



MATHS

NCERT - NCERT MATHEMATICS(ENGLISH)

ALGEBRAIC EXPRESSIONS AND IDENTITIES

Solved Examples

1. Simplify the expressions and evaluate them as directed: (i)

$$x(x - 3) + 2 \text{ for } x = 1 \text{ (ii) } 3y(2y - 7) - 3(y - 4) - 63 \text{ for } y = 2$$

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2. Multiply (i) $(x - 4)$ and $(2x + 3)$ (ii) $(x - y)$ and $(3x + 5y)$

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3. Multiply (i) $(a + 7)$ and $(b - 5)$ (ii) $(a^2 + 2b^2)$ and $(5a - 3b)$

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4. Add: $7xy + 5yz - 3zx$, $4yz + 9zx - 4y$, $-3xz + 5x - 2xy$

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5. Add (i) $5m(3 - m)$ and $6m^2 - 13m - 13m$ (ii)
 $4y(3y^2 + 5y - 7)$ and $2(y^3 - 4y^2 + 5)$

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6. Subtract $3pq(p - q)$ from $2pq(p + q)$

A. $-3p^2q + 5pq^2$

B. $-p^2q + 5pq^2$

C. $-p^2q + 5p^2q^2$

D. $p^2q - 5pq^2$

Answer: B



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



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8. Complete the table for area of a rectangle with given length and breadth.



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9. Find the volume of each rectangular box with given length, breadth and height.



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10. Using the Identity (I), find (i) $(2x + 3y)^2$ (ii) 103^2



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



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12. Using Identity find (i) $\left(\frac{3}{2}(m) + \frac{2}{3}(n)\right)\left(\frac{3}{2}(m) - \frac{2}{3}(n)\right)$ (ii) $983^2 - 17^2$ (iii) 194×206



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13. Using Identity find (i) $(4p - 3q)^2$ (ii) $(49)^2$

A. (i) $19p^2 + 9q^2 - 24pq$

(ii) 2481

B. (i) $16p^2 + 9q^2 - 24pq$

(ii) 2401

C. (i) $6p^2 + 8q^2 - 24pq$

(ii) 2501

D. (i) $10p^2 + 9q^2 - 24pq$

(ii) 2401

Answer: B



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Exercise 9 5

1. Simplify.

(i) $(a^2 - b^2)^2$

$$(ii) (2x + 5)^2 - (2x - 5)^2$$

$$(iii) (7m - 8n)^2 + (7m + 8n)^2 \quad (iii) (4m + 5n)^2 + (5m + 4n)^2 \quad (iv)$$

$$(2.5p - 1.5q)^2 - (1.5p - 2.5q)^2 \quad (v) \quad (ab + ba)^2 - 2ab^2c \quad (vi)$$

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



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

$$(x + 3)(x + 3) \quad (ii) (2y + 5)(2y + 5) \quad (iii) (2a - 7)(2a - 7) \quad (iv)$$

$$\left((3a) - \frac{1}{2} \right) \left((3a) - \frac{1}{2} \right) \quad (v) \quad (1.1m - 0.4)(1.1m + 04) \quad (vi)$$

$$(a^2 + b^2)(-a^2 + b^2) \quad (vii) (6x - 7)(6x + 7) \quad (viii) (-a + c)(-a + c)$$

$$(viii) \left(\frac{x}{2} + \frac{3y}{4} \right) \left(\frac{x}{2} + \frac{3y}{4} \right) \quad (ix) (7a - 9b)(7a - 9b)$$



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3. Find the following squares by using the identities. (i) $(b - 7)^2$ (ii)

$$(xy + 3z)^2 \quad (iii) (6x^2 - 5y)^2 \quad (iv) \left(\frac{2}{3}(m) + \frac{3}{2}(n) \right)^2 \quad (v) (0.4p - 0.5q)^2$$

$$(vi) (2xy + 5y)^2$$



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4. Use the identity $(x + a)(x + b) = x^2 + (a + b)x + ab$ to find the following products. (i) $(x + 3)(x + 7)$ (ii) $(4x + 5)(4x + 1)$ (iii) $(4x + 5)(4x + 1)$ (iv) $(4x + 5)(4x - 1)$ (v) $(2x + 5y)(2x + 3y)$ (vi) $(2a^2 + 9)(2a^2 + 5)$ (vii) $(xyz - 4)(xyz - 2)$



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5. Show that. (i) $(3x + 7)^2 - 84x = (3x - 7)^2$ (ii)
 $(9p - 5q)^2 + 180pq = (9p + 5q)^2$ (iii)
 $\left(\frac{4}{3}(m) - \frac{3}{4}(n)\right)^2 + 2mn = \frac{16}{9}(m^2) + \frac{9}{16}(n^2)$ (iv)
 $(4pq + 3q)^2 - (4pq - 3q)^2 = 48pq^2$ (v)
 $(a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a) = 0$



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6. Using $a^2 - b^2 = (a + b)(a - b)$, find (i) $51^2 - 49^2$ (ii) $(1.02)^2 - (0.98)^2$ (iii) $153^2 - 147^2$ (iv) $12.1^2 - 7.9^2$

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7. Using identities, evaluate. (i) 71^2 (ii) 99^2 (iii) 102^2 (iv) 998^2 (v) 5.2^2 (vi) 297×303 (vii) 78×82 (viii) 892 (ix) 105×95 Type here in ASCII with maths in back tick:

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8. Using $(x + a)(x + b) = x^2 + (a + b)x + ab$, find (i) 103×104 (ii) 51×52 (iii) 103×98 (iv) 97×98

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1. Find the product. (i) $(5 - 2x)(3 + x)$ (ii) $(x + 7y)(7x - y)$ (iii) $(a^2 + b)(a + b^2)$ (iv) $(p^2 - q^2)(2p + q)$

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2. Simplify.

(i) $(x^2 - 5)(x + 5) + 25$

(ii) $(a^2 + 5)(b^3 + 3) + 5$

(iii) $(t + s^2)(t^2 - s)$

(iv) $(a + b)(c - d) + (9a - b)(c + d) + 2(ac + bd)$

(v) $(x + y)(2x + y) + (x + 2y) + (x + 2y)(x - y)$

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3. Multiply the binomials. (i) $(2x + 5)$ and $(4x - 3)$ (ii)

$(y - 8)$ and $(3y - 4)$ (iii) $(25l - 05m)$ and $(25l + 05m)$ (iv)

$(a + 3b)$ and $(x + 5)$ (v) $(2pq + 3q^2)$ and $(3pq - 2q^2)$ (vi)

$\left(\frac{3}{4}(a^2) + 3b^2\right)$ and $\left((a^2) - \frac{2}{3}(b^2)\right)$

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Exercise 9 2

1. Obtain the volume of rectangular boxes with the following length, breadth and height respectively. (i) $5a, 3a^2, 7a^4$ (ii) $2p, 4q, 8r$ (iii) $xy, 2x^2y, 2xy^2$ (iv) $a, 2b, 3c$

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2. Obtain the product of (i) xy, yz, zx (ii) $a, -a^2, a^3$ (iii) $2, 4y, 8y^2, 16y^3$ (iv) $a, 2b, 3c, 6abc$ (v) $m, -mn, mnp$

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3. Find the product of the following pairs of monomials. (i) $4, 7p$ (ii) $-4p, 7p$ (iii) $-4p, 7pq$ (iv) $4p^3, -3p$ (v) $4p, 0$



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

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5. Complete the table of products.

$\frac{\text{First monomial}}{\text{second monomial}}$	$2x$	$-5y$	$-3x^2$	$-4xy$	$7x^2y$	$-9x^2y^2$
$2x$
$-5y$
$-3x^2$
$-4xy$
$7x^2y$
$-9x^2y^2$

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1. Find the product. (i) $(a^2) \times (2a^{22}) \times (4a^{26})$ (ii) $\left(\frac{2}{3}xy\right) \times \left(\frac{-9}{3}xy\right) \times \left(\frac{-9}{10}x^2y^2\right)$ (iii) $\left(-\frac{10}{3}p^3q\right) \times \left(\frac{6}{5}p^3q\right)$ (iv) $x \times x^2 \times x^3 \times x^4$



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2. Complete the table.



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3. Carry out the multiplication of the expressions in each of the following pairs. (i) $4p, q + r$ (ii) $ab, a - b$ (iii) $a + b, 7a^2b^2$ (iv) $a^2 - 9, 4a$ (v) $pq + qr + rp, 0$



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4. (a) Add: $p(p - q), q(q - r)$ and $r(r - p)$ (l) add: $2x(z - x - y)$ and $2y(z - y - x)$ (w) Subtract:

$$3l(l - 4m + 5n) - 4l(10n - 3m + 2l) \quad \text{(ii)} \quad \text{(d)} \quad \text{Subtract:}$$

$$3a(a + b + c) - 2b(a - b + c) - 4c(-a + b + c)$$

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5. (a) Simplify $3 \times (4x - 5) + 3$ and find its values for (i) $x = 3$ (ii)

$x = \frac{1}{2}$. (j) simplify $a(a^2 + a + 1) + 5$ and find its value for (i) $a = 0$ (ii)

$a = 1$ (iii) $a = -1$

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Exercise 9 1

1. (a) Subtract $4a - 7ab + 3b + 12$ from $12a - 9ab + 5b - 3$

(b) Subtract $3xy + 5yz - 7zx$ from $5xy - 2yz - 2zx + 10xyz$

(c) Subtract $4p^2q - 3pq + 5pq^2 - 8p + 7q - 10$ from

$18 - 3p - 11q + 5pq - 2pq^2 + 5p^2q$

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2. Identify the terms, their coefficients for each of the following expressions.

(i) $5xyz^2 - 3zy$

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

(iii) $4x^2y^2 - 4x^2y^2z^2 + z^2$

(iv) $3 - pq + qr - rp$

(v) $\frac{x}{2} + \frac{y}{2} - xy$

(vi) $0.3a - 0.6ab + 0.5b$



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3. Add the following.

(i) $ab - bc, bc - ca, ca - ab$

(ii) $a - b + ab, b - c + bc, c - a + ac$

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

(iv) $l^2 + m^2, m^2 + n^2, n^2 + l^2, 2lm + 2mn + 2nl$



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4. Classify the following polynomials as monomials, binomials, trinomials.

Which polynomials do not fit in any of these three categories?

$x + y$, 1000 , $x + x^2 + x^3 + x^4$, $7 + y + 5x$, $2y - 3y^2$, $2y - 3y^2 + 4y^3$, $5x$



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