Important Questions Class 8 Maths Chapter 8 Algebraic Expressions and Identities

Question 1. Find the terms and 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) $x/2 + y/2 – xy$

(vi) $0.3a – 0.6ab + 0.5b$

Answer 1. The terms and coefficients are given below,

Terms	Coefficient
(i) $5xyz^2$, $-3zy$	5, -3
(ii) 1, x, x^2	1, 1, 1
(iii) $4x^2y^2$, $-4x^2y^2z^2$, z^2	4, -4, 1
(iv) 3, -pq, qr, -rp	3, -1, 1, -1
(v) x/2, y/2, -xy	1/2, 1/2, -1
(vi) 0.3a, -0.6ab, 0.5b	0.3, -0.6, 0.5

Question 2. Classify the following polynomials as monomials, binomials, and trinomials. Also, state the

polynomials do not fall in any of these three categories?

$x + y$, 1000, $x + x^2 + x^3$, $7 + y + 5x$, $2y – 3y^2$, $2y – 3y^2 + 4y^3$, $5x – 4y + 3xy$, $4z – 15z^2$, $ab + bc + cd + da$, pqr,

$p^2q + pq^2$, $2p + 2q$,

Answer 2. The classified terms are given below,

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Monomials- 1000, pqr

Binomials- $x + y$, $2y – 3y^2$, $4z – 15z^2$, $p^2q + pq^2$, $2p + 2q$

Trinomials- $x + x^2 + x^3$, $7 + y + 5x$, $2y – 3y^2 + 4y^3$, $5x – 4y + 3xy$

Polynomials that do not fall in any of these categories are $x + y$, $x + x^2 + x^3$, $ab + bc + cd + da$

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

Answer 3. (i) $(ab – bc) + (bc – ca) + (ca – ab)$

$= ab – bc + bc – ca + ca – ab$

$= ab-ab-bc+bc-ca+ca$

$= 0$

(ii) $(a – b + ab) + (b – c + bc) + (c – a + ac)$

$= a – b + ab + b – c + bc + c -a +ac$

$= a – a -b + b + ab – c + c + bc + ac$

$= ab + bc + ac$

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

$= 2p^2q^2 – 3pq + 4 + 5 + 7pq – 3p^2q^2$

$= 2p^2q^2 – 3p^2q^2 + 7pq – 3pq + 4 + 5$

$= -1p^2q^2 + 4pq + 9$

$= 4pq + 9 – p^2q^2$

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

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

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

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

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

Question 4. Subtract the following.

(i) 4a – 7ab + 3b + 12 from 12a – 9ab + 5b – 3

(ii 3xy + 5yz – 7zx from 5xy – 2yz – 2zx + 10xyz

(iii) $4p^2q – 3pq + 5pq^2 – 8p + 7q – 10$ from $18 – 3p – 11q + 5pq – 2pq2 + 5p^2q$

Answer 4.

(i) (12a – 9ab + 5b – 3) – (4a – 7ab + 3b + 12)

$= 12a – 9ab + 5b – 3 – 4a + 7ab – 3b – 12$

$= 12a – 4a – 9ab + 7ab + 5b – 3b – 3 – 12$

$= 8a – 2ab + 2b – 15$

(ii) (5xy – 2yz – 2zx + 10xyz) – (3xy + 5yz – 7zx)

$= 5xy – 2yz – 2zx + 10xyz – 3xy – 5yz + 7zx$

$= 5xy – 3xy – 2yz – 5yz – 2zx + 7zx + 10xyz$

$= 2xy – 7yz + 5zx + 10xyz$

(iii) ($18 – 3p – 11q + 5pq – 2pq2 + 5p^2q$) – ($4p^2q – 3pq + 5pq^2 – 8p + 7q – 10$)

$= 18 – 3p – 11q + 5pq – 2pq2 + 5p^2q – 4p^2q + 3pq – 5pq^2 + 8p – 7q + 10$

$= 18 + 10 – 3p + 8p – 11q – 7q + 5pq + 3pq – 2pq2 – 5pq^2 + 5p^2q – 4p^2q$

$= 28 + 5p – 18q + 8pq – 7pq^2 + p^2q$

Question 5. Multiply the following.

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(i) $-7pq^2r^3, -13p^3q^2r$

(ii) $3x^2y^2z^2, 17xyz$

(iii) $15xy^2, 17yz^2$

(iv) $-5a^2bc, 11ab, 13abc^2$

(v) $(pq - 2r), (pq - 2r)$

(vi) $(3/2p^2 + 2/3q^2), (2p^2 - 3q^2)$

Answer 5. (i) $(-7pq^2r^3) \times (-13p^3q^2r)$

$= 91P4\ q4\ r4$

(ii) $(3x^2y^2z^2) \times (17xyz)$

$= 51x^3y^3z^3$

(iii) $(15xy^2) \times (17yz^2)$

$= 255xy^3z^2$

(iv) $(-5a^2bc) \times (11ab) \times (13abc^2)$

$= -715a^4b^3c^3$

(v) $(pq - 2r) \times (pq - 2r)$

$= pq (pq - 2r) - 2r(pq - 2r)$

$= p^2q^2 - 2pqr - 2rpq + 4r^2$

$= p^2q^2 - 4pqr + 4r^2$

(vi) $(3\ p^2 + 2\ q^2) \times (2p^2 - 3q^2)$

$2 \qquad 3$

$= 3p^2 \times 2p^2 - 3\ p^2 \times 3q^2 + 2q^2 \times 2p^2 - 2q^2 \times 3q^2$

$2 \qquad 2 \qquad 3 \qquad 3$

$= 6P4 - 9p^2q^2 + 4q^2p^2 - 6q4$

$2 \quad 2 \quad 3 \quad 3$

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$$= \quad 3P4 - 9p^2q^2 + 4q^2p^2 - 2q4$$

$$2 \qquad 3$$

Question 6. Which term is the like term similar to $24a^2bc$?

(a) $13 \times 8a \times 2b \times c \times a$

(b) $8 \times 3 \times a \times b \times c$

(c) $3 \times 8 \times a \times b \times c \times c$

(d) $3 \times 8 \times a \times b \times b \times c$

Answer 6. Option (a)

Explanation: To find out the similar term as $24a^2bc$, let us find the product of each of the equations,

1. $13 \times 8a \times 2b \times c \times a = 208a^2bc$
2. $8 \times 3 \times a \times b \times c = 24abc$
3. $3 \times 8 \times a \times b \times c \times c = 24abc^2$
4. $3 \times 8 \times a \times b \times b \times c = 24ab^2c$

Hence, we can get that option (a) is correct.

Question 7. Which of the following is an identity?

(a) $(p + q)^2 = p^2 + q^2$

(b) $p^2 – q^2 = (p – q)^2$

(c) $p^2 – q^2 = p^2 + 2pq – q^2$

(d) $(p + q)^2 = p^2 + 2pq + q^2$

Answer 7. Option (d)

Explanation: The equation $(p + q)^2 = p^2 + 2pq + q^2$ follows the first standard algebraic identity

$(a + b)^2 = a^2 + 2ab + b^2$. The rest of the other options do not follow any of the standard identities. Hence option (d) is correct.

Question 8. Fill in the blanks.

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

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(b) The product of two terms with like signs is a _____ term.

(c) The product of two terms with unlike signs is a _____ term.

(d) (a – b) _____ = $a^2 – 2ab + b^2$

(e) $a^2 – b^2 = (a + b)$ _____.

(f) $(a – b)^2$ + _____ = $a^2 – b^2$

(g) $(a + b)^2 – 2ab$ = _____ + _____

(h) The product of two polynomials is a _____

(i) The coefficient in – 37abc is _____.

(j) Number of terms in the expression a2 + bc × d is _____

Answer 8.

(a) ab

As per the standard identity 4, $(x + a) (x + b) = x^2 + (a + b)x + ab$

(b) Positive

(c) Negative

(d) ^2 or $(a – b)^2$

As per standard identity 2, $(a – b)^2 = a^2 – 2ab + b^2$

(e) (a – b)

As per standard identity 3, $(a + b) (a – b) = a^2 – b^2$

(f) $2ab – 2b^2$

Let us solve the equation with x in the blank space. As per identity 2, $(a – b)^2 = a^2 – 2ab + b^2$.

Hence, $a^2 – 2ab + b^2 + x = a^2 – b^2$

$x = a^2 – b^2 – a^2 + 2ab – b^2$

$x = 2ab – 2b^2$

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(g) $a^2 + b^2$

Using Identity 1 $(a + b)^2 = a^2 + 2ab + b^2$,

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

(h) Polynomial

(i) -37

(j) 2

Question 9. Solve the below using correct identities.

(a) $(48)^2$

(b) $181^2 – 19^2$

(c) 497 × 505

(d) 2.07 × 1.93

Answer 9.

(a) $(48)^2$

$= (50 – 2)^2$

As $(a – b)^2 = a^2 – 2ab + b^2$, hence

$(50 – 2)^2 = (50)^2 – 2 \times 50 \times 2 + (2)^2$

$= 2500 – 200 + 4$

$= 2300 + 4$

$= 2304$

(b) As $a^2 – b^2 = (a – b) (a + b)$

$181^2 – 19^2 = (181 – 19) (181 + 19)$

$= 162 \times 200$

$= 32400$

(c) By using the identity (x + a) (x + b) = x2 + (a + b) x + ab

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497 x 505 = (500 – 3) (500 + 5)

= 500^2 + (–3 + 5) × 500 + (–3) (5)

= 250000 + 1000 – 15

= 250985

(d) As (a + b) (a – b) = $a^2 – b^2$

2.07 × 1.93 = (2 + 0.07) (2 – 0.07)

= $2^2 – 0.07^2$

= 3.9951

Question 10. The length of a rectangular box is (x + 9y) and the area is $x^2 + 12xy + 27y^2$. Find the breadth.

Answer 10. Area of a rectangle = length x breadth, hence breadth = area / length.

breadth = $x^2 + 12xy + 27y^2$

(x + 9y)

= $x^2 + 9xy + 3xy + 27y^2$

(x + 9y)

= x (x + 9y) + 3y (x + 9y)

(x + 9y)

breadth = x + 3y

Question 11. With the help of identity (x + a) (x + b) = x^2 + (a + b) x + ab, find the following products.

(a) (x + 3) (x + 7)

(b) (4x + 5) (4x + 1)

(c) (4x – 5) (4x – 1)

(d) (4x + 5) (4x – 1)

(e) (2x + 5y) (2x + 3y)

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(f) $(2a^2+ 9) (2a^2+ 5)$

(g) (xyz – 4) (xyz – 2)

Answer 11.

1. (x + 3) (x + 7)

$= x^2 + (3 + 7) x + (3 \times 7)$

$= x^2 + 10x + 21$

1. (4x + 5) (4x + 1)

$= 16x^2 + (5 + 1) 4x + (5 \times 1)$

$= 16x^2 + 24x + 5$

(c) (4x – 5) (4x – 1)

$= 16x^2 + (– 5 – 1) 4x + (-5 \times -1)$

$= 16x^2 – 24x + 5$

(d) (4x + 5) (4x – 1)

$= 16x^2 + (5 + (– 1))4x + (5 \times (– 1))$

$= 16x^2 + 16x – 5$

(e) (2x + 5y) (2x + 3y)

$= 4x^2 + (5y + 3y)2x + (5y \times 3y)$

$= 4x^2 + 16xy + 15y^2$

(f) $(2a^2+ 9) (2a^2+ 5)$

$= 4a4 + (9 + 5)2a^2 + (9 \times 5)$

$= 4a4 + 28a^2 + 45$

(g) (xyz – 4) (xyz – 2)

$= x^2y^2z^2 + (-4 – 2)xyz + (– 4 \times – 2)$

$= x^2y^2z^2 – 6xyz + 8$

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Question 12. The exponents of the variables in a polynomial are always

(a) Integers

(b) Positive integers

(c) Non-negative integers

(d) Non-positive integers

Answer 12. (c) Non-negative integers

Explanation: A polynomial will have a non-zero coefficient and variables having non-negative integers as exponents. For example : a + b + r + q, 3ab, 5xyz – 10, 2a + 3b + 7z, etc.

Question 13. The product of a binomial and monomial is a

(a) Monomial

(b) Binomial

(c) Trinomial

(d) None of these

Answer 13. (b) Binomial

Explanation: This can be demonstrated through an example below,

$x (y + z) = xy + xz$

This expression contains two terms, x is a monomial and (y + z) is a binomial.

The product of multiplying these terms results in a binomial product xy + xz.

Question 14. Using identities, find products for the below.

(a) 71^2

(b) 99^2

(c) 102^2

(d) 998^2

(e) 5.2^2

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(f) 297 × 303

(g) 78 × 82

(h) 8.9^2

(i) 10.5 × 9.5

Answer 14.

1. $71^2 = (70 + 1)^2$ Identity applied $(a + b)^2 = a^2 + 2ab + b^2$

$= 70^2 + 2(70 \times 1) + 1^2$

$= 4900 + 140 + 1$

$= 5041$

1. $99^2 = (100 - 1)^2$ Identity applied $(a - b)^2 = a^2 - 2ab + b^2$

$= 100^2 - 2(100 \times 1) + 1^2$

$= 10000 - 200 + 1$

$= 9801$

(c) $102^2 = (100 + 2)^2$ Identity applied $(a + b)^2 = a^2 + 2ab + b^2$

$= 100^2 + 2(100 \times 2) + 2^2$

$= 10000 + 400 + 4$

$= 10404$

(d) $998^2 = (1000 - 2)^2$ Identity applied $(a - b)^2 = a^2 - 2ab + b^2$

$= 1000^2 - 2(1000 \times 2) + 2^2$

$= 1000000 - 4000 + 4$

$= 996004$

(e) $5.2^2 = (5 + 0.2)^2$ Identity applied $(a + b)^2 = a^2 + 2ab + b^2$

$= 5^2 + 2(5 \times 0.2) + 0.2^2$

$= 25 + 2 + 0.04$

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= 27.04

(f) 297 × 303 = (300 – 3) (300 + 3) Identity applied (a + b) (a – b) = $a^2 - b^2$

= $300^2 - 3^2$

= 90000 – 9

= 89991

(g) 78 × 82 = (80 – 2) (80 + 2) Identity applied (a + b) (a – b) = $a^2 - b^2$

= $80^2 - 2^2$

= 6400 – 4

= 6396

(h) 8.9^2 = (9.0 – 0.1)^2 Identity applied (a – b)^2 = $a^2 - 2ab + b^2$

= $9.0^2 - 2 (9.0 \times 0.1) + 0.1^2$

= 81 – 1.8 + 0.01

= 79.21

(i) 10.5 x 9.5 = (10 + 0.5) (10 – 0.5) Identity applied (a + b) (a – b) = $a^2 - b^2$

= $10^2 - 0.5^2$

= 100 – 0.25

= 99.75

Question 15. The Coefficient of y in the term −y is

3

(a) – 1

(b) – 3

(c) – 1

3

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(d) 1

3

Answer 15. (c) – 1

3

Explanation: Coefficient is defined as the numerical factor of a term.

Hence, the numerical factor/ coefficient of the term −y is −1

3 3

Question 16.Obtain the volume of rectangular boxes with the following length, breadth and height

respectively.

(a) 5a, 3a², 7a4

(b) 2p, 4q, 8r

(c) xy, 2x²y, 2xy²

(d) a, 2b, 3c

Answer 16. The volume of a rectangular box is the product of its length,

breadth and height, i.e Volume = length x breadth x height.

Volumes are calculated as below,

(a) length = 5a, breadth = 3a², height = 7a4

Volume = 5a x 3a² x 7a4

= 105a7

(b) length = 2p, breadth = 4q, height = 8r

Volume = 2p x 4q x 8r

= 64pqr

(c) length = xy, breadth = 2x²y, height = 2xy²

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Volume = $xy \times 2x^2y \times 2xy^2$

= 4x4y4

(d) length = a, breadth = 2b, height = 3c

Volume = a x 2b x 3c

= 6abc

Question 17. State whether the following are True (T) or False (F):

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

(b) $(a – b)^2 = a^2 – b^2$

(c) $(a + b)(a – b) = a^2 – b^2$

(d) The product of two negative terms is a negative term.

(e) The product of one negative and one positive term is a negative term.

(f) The coefficient of the term $– 6x^2y^2$ is – 6.

(g) $p^2q + q^2r + r^2q$ is a binomial

(h) An equation is true for all values of its variables.

Answer 17.

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

(b) False. $(a – b)^2 = a^2 – 2ab + b^2$

(c) True.

(d) False. The product of two negative terms is positive.

(e) True

(f) True

(g) False. The equation $p^2q + q^2r + r^2q$ consists of three terms; hence it is a trinomial.

(h) False. An equation is not true for all values of its variables. For example : $4x + 2 = 10$ is true, only for $x = 2$.

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Question 18. Show that LHS = RHS for the below equations.

(a) $(3x + 7)^2 – 84x = (3x – 7)^2$

(b) $(9p – 5q)^2 + 180pq = (9p + 5q)^2$

(c) $(4pq + 3q)^2 – (4pq – 3q)^2 = 48pq^2$

(d) (a – b) (a + b) + (b – c) (b + c) + (c – a) (c + a) = 0

Answer 18.

(a) LHS = $(3x + 7)^2 – 84x$

$= (3x)^2 + 2 (3x \times 7) + 7^2 – 84x$

$= 9x^2 + 42x + 49 – 84x$

$= 9x^2 – 42x + 49$

RHS = $(3x – 7)^2$

$= (3x)^2 – 2 (3x \times 7) + 7^2$

$= 9x^2 – 42x + 49$

Hence LHS = RHS

(b) LHS = $(9p – 5q)^2 + 180pq$

$= (9p)^2 – 2 (9p \times 5q) + (5q)^2 + 180pq$

$= 81p^2 + 90pq + 25q^2$

RHS = $(9p + 5q)^2$

$= (9p)^2 + 2 (9p \times 5q) + (5q)^2$

$= 81p^2 + 90pq + 25q^2$

Hence LHS = RHS

(c) LHS = $(4pq + 3q)^2 – (4pq – 3q)^2$

$= (4pq)^2 + 2 (4pq \times 3q) + (3q)^2 – ((4pq)^2 – 2 (4pq \times 3q) + (3q)^2)$

$= 16p^2q^2 + 24pq^2 + 9q^2 – 16p^2q^2 + 24pq^2 – 9q^2$

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= $48pq^2$

RHS = $48pq^2$

Hence LHS = RHS

(d) LHS = $(a – b)(a + b) + (b – c)(b + c) + (c – a)(c + a)$

$= a^2 + ab – ba – b^2 + b^2 + bc – cb – c^2 + c^2 + ca – ac – a^2$

$= 0$

RHS = 0

Hence LHS = RHS

Question 19. Expand the following, using suitable identities.

(a) $(xy + yz)^2$

(b) $(x^2y – xy^2)^2$

(c) $(7x + 5)^2$

(d) $(0.9p – 0.5q)^2$

(e) $(x^2 + y^2) (x^2 – y^2)$

Answer 19.

(a) $(xy + yz)^2$

$= (xy)^2 + 2 (xy \times yz) + (yz)^2$

$= x^2y^2 + 2xy^2z + y^2z^2$

(b) $(x^2y – xy^2)^2$

$= (x^2y)^2 – 2 (x^2y \times xy^2) + (xy^2)^2$

$= x4y^2 – 2x^3y^3 + x^2y4$

(c) $(7x + 5)^2$

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

$= 49x^2 + 70x + 25$

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(d) $(0.9p – 0.5q)^2$

$= (0.9p)^2 – 2 (0.9p \times 0.5q) + (0.5q)^2$

$= 0.81p^2 – 0.9pq + 0.25q^2$

(e) $(x^2 + y^2) (x^2 – y^2)$

$= x4 – x^2y^2 + y^2x^2 – y4$

$= x4 – y4$

Question 20. Select the correct option of volume of a rectangular box with length = 2ab, breadth = 3ac and height = 2ac

(a) $12a^3bc^2$

(b) $12a^3bc$

(c) $12a^2bc$

(d) 2ab +3ac + 2ac

Answer 20. Option (a)

Explanation: The formula for calculating the volume of a rectangular box is

Volume = length x breadth x height

With the length of the input = 2ab, breadth = 3ac and height = 2ac

Volume = 2ab x 3ac x 2ac

$= 12a^3bc^2$

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