8 ALGEBRAIC EXPRESSIONS AND IDENTITIES

TEXT BOOK EXERCISE 8.1

Q. 1. Give five examples of expressions having one variable and having two variables.

Solution. Expressions having one variable :

(i) $2x + 7$ (ii) $y + 8$
(iii) $x^2 + 7$ (iv) $x^2 + 3x + 5$
(v) $y^2 + 3y + 2$

Expressions having two variables :

(i) $7xy - 8$ (ii) $3x + 2y$
(iii) $ax + by + c$ (iv) $8xy^2 + 5$
(v) $-5x + 7xy$

Q. 2. Construct :

(i) Three polynomials with only x as variable

(ii) Three binomials with x and y as variables

(iii) Three monomials with x and y as variables

(iv) Three polynomials with four or more terms

Solution.

(i) Three polynomials with only x as variable
(a) $4x^2 - 4x + 5$ (b) $x^2 + 3x + 5$
(c) $x^3 + 2x^2 - 3x + 5$

(ii) Three binomials with x and y as variables
(a) $3x^2y + 4xy$ (b) $9xy + 6xy^2$
(c) $5xy + 8x^2y$

(iii) Three monomials with x and y as variables
(a) $2xy$ (b) $-9xy$
(c) $8xy$.

(iv) Three polynomials with four or more terms
(a) $2x + y + z + 200$
(b) $2x^3 + 5x^2 + 3x + 18$
(c) $3x^2 + 4xy + y^2 + y + x + 9$

Q. 3. Write two terms which are like to

(i) $7x$ (ii) $3ab$
(iii) $7x^2y$ (iv) $2lm$

Solution.

(i) $3x, -5x$ (ii) $4ab, 7ab$
(iii) $9x^2y, 5x^2y$ (iv) $5lm, 7lm$

Q. 4. Identify the terms, their coefficients for each of the following expressions :

(i) $5xy - 3zy$

(ii) $2 + 2x - 3x^2$

(iii) $4x^2y^2 - 4z^2 + 3xy$

(iv) $ab + bc + abc + 7$

(v) $\dfrac{x}{6} + \dfrac{y}{6} + 2xz$

(vi) $0.3a - 0.5ab$

(vii) $\dfrac{xy}{2} + 7x + \dfrac{3}{2}y$

(viii) $0.4a - 0.6ab + 3b^2$

(ix) $3xy^2 + 5xyz - 6y^2$

Solution. (i) $5xy - 3zy$

Term	$5xy$	$-3zy$
Coefficient	5	-3

(ii) $2 + 2x - 3x^2$

Term	2	$2x$	$-3x^2$
Coefficient	2	2	-3

(iii) $4x^2y^2 - 4z^2 + 3xy$

Term	$4x^2y^2$	$-4z^2$	$3xy$
Coefficient	4	-4	3

(iv) $ab + bc + abc + 7$

Term	ab	bc	abc	7
Coefficient	1	1	1	7

(v) $\dfrac{x}{6} + \dfrac{y}{6} + 2xz$

Term	$\dfrac{x}{6}$	$\dfrac{y}{6}$	$2xz$
Coefficient	$\dfrac{1}{6}$	$\dfrac{1}{6}$	2

(vi) $0.3a - 0.5ab$

Term	$0.3a$	$-0.5ab$
Coefficient	0.3	-0.5

(vii) $\dfrac{xy}{2} + 7x + \dfrac{3}{2}y$

Term	$\dfrac{xy}{2}$	$7x$	$\dfrac{3}{2}y$
Coefficient	$\dfrac{1}{2}$	7	$\dfrac{3}{2}$

(viii) $0.4a - 0.6ab + 3b^2$

Term	$0.4a$	$-0.6ab$	$3b^2$
Coefficient	0.4	-0.6	3

(ix) $3xy^2 + 5xyz - 6y^2$

Term	$3xy^2$	$5xyz$	$-6y^2$
Coefficient	3	5	-6

Q. 5. Classify the following polynomials as monomials, binomials and trinomials. Which polynomials do not fit in any of these three categories ? and why ?

(i) **3x**

(ii) **y**

(iii) **4**

(iv) **3x – 2y**

(v) $\dfrac{y}{2} + z$

(vi) **x + y + 2z**

(vii) **2x – y + 7**

(viii) **a + b + c**

(ix) **x – y + 2z**

(x) **14x²yz**

(xi) **x² – y²**

(xii) **a² + b² + c².**

Solution.

(i) Monomial *(ii)* Monomial

(iii) Monomial *(iv)* Binomial

(v) Binomial *(vi)* Trinomial

(vii) Trinomial *(viii)* Trinomial

(ix) Trinomial *(x)* Monomial

(xi) Binomial *(xii)* Trinomial.

Q. 6. Add the following :

(i) **ab + a²b – 3abc and 4abc – 7a²b + 2ab + 3**

(ii) **x + y + 3z – 2xyz and – 2x + 3y + 4z – 8**

(iii) **x² – y², y² – z², z² – x²**

(iv) **x – y, – y + z, z – x**

(v) **2x²y² – 3xy + 4 and 5 + 7xy – 3x²y²**

(vi) **x² + y² – z², x² – y² + z², – x² + y² + z²**

Solution.

(i)
$$ab + a^2b - 3abc$$
$$+\,2ab - 7a^2b + 4abc + 3$$
$$\overline{\;3ab - 6a^2b + abc \;\; +3\;}\quad \textbf{Ans.}$$

(ii)
$$x + y + 3z - 2xyz$$
$$-\,2x + 3y + 4z \qquad\quad -8$$
$$\overline{\;-x + 4y + 7z - 2xyz - 8\;}\quad \textbf{Ans.}$$

(iii)
$$x^2 - y^2$$
$$y^2 - z^2$$
$$-x^2 \qquad\quad + z^2$$
$$\overline{\;0 + \;\;0\;\; +0 = 0\;}\quad \textbf{Ans.}$$

(iv)
$$x - y$$
$$-y + z$$
$$-x \qquad + z$$
$$\overline{\;0 - 2y + 2z = -2y + 2z\;}\quad \textbf{Ans.}$$

(v)
$$2x^2y^2 - 3xy + 4$$
$$-3x^2y^2 + 7xy + 5$$
$$\overline{\;-x^2y^2 + 4xy + 9\;}\quad \textbf{Ans.}$$

(vi)
$$x^2 + y^2 - z^2$$
$$x^2 - y^2 + z^2$$
$$-x^2 + y^2 + z^2$$
$$\overline{\;x^2 + y^2 + z^2\;}\quad \textbf{Ans.}$$

Q. 7. Subtract

(i) $5x - 3xy + 7y + 18$ from $13x - 7xy - 6y + 8$

(ii) $2lm + 3mm - 8nl$ from $9lm + 7mn + 13nl$

(iii) $ab + bc + ca + abc$ from $3ab - 2bc - 4abc$

(iv) $2x + 3y + 4z + 3xyz$ from $4x - 7xyz$

(v) $0.3x + 0.2y + 2xyz$ from $0.7x + 0.8y - 9xyz$

(vi) $ab + bc - cd + abc$ from $2ab - 2bc + 2cd - 2abc$

Solution.

(i)
$$\begin{array}{r} 13x - 7xy - 6y + 8 \\ 5x - 3xy + 7y + 18 \\ -\quad+\quad-\quad- \\ \hline 8x - 4xy - 13y - 10 \end{array}$$ **Ans.**

(ii)
$$\begin{array}{r} 9lm + 7mn + 13nl \\ 2lm + 3mn - 8nl \\ -\quad-\quad+ \\ \hline 7lm + 4mn + 21nl \end{array}$$ **Ans.**

(iii)
$$\begin{array}{r} 3ab - 2bc \quad\quad - 4abc \\ ab + bc + ca + abc \\ -\quad-\quad-\quad- \\ \hline 2ab - 3bc - ca - 5abc \end{array}$$ **Ans.**

(iv)
$$\begin{array}{r} 4x \quad\quad\quad\quad - 7xyz \\ 2x + 3y + 4z + 3xyz \\ -\quad-\quad-\quad- \\ \hline 2x - 3y - 4z - 10xyz \end{array}$$ **Ans.**

(v)
$$\begin{array}{r} 0.7x + 0.8y - 9xyz \\ 0.3x + 0.2y + 2xyz \\ -\quad-\quad- \\ \hline 0.4x + 0.6y - 11xyz \end{array}$$ **Ans.**

(vi)
$$\begin{array}{r} 2ab - 2bc + 2cd - 2abc \\ ab + bc - cd + abc \\ -\quad-\quad+\quad- \\ \hline ab - 3bc + 3cd - 3abc \end{array}$$ **Ans.**

Q. 8. Subtract the third expression from the sum of first two expressions.

(i) $2ab + bc - cd$, $abc + ab - 2bc$, $- 2bc + 3ab$

(ii) $2x + 3y - 2z$, $x - y + 3xyz$, $4x + 3y - 4z + 7xyz$

(iii) $0.2x + 0.3y + 0.4xy$, $0.8x + 0.7y$, $x + y - 0.6xy$

(iv) $7xy + 3x + 2y - 3z$, $x + y + 2z$, $4xy - x - y + 4z$

(v) $0.3xy + 0.2yz$, $0.4xy + 0.3zx$, $0.2xy + 0.2yz$

(vi) $0.4xyz + 0.3xy^2$, $0.7xyz + 0.2xy^2$, $xyz + 0.4xy^2$

Solution. (i) Firstly, add first two terms

$$\begin{array}{r} 2ab + bc - cd \\ abc + ab - 2bc \\ \hline abc + 3ab - bc - cd \end{array}$$

Now, subtract $- 2bc + 3ab$ from $abc + 3ab - bc - cd$

$$\therefore \begin{array}{r} abc + 3ab - bc - cd \\ 3ab - 2bc \\ -\quad+ \\ \hline abc + \ 0 \ + bc - cd \end{array}$$

$$= abc + bc - cd \ \textbf{Ans.}$$

(ii) Firstly, add first two terms

$$\begin{array}{r} 2x + 3y - 2z \\ x - y + 3xyz \\ \hline 3x + 2y - 2z + 3xyz \end{array}$$

Now, subtract $4x + 3y - 4z + 7xyz$ from $3x + 2y - 2z + 3xyz$

$$\therefore \begin{array}{r} 3x + 2y - 2z + 3xyz \\ 4x + 3y - 4z + 7xyz \\ -\quad-\quad+\quad- \\ \hline -x - y + 2z - 4xyz \end{array}$$ **Ans.**

(iii) Firstly, add first two terms

$$\begin{array}{r} 0.2x + 0.3y + 0.4xy \\ 0.8x + 0.7y \\ \hline 1.0x + 1.0y + 0.4xy \end{array} = x + y + 0.4xy$$

Now, subtract $x + y - 0.6xy$ from $x + y + 0.4xy$

$\therefore$

$$\begin{array}{r} x + y + 0.4xy \\ x + y - 0.6xy \\ -\ -\ + \\ \hline 0 + 0 + 1.0xy = xy \end{array}$$ **Ans.**

(iv) Firstly, add first two terms

$$\begin{array}{r} 7xy + 3x + 2y - 3z \\ x + y + 2z \\ \hline 7xy + 4x + 3y - z \end{array}$$

Now, subtract $4xy - x - y + 4z$ from $7xy + 4x + 3y - z$

$\therefore$

$$\begin{array}{r} 7xy + 4x + 3y - z \\ 4xy - x - y + 4z \\ -\quad +\quad +\quad - \\ \hline 3xy + 5x + 4y - 5z \end{array}$$ **Ans.**

(v) Firstly, add first two terms

$$\begin{array}{r} 0.3xy + 0.2yz \\ 0.4xy \qquad\quad + 0.3zx \\ \hline 0.7xy + 0.2yz + 0.3zx \end{array}$$

Now, subtract $0.2xy + 0.2yz$ from $0.7xy + 0.2yz + 0.3zx$

$\therefore$

$$\begin{array}{r} 0.7xy + 0.2yz + 0.3zx \\ 0.2xy + 0.2yz \\ -\qquad - \\ \hline 0.5xy + 0 + 0.3zx \end{array}$$

$= 0.5xy + 0.3zx$ **Ans.**

(vi) Firstly, add first two terms

$$\begin{array}{r} 0.4xyz + 0.3xy^2 \\ 0.7xyz + 0.2xy^2 \\ \hline 1.1xyz + 0.5xy^2 \end{array}$$

Now, subtract $xyz + 0.4xy^2$ from $1.1xyz + 0.5xy^2$

$\therefore$

$$\begin{array}{r} 1.1xyz + 0.5xy^2 \\ xyz + 0.4xy^2 \\ -\qquad - \\ \hline 0.1xyz + 0.1xy^2 \end{array}$$ **Ans.**

Q. 9. If sides of a triangle are given by expressions, $x^2 - 5x + 6$, $3 - 3x^2 + 7x$ and $11x^2 + 8x - 11$. Find the perimeter of triangle.

Solution. Perimeter of triangle = Sum of three sides.

$$\begin{array}{r} x^2 - 5x + 6 \\ -3x^2 + 7x + 3 \\ 11x^2 + 8x - 11 \\ \hline 9x^2 + 10x - 2 \end{array}$$ **Ans.**

Q. 10. Multiple Choice Questions :

(i) Identify coefficient of y in $7y - 5$.
  (a) 7   (b) -5
  (c) 5   (d) 12.

(ii) Which of following is a monomial ?
  (a) $7x + 5$ (b) $x + y + z$
  (c) $3x^3$ (d) $5x^2 - 7x + 6$.

(iii) Identify the binomial.
  (a) $5x + 2$ (b) $x + x + 1$
  (c) $6z$ (d) $\sqrt{t}$.

(iv) Find the trinomial from following expressions.
  (a) $5xy - 3zy$ (b) $2x - y + 7$
  (c) $x - y + 2z + 4$ (d) $x^3 + 3$.

(v) Out of given expression which are like terms ?
  (a) $7x$ and $7y$ (b) $3x$ and $3x^2$
  (c) x^2 and $3x^2$ (d) $x^3 + 3$.

(vi) Addition of $2a - b$ and $a - 2b$ will give :
  (a) $a - b$ (b) $2a - 2b$
  (c) $3a - 3b$ (d) $a + b$.

(vii) What does given diagram represents.
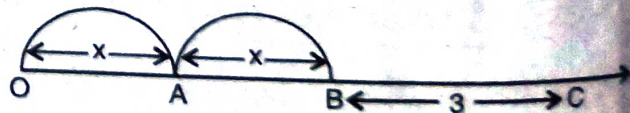
  (a) $x + 3$ (b) $2x + 3$
  (c) $2x - 3$ (d) $x^2 + 3$.

(viii) The expression $3x - 5$ is a :
  (a) Monomial   (b) Binomial
  (c) Trinomial   (d) None of these.

(ix) Identify the terms in expression $-5x + 7xy$.
  (a) -5 and 7   (b) $-5x$ and $7x$
  (c) $-5x$ and $7xy$ (d) $-5x$ and $7y$.

(x) Add $ab - bc$, $bc - ac$, $ac - ab$

(a) 0

(b) $ab + bc + ac$

(c) abc

(d) $a + b + c$.

(xi) Find the value of expression $3x - 5$ at $x = 5$.

(a) 5

(b) 10

(c) 15

(d) 20.

Ans. (i) (a) 7   (ii) (c) $3x^3$

(iii) (a) $5x + 2$ (iv) (b) $2x - y + 7$

(v) (c) x^2 and $3x^2$ (vi) (c) $3a - 3b$

(vii) (b) $2x + 3$ (viii) (b) Binomial

(ix) (c) $- 5x$ and $7xy$

(x) (a) 0   (xi) (b) 10.