. Using identities, evaluate: 10.5×9.5

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45. Using $a^2-b^2=(a+b)(a-b)$, find: 51^2-49^2

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46. Using $a^2-b^2=(a+b)(a-b)$, find: $(1.02)^2-(0.98)^2$

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47. Using $a^2-b^2=(a+b)(a-b)$, find: 153^2-147^2

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48. Using $a^2-b^2=(a+b)(a-b)$, find: $12.1^2-7.9^2$

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49. Using $(x+a)(x+b) = x^2 + (a+b)x + ab$, find:

103×104

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50. Using $(x+a)(x+b) = x^2 + (a+b)x + ab$, find:

5.1×5.2

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51. Using $(x+a)(x+b) = x^2 + (a+b)x + ab$, find:

103×104

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52. Using $(x+a)(x+b) = x^2 + (a+b)x + ab$, find:

5.1×5.2

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Additional Questions For Practice

1. Symbol which can take different values is called a _____

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2. Terms have same literal coefficient with same degree are called _____terms.

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3. Any factor of a non-constant terms of an algebraic expression is called the _____ of the remaining factors of the term.

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4. Term of the expression which has no literal factor is called there _____ terms

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5. Value of the expression $3a\left(a^2-b^2\right)$ at $a=-1$ and $b=-1$ is ___

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6. The product of $3x^3y^3 \times 4x^4 \times 0$ is _____

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7. Answer the multiple choice question

The literal coefficient of $-7x^2y$ is

a. -7

b. x^2y

c. $-x^2y$

d. none

A. -7

B. x^2y

C. $-x^2y$

D. None

Answer:

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8. Answer the multiple choice question

Which of the following algebraic expression is not a polynomial.

a. $\frac{4x^2}{2x} + 3x - 7$

b. $3x \times \frac{1}{x} + 5$

c. $x^2 - 2x + 1$

d. None

A. $\frac{4x^2}{2x} + 3x - 7$

B. $3x \times \frac{1}{x} + 5$

C. $x^2 - 2x + 1$

D. None

Answer:

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9. Answer the multiple choice question

Which of the following expression is not a monomial.

a. $3x + y - z$

b. $2x \times y \times z$

c. $7x^2y^2 \div 3xy$

d. none

A. $3x + y - z$

B. $2x \times y \times z$

C. $7x^2y^2 \div 3xy$

D. None

Answer:

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10. Answer the multiple choice question

Symbol which takes various values in the expression

a. constant

b. polynomial

c. variable

d. none

A. Constant

B. Polynomial

C. Variable

D. None

Answer:

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11. Answer the multiple choice question

$x^2 - 3x + 1$ is a

a. monomial

b. binomial

c. trinomial

d. none

A. monomial

B. binomial

C. trinomial

D. None

Answer:

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12. Answer the multiple choice question

Number of terms in the product of $(x-2)\left(x^2+3x+1\right)$ is

A. 4

B. 5

C. 6

D. None

Answer:

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13. State whether the following statements are true or false.

Equation is also an identity.

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14. State whether the following statements are true or false.

Terms are added to form an expression.

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15. State whether the following statements are true or false.

$(x-y)(x+y)=x^2+y^2$

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16. State whether the following statements are true or false.

product of two factors with same sign is positive.

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17. State whether the following statements are true or false.

Symbol which has fixed value is called a variable.

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18. State whether the following statements are true or false.

$(x + a)(x + b) = x^2 + ab + c(a + b)$

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Additional Questions For Practice Short Answer Type Questions

1. Write an expression having

one term

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2. Write an expression having two terms

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3. Write an expression having Three terms

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4. Write two like terms for each of the which are similar to

$3x^2y$

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5. Write two like terms for each of the which are similar to

$a^3b^2c^5$

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6. Write the numerical coefficient of the temrs of expression

$2x^2 - 7x + 5$

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Additional Questions For Practice Long Answer Type Questions

1. Evaluate $(4p-q)^2-(4p+q)^2$ if $p=-1$ and $q=2$

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2. Verify $(4x+9)^2-144x=(4x-9)^2$

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3. Perimeter of a triangle is $6p^2-5p+10$ and two and sides of the triangle are p^2+p-2 and $2p^2-3p+5$. Find the third side of the triangle.

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4. Adjacent sides of the rectangle are $2x^2 + 10xy + 3y^2$ and $x^2 - 2xy + 1$, find its area.

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5. Simplify the

$(x-1)(x+1)(x^2+1)$

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6. Simplify

$$\frac{41^2 - 9^2}{50}$$

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7. Simplify

$$\left(3x + \frac{1}{2}y\right)(3x + 2z)$$

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Additional Questions For Practice Hots Higher Order Thinking Skill

1. If $x + \frac{1}{x} = 5$ find $x^2 + \frac{1}{x^2}$

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Sample Paper For Practice

1. Fill in the blank

if the coefficient of the term is _____ it is usually omitted.

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2. Fill in the blank

Algebraic expression having _____ terms is called a binomial.

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3. Fill in the blank

$a(b-x)+b(c-a)+c(a-b)=$ _____

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4. Fill in the blank

_____ is an equality which is true for all the values of the variables in the equality.

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5. State whether the following statements are true or false .

Numerical coefficient of $-8xy^3$ is -8

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6. State whether the following statements are true or false .

An equation is true for all the values of variables in it.

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7. State whether the following statements are true or false .

$(a-b)^2 = a^2 + b^2 - 2ab$

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8. State whether the following statements are true or false .

In addition/Subtraction of algebraic expressions, unlike terms are grouped to find the sum/difference.

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9. $(5x+2y)(5x-2y)$ can be simplified using the identity.

a. $(x+b)^2 = a^2 + 2ab + b^2$

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

c. $(a+b)(a-b)=a^2-b^2$

d. none

A. $(x+b)^2=a^2+2ab+b^2$

B. $(x-b)^2=a^2-2ab+b^2$

C. $(a+b)(a-b)=a^2-b^2$

D. None

Answer: C

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10. The number of like terms in the expression.

$-2z^2xy+5xzy^2-xyz^2+5zx^2y-11xz^2y$ is

A. 2

B. 1

C. 3

D. None

Answer: A

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11. Area of the reactangle whose length is $3x^2y^2$ and breadth $2x^3y$ is

A. $6x^6y^3$

B. $6x^9y^2$

C. $5x^6y^3$

D. None

Answer: A

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12. The middle term of the expression $(2a - 3b)^2$ is

A. $4a^2$

B. $9b^2$

C. $-12ab$

D. None

Answer: C

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13. Construct the following polynomials

A monomial with variable lmn

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14. Construct the following polynomials

A binomial with variable p and q

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15. Construct the following polynomials

A trinomial with variable y

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16. Construct the following polynomials

Polynomial with four terms having a and b as variables

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17. Solve the following identities and find the missing terms.

$58^2 - 42^2 =$ _____ $\times$ _____= _____

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18. Solve the following identities and find the missing terms.

`(30 + 7) (30 -7) =_____

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19. Solve the following identities and find the missing terms.

$(6x - 5y)^2 = \_\_\_\_\_ - 2(6x)(5y) + 25y^2 = \_\_\_\_\_$

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20. Solve the following identities and find the missing terms.

$(x + 7)(x + 5) = x^2 + x(7 + 5) + \ = \_\_\_\_\_$

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21. Find two monomials with positive integer coefficients whose product is the given monomial

$3xyz$

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22. Find two monomials with positive integer coefficients whose product is the given monomial

$2ab^2c$

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23. Evaluate $196m^2 - 56mn + 4n^2$. Using the identity, if $m = 1, n = -1$

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24. What should be the value of x, if $3p^2 - p - x = 0$ for $p = -2$

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25. Subtract $8x(x-y)$ from $3x(x+y)-6y(x-y)$

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26. Verify

$(a+b+c)\left(a^2+b^2+c^2-ab-bc-ca\right)=a^3+b^2+c^2-3abc$

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27. Add

$x^2y(y+z)+y^2z(y-z)$ and $z^2y(y-z)-yz\left(x^2+y^2\right)$

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