

EXERCISE 6.2

Add the following algebraic expressions:

(i) $3a^2b, -4a^2b, 9a^2b$

(ii) $\frac{2}{3}a, \frac{3}{5}a, -\frac{6}{5}a$

(iii) $4xy^2 - 7x^2y, 12x^2y - 6xy^2, -3x^2y + 5xy^2$

(iv) $\frac{3}{2}a - \frac{5}{4}b + \frac{2}{5}c, \frac{2}{3}a - \frac{7}{2}b + \frac{7}{2}c, \frac{5}{3}a + \frac{5}{2}b - \frac{5}{4}c$

(v) $\frac{11}{2}xy + \frac{12}{5}y + \frac{13}{7}x, -\frac{11}{2}y - \frac{12}{5}x - \frac{13}{7}xy$

(vi) $\frac{7}{2}x^3 - \frac{1}{2}x^2 + \frac{5}{3}, \frac{3}{2}x^3 + \frac{7}{4}x^2 - x + \frac{1}{3}, \frac{3}{2}x^2 - \frac{5}{2}x - 2$

Solution:

(i) $3a^2b, -4a^2b, 9a^2b$

Let us add the given expression

$$3a^2b + (-4a^2b) + 9a^2b$$

$$3a^2b - 4a^2b + 9a^2b$$

$$8a^2b$$

(ii) $\frac{2}{3}a, \frac{3}{5}a, -\frac{6}{5}a$

Let us add the given expression

$$\frac{2}{3}a + \frac{3}{5}a + (-\frac{6}{5}a)$$

$$\frac{2}{3}a + \frac{3}{5}a - \frac{6}{5}a$$

Let us take LCM for 3 and 5 which is 15

$$\frac{(2 \times 5)}{(3 \times 5)}a + \frac{(3 \times 3)}{(5 \times 3)}a - \frac{(6 \times 3)}{(5 \times 3)}a$$

$$\frac{10}{15}a + \frac{9}{15}a - \frac{18}{15}a$$

$$\frac{(10a + 9a - 18a)}{15}$$

$$\frac{a}{15}$$

(iii) $4xy^2 - 7x^2y, 12x^2y - 6xy^2, -3x^2y + 5xy^2$

Let us add the given expression

$$4xy^2 - 7x^2y + 12x^2y - 6xy^2 - 3x^2y + 5xy^2$$

Upon rearranging

$$12x^2y - 3x^2y - 7x^2y - 6xy^2 + 5xy^2 + 4xy^2$$

$$3xy^2 + 2x^2y$$

(iv) $\frac{3}{2}a - \frac{5}{4}b + \frac{2}{5}c, \frac{2}{3}a - \frac{7}{2}b + \frac{7}{2}c, \frac{5}{3}a + \frac{5}{2}b - \frac{5}{4}c$

Let us add the given expression

$$\frac{3}{2}a - \frac{5}{4}b + \frac{2}{5}c + \frac{2}{3}a - \frac{7}{2}b + \frac{7}{2}c + \frac{5}{3}a + \frac{5}{2}b - \frac{5}{4}c$$

Upon rearranging

$$\frac{3}{2}a + \frac{2}{3}a + \frac{5}{3}a - \frac{5}{4}b - \frac{7}{2}b + \frac{5}{2}b + \frac{2}{5}c + \frac{7}{2}c - \frac{5}{4}c$$

By taking LCM for (2 and 3 is 6), (4 and 2 is 4), (5, 2 and 4 is 20)

$$(9a+4a+10a)/6 + (-5b-14b+10b)/4 + (8c+70c-25c)/20$$

$$23a/6 - 9b/4 + 53c/20$$

(v) $11/2xy + 12/5y + 13/7x, -11/2y - 12/5x - 13/7xy$

Let us add the given expression

$$11/2xy + 12/5y + 13/7x + -11/2y - 12/5x - 13/7xy$$

Upon rearranging

$$11/2xy - 13/7xy + 13/7x - 12/5x + 12/5y - 11/2y$$

By taking LCM for (2 and 7 is 14), (7 and 5 is 35), (5 and 2 is 10)

$$(11xy-13xy)/14 + (65x-84x)/35 + (24y-55y)/10$$

$$51xy/14 - 19x/35 - 31y/10$$

(vi) $7/2x^3 - 1/2x^2 + 5/3, 3/2x^3 + 7/4x^2 - x + 1/3, 3/2x^2 - 5/2x - 2$

Let us add the given expression

$$7/2x^3 - 1/2x^2 + 5/3 + 3/2x^3 + 7/4x^2 - x + 1/3 + 3/2x^2 - 5/2x - 2$$

Upon rearranging

$$7/2x^3 + 3/2x^3 - 1/2x^2 + 7/4x^2 + 3/2x^2 - x - 5/2x + 5/3 + 1/3 - 2$$

$$10/2x^3 + 11/4x^2 - 7/2x + 0/6$$

$$5x^3 + 11/4x^2 - 7/2x$$

2. Subtract:

(i) $-5xy$ from $12xy$

(ii) $2a^2$ from $-7a^2$

(iii) $2a-b$ from $3a-5b$

(iv) $2x^3 - 4x^2 + 3x + 5$ from $4x^3 + x^2 + x + 6$

(v) $2/3y^3 - 2/7y^2 - 5$ from $1/3y^3 + 5/7y^2 + y - 2$

(vi) $3/2x - 5/4y - 7/2z$ from $2/3x + 3/2y - 4/3z$

(vii) $x^2y - 4/5xy^2 + 4/3xy$ from $2/3x^2y + 3/2xy^2 - 1/3xy$

(viii) $ab/7 - 35/3bc + 6/5ac$ from $3/5bc - 4/5ac$

Solution:

(i) $-5xy$ from $12xy$

Let us subtract the given expression

$$12xy - (-5xy)$$

$$5xy + 12xy$$

$$17xy$$

(ii) $2a^2$ from $-7a^2$

Let us subtract the given expression

$$(-7a^2) - 2a^2$$

$$-7a^2 - 2a^2$$

$$-9a^2$$

(iii) $2a-b$ from $3a-5b$

Let us subtract the given expression

$$(3a - 5b) - (2a - b)$$

$$3a - 5b - 2a + b$$

$$a - 4b$$

(iv) $2x^3 - 4x^2 + 3x + 5$ from $4x^3 + x^2 + x + 6$

Let us subtract the given expression

$$(4x^3 + x^2 + x + 6) - (2x^3 - 4x^2 + 3x + 5)$$

$$4x^3 + x^2 + x + 6 - 2x^3 + 4x^2 - 3x - 5$$

$$2x^3 + 5x^2 - 2x + 1$$

(v) $2/3y^3 - 2/7y^2 - 5$ from $1/3y^3 + 5/7y^2 + y - 2$

Let us subtract the given expression

$$1/3y^3 + 5/7y^2 + y - 2 - 2/3y^3 + 2/7y^2 + 5$$

Upon rearranging

$$1/3y^3 - 2/3y^3 + 5/7y^2 + 2/7y^2 + y - 2 + 5$$

By grouping similar expressions we get,

$$-1/3y^3 + 7/7y^2 + y + 3$$

$$-1/3y^3 + y^2 + y + 3$$

(vi) $3/2x - 5/4y - 7/2z$ from $2/3x + 3/2y - 4/3z$

Let us subtract the given expression

$$2/3x + 3/2y - 4/3z - (3/2x - 5/4y - 7/2z)$$

Upon rearranging

$$2/3x - 3/2x + 3/2y + 5/4y - 4/3z + 7/2z$$

By grouping similar expressions we get,

LCM for (3 and 2 is 6), (2 and 4 is 4), (3 and 2 is 6)

$$(4x-9x)/6 + (6y+5y)/4 + (-8z+21z)/6$$

$$-5x/6 + 11y/4 + 13z/6$$

(vii) $x^2y - 4/5xy^2 + 4/3xy$ from $2/3x^2y + 3/2xy^2 - 1/3xy$

Let us subtract the given expression

$$2/3x^2y + 3/2xy^2 - 1/3xy - (x^2y - 4/5xy^2 + 4/3xy)$$

Upon rearranging

$$2/3x^2y - x^2y + 3/2xy^2 + 4/5xy^2 - 1/3xy - 4/3xy$$

By grouping similar expressions we get,

LCM for (3 and 1 is 3), (2 and 5 is 10), (3 and 3 is 3)
 $-1/3x^2y + 23/10xy^2 - 5/3xy$

(viii) $ab/7 - 35/3bc + 6/5ac$ from $3/5bc - 4/5ac$

Let us subtract the given expression

$$3/5bc - 4/5ac - (ab/7 - 35/3bc + 6/5ac)$$

Upon rearranging

$$3/5bc + 35/3bc - 4/5ac - 6/5ac - ab/7$$

By grouping similar expressions we get,

LCM for (5 and 3 is 15), (5 and 5 is 5)

$$(9bc+175bc)/15 + (-4ac-6ac)/5 - ab/7$$

$$184bc/15 + -10ac/5 - ab/7$$

$$- ab/7 + 184bc/15 - 2ac$$

3. Take away:

(i) $6/5x^2 - 4/5x^3 + 5/6 + 3/2x$ from $x^3/3 - 5/2x^2 + 3/5x + 1/4$

(ii) $5a^2/2 + 3a^3/2 + a/3 - 6/5$ from $1/3a^3 - 3/4a^2 - 5/2$

(iii) $7/4x^3 + 3/5x^2 + 1/2x + 9/2$ from $7/2 - x/3 - x^2/5$

(iv) $y^3/3 + 7/3y^2 + 1/2y + 1/2$ from $1/3 - 5/3y^2$

(v) $2/3ac - 5/7ab + 2/3bc$ from $3/2ab - 7/4ac - 5/6bc$

Solution:

(i) $6/5x^2 - 4/5x^3 + 5/6 + 3/2x$ from $x^3/3 - 5/2x^2 + 3/5x + 1/4$

Let us subtract the given expression

$$1/3x^3 - 5/2x^2 + 3/5x + 1/4 - (6/5x^2 - 4/5x^3 + 5/6 + 3/2x)$$

Upon rearranging

$$1/3x^3 + 4/5x^3 - 5/2x^2 - 6/5x^2 + 3/5x - 3/2x + 1/4 - 5/6$$

By grouping similar expressions we get,

LCM for (3 and 5 is 15), (2 and 5 is 10), (5 and 2 is 10), (4 and 6 is 24)

$$17/15x^3 - 37/10x^2 - 9/10x - 14/24$$

$$17/15x^3 - 37/10x^2 - 9/10x - 7/12$$

(ii) $5a^2/2 + 3a^3/2 + a/3 - 6/5$ from $1/3a^3 - 3/4a^2 - 5/2$

Let us subtract the given expression

$$1/3a^3 - 3/4a^2 - 5/2 - (5/2a^2 + 3/2a^3 + a/3 - 6/5)$$

Upon rearranging

$$1/3a^3 - 3/2a^3 - 3/4a^2 - 5/2a^2 - a/3 - 5/2 + 6/5$$

By grouping similar expressions we get,

LCM for (3 and 2 is 6), (4 and 2 is 4), (2 and 5 is 10)

$$(2a^3 - 9a^3)/6 - (3a^2 + 10a^2)/4 - a/3 + (-25+12)/10$$

$$-7/6a^3 - 13/4a^2 - a/3 - 13/10$$

(iii) $7/4x^3 + 3/5x^2 + 1/2x + 9/2$ from $7/2 - x/3 - x^2/5$

Let us subtract the given expression

$$7/2 - x/3 - 1/5x^2 - (7/4x^3 + 3/5x^2 + 1/2x + 9/2)$$

Upon rearranging

$$-7/4x^3 - 1/5x^2 - 3/5x^2 - x/3 - x/2 + 7/2 - 9/2$$

By grouping similar expressions we get,

LCM for (3 and 2 is 6)

$$-7/4x^3 - 4/5x^2 - (2x-3x)/6 + (7-9)/2$$

$$-7/4x^3 - 4/5x^2 - 5/6x - 1$$

(iv) $y^3/3 + 7/3y^2 + 1/2y + 1/2$ from $1/3 - 5/3y^2$

Let us subtract the given expression

$$1/3 - 5/3y^2 - (1/3y^3 + 7/3y^2 + 1/2y + 1/2)$$

Upon rearranging

$$-1/3y^3 - 5/3y^2 - 7/3y^2 - 1/2y + 1/3 - 1/2$$

By grouping similar expressions we get,

LCM for (3 and 3 is 3), (3 and 2 is 6)

$$-1/3y^3 + (-5y^2 - 7y^2)/3 - 1/2y + (2-3)/6$$

$$-1/3y^3 - 12/3y^2 - 1/2y - 1/6$$

(v) $2/3ac - 5/7ab + 2/3bc$ from $3/2ab - 7/4ac - 5/6bc$

Let us subtract the given expression

$$3/2ab - 7/4ac - 5/6bc - (2/3ac - 5/7ab + 2/3bc)$$

Upon rearranging

$$3/2ab + 5/7ab - 7/4ac - 2/3ac - 5/6bc - 2/3bc$$

By grouping similar expressions we get,

LCM for (2 and 7 is 14), (4 and 3 is 12), (6 and 3 is 6)

$$(21ab+10ab)/14 - (21ac-8ac)/12 - (5bc-4bc)/6$$

$$31/14ab - 29/12ac - 3/2bc$$

4. Subtract $3x - 4y - 7z$ from the sum of $x - 3y + 2z$ and $-4x + 9y - 11z$.

Solution:

The sum of $x - 3y + 2z$ and $-4x + 9y - 11z$ is

$$(x - 3y + 2z) + (-4x + 9y - 11z)$$

Upon rearranging

$$x - 4x - 3y + 9y + 2z - 11z$$

$$-3x + 6y - 9z$$

Now, Let us subtract the given expression from $-3x + 6y - 9z$

$$(-3x + 6y - 9z) - (3x - 4y - 7z)$$

Upon rearranging

$$-3x - 3x + 6y + 4y - 9z + 7z$$

$$-6x + 10y - 2z$$

5. Subtract the sum of $3l - 4m - 7n^2$ and $2l + 3m - 4n^2$ from the sum of $9l + 2m - 3n^2$ and $-3l + m + 4n^2$

Solution:

Sum of $3l - 4m - 7n^2$ and $2l + 3m - 4n^2$

$$3l - 4m - 7n^2 + 2l + 3m - 4n^2$$

Upon rearranging

$$3l + 2l - 4m + 3m - 7n^2 - 4n^2$$

$$5l - m - 11n^2 \dots\dots\dots \text{equation (1)}$$

Sum of $9l + 2m - 3n^2$ and $-3l + m + 4n^2$

$$9l + 2m - 3n^2 + (-3l + m + 4n^2)$$

Upon rearranging

$$9l - 3l + 2m + m - 3n^2 + 4n^2$$

$$6l + 3m + n^2 \dots\dots\dots \text{equation (2)}$$

Let us subtract equation (i) from (ii), we get

$$6l + 3m + n^2 - (5l - m - 11n^2)$$

Upon rearranging

$$6l - 5l + 3m + m + n^2 + 11n^2$$

$$l + 4m + 12n^2$$

6. Subtract the sum of $2x - x^2 + 5$ and $-4x - 3 + 7x^2$ from 5.

Solution:

Sum of $2x - x^2 + 5$ and $-4x - 3 + 7x^2$ is

$$2x - x^2 + 5 + (-4x - 3 + 7x^2)$$

$$2x - x^2 + 5 - 4x - 3 + 7x^2$$

Upon rearranging

$$-x^2 + 7x^2 + 2x - 4x + 5 - 3$$

$$6x^2 - 2x + 2 \dots\dots\dots \text{equation (i)}$$

Let us subtract equation (i) from 5 we get,

$$5 - (6x^2 - 2x + 2)$$

$$5 - 6x^2 + 2x - 2$$

$$3 + 2x - 6x^2$$

7. Simplify each of the following:

(i) $x^2 - 3x + 5 - \frac{1}{2}(3x^2 - 5x + 7)$

(ii) $[5 - 3x + 2y - (2x - y)] - (3x - 7y + 9)$

(iii) $\frac{11}{2}x^2y - \frac{9}{4}xy^2 + \frac{1}{4}xy - \frac{1}{14}y^2x + \frac{1}{15}yx^2 + \frac{1}{2}xy$

(iv) $(\frac{1}{3}y^2 - \frac{4}{7}y + 11) - (\frac{1}{7}y - 3 + 2y^2) - (\frac{2}{7}y - \frac{2}{3}y^2 + 2)$

(v) $-\frac{1}{2}a^2b^2c + \frac{1}{3}ab^2c - \frac{1}{4}abc^2 - \frac{1}{5}cb^2a^2 + \frac{1}{6}cb^2a - \frac{1}{7}c^2ab + \frac{1}{8}ca^2b$

Solution:

(i) $x^2 - 3x + 5 - \frac{1}{2}(3x^2 - 5x + 7)$

Upon rearranging

$$x^2 - \frac{3}{2}x^2 - 3x + \frac{5}{2}x + 5 - \frac{7}{2}$$

By grouping similar expressions we get,

LCM for (1 and 2 is 2)

$$(\frac{2x^2 - 3x^2}{2}) - (\frac{6x + 5x}{2}) + (\frac{10-7}{2})$$

$$-\frac{1}{2}x^2 - \frac{1}{2}x + \frac{3}{2}$$

(ii) $[5 - 3x + 2y - (2x - y)] - (3x - 7y + 9)$

$$5 - 3x + 2y - 2x + y - 3x + 7y - 9$$

Upon rearranging

$$-3x - 2x - 3x + 2y + y + 7y + 5 - 9$$

By grouping similar expressions we get,

$$-8x + 10y - 4$$

(iii) $\frac{11}{2}x^2y - \frac{9}{4}xy^2 + \frac{1}{4}xy - \frac{1}{14}y^2x + \frac{1}{15}yx^2 + \frac{1}{2}xy$

Upon rearranging

$$\frac{11}{2}x^2y + \frac{1}{15}x^2y - \frac{9}{4}xy^2 - \frac{1}{14}xy^2 + \frac{1}{4}xy + \frac{1}{2}xy$$

By grouping similar expressions we get,

LCM for (2 and 15 is 30), (4 and 14 is 56), (4 and 2 is 4)

$$(\frac{165x^2y + 2x^2y}{30}) + (\frac{-126xy^2 - 4xy^2}{56}) + (\frac{xy + 2xy}{4})$$

$$\frac{167}{30}x^2y - \frac{130}{56}xy^2 + \frac{3}{4}xy$$

$$\frac{167}{30}x^2y - \frac{65}{28}xy^2 + \frac{3}{4}xy$$

(iv) $(\frac{1}{3}y^2 - \frac{4}{7}y + 11) - (\frac{1}{7}y - 3 + 2y^2) - (\frac{2}{7}y - \frac{2}{3}y^2 + 2)$

Upon rearranging

$$\frac{1}{3}y^2 - 2y^2 - \frac{2}{3}y^2 - \frac{4}{7}y - \frac{1}{7}y - \frac{2}{7}y + 11 + 3 - 2$$

By grouping similar expressions we get,

LCM for (3, 1 and 3 is 3), (7, 7 and 7 is 7)

$$(\frac{y^2 - 6y^2 + 2y^2}{3}) - (\frac{4y - y - 2y}{7}) + 12$$

$$-\frac{3}{3}y^2 - \frac{7}{7}y + 12$$

$$-y^2 - y + 12$$

(v) $-1/2a^2b^2c + 1/3ab^2c - 1/4abc^2 - 1/5cb^2a + 1/6cb^2a - 1/7c^2ab + 1/8ca^2b$

Upon rearranging

$$-1/2a^2b^2c - 1/5a^2b^2c + 1/3ab^2c + 1/6ab^2c - 1/4abc^2 - 1/7abc^2 + 1/8a^2bc$$

By grouping similar expressions we get,

LCM for (2 and 5 is 10), (3 and 6 is 6), (4 and 7 is 28)

$$-7/10a^2b^2c + 1/2ab^2c - 11/28abc^2 + 1/8a^2bc$$



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