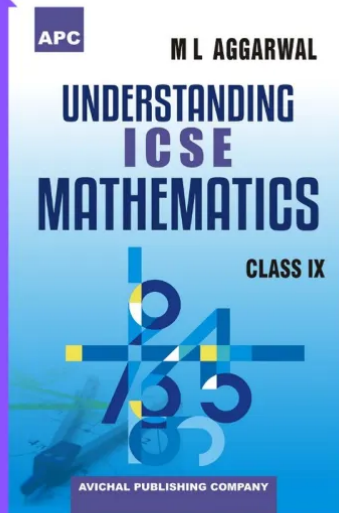


ML Aggarwal Solutions for Class 9 Maths

Chapter 4- Factorization



www.indcareer.com/schools



ML Agrawal Solutions

CLASS 9 MATHS

Chapter 4: Factorization

For any clarifications or questions you can write to info@indcareer.com

Postal Address

IndCareer.com, 52, Shilpa Nagar, Somalwada Nagpur - 440015
Maharashtra, India

WhatsApp: +91 9561 204 888, **Website:** <https://www.indcareer.com> Class 8: Biology
Chapter 6 solutions. Complete Class 8 Biology Chapter 6 Notes.

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

ML Aggarwal Solutions for Class 9 Maths

Chapter 4- Factorization

Class 9: Maths Chapter 4 solutions. Complete Class 9 Maths Chapter 4 Notes.

ML Aggarwal Solutions for Class 9 Maths Chapter 4- Factorization

ML Aggarwal 9th Maths Chapter 4, Class 9 Maths Chapter 4 solutions

Exercise 4.1

Factorise the following (1 to 9):

1. (i) $8xy^3 + 12x^2y^2$

Solution:-

$$8xy^3 + 12x^2y^2$$

Take out common in both terms,

$$\text{Then, } 4xy^2 (2y + 3x)$$

Therefore, HCF of $8xy^3$ and $12x^2y^2$ is $4xy^2$.

(ii) $15ax^3 - 9ax^2$

Solution:-

$$15ax^3 - 9ax^2$$

Take out common in both terms,

$$\text{Then, } 3ax^2 (5x - 3)$$

Therefore, HCF of $15ax^3$ and $9ax^2$ is $3ax^2$.

2.

(i) $21py^2 - 56py$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Solution:-

$$21py^2 - 56py$$

Take out common in both terms,

$$\text{Then, } 7py (3y - 8)$$

Therefore, HCF of $21py^2$ and $56py$ is $7py$.

(ii) $4x^3 - 6x^2$

Solution:-

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

Take out common in both terms,

$$\text{Then, } 2x^2 (2x - 3)$$

Therefore, HCF of $4x^3$ and $6x^2$ is $2x^2$.

3.

(i) $2\pi r^2 - 4\pi r$

Solution:-

$$2\pi r^2 - 4\pi r$$

Take out common in both terms,

$$\text{Then, } 2\pi r (r - 2)$$

Therefore, HCF of $2\pi r^2$ and $4\pi r$ is $2\pi r$.

(ii) $18m + 16n$

Solution:-

$$18m + 16n$$

Take out common in both terms,

$$\text{Then, } 2 (9m + 8n)$$

Therefore, HCF of $18m$ and $16n$ is 2 .

4.

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

(i) $25abc^2 - 15a^2b^2c$

Solution:-

$$25abc^2 - 15a^2b^2c$$

Take out common in both terms,

$$\text{Then, } 5abc(5c - 3ab)$$

Therefore, HCF of $25abc^2$ and $15a^2b^2c$ is $5abc$.

(ii) $28p^2q^2r - 42pq^2r^2$

Solution:-

$$28p^2q^2r - 42pq^2r^2$$

Take out common in both terms,

$$\text{Then, } 14pq^2r(2p - 3r)$$

Therefore, HCF of $28p^2q^2r$ and $42pq^2r^2$ is $14pq^2r$.

5.

(i) $8x^3 - 6x^2 + 10x$

Solution:-

$$8x^3 - 6x^2 + 10x$$

Take out common in both terms,

$$\text{Then, } 2x(4x^2 - 3x + 5)$$

Therefore, HCF of $8x^3$, $6x^2$ and $10x$ is $2x$.

(ii) $14mn + 22m - 62p$

Solution:-

$$14mn + 22m - 62p$$

Take out common in both terms,

$$\text{Then, } 2(7mn + 11m - 31p)$$

Therefore, HCF of $14mn$, $22m$ and $62p$ is 2 .

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

6.

(i) $18p^2q^2 - 24pq^2 + 30p^2q$

Solution:-

$$18p^2q^2 - 24pq^2 + 30p^2q$$

Take out common in both terms,

Then, $6pq (3pq - 4q + 5p)$

Therefore, HCF of $18p^2q^2$, $24pq^2$ and $30p^2q$ is $6pq$.

(ii) $27a^3b^3 - 18a^2b^3 + 75a^3b^2$

Solution:-

$$27a^3b^3 - 18a^2b^3 + 75a^3b^2$$

Take out common in both terms,

Then, $3a^2b^2 (9a - 6b + 25a)$

Therefore, HCF of $27a^3b^3$, $18a^2b^3$ and $75a^3b^2$ is $3a^2b^2$.

7.

(i) $15a (2p - 3q) - 10b (2p - 3q)$

Solution:-

$$15a (2p - 3q) - 10b (2p - 3q)$$

Take out common in both terms,

Then, $5(2p - 3q) [3a - 2b]$

Therefore, HCF of $15a (2p - 3q)$ and $10b (2p - 3q)$ is $5(2p - 3q)$.

(ii) $3a(x^2 + y^2) + 6b (x^2 + y^2)$

Solution:-

$$3a(x^2 + y^2) + 6b (x^2 + y^2)$$

Take out common in all terms,

Then, $3(x^2 + y^2) (a + 2b)$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Therefore, HCF of $3a(x^2 + y^2)$ and $6b(x^2 + y^2)$ is $3(x^2 + y^2)$.

8.

(i) $6(x + 2y)^3 + 8(x + 2y)^2$

Solution:-

$$6(x + 2y)^3 + 8(x + 2y)^2$$

Take out common in all terms,

$$\text{Then, } 2(x + 2y)^2 [3(x + 2y) + 4]$$

Therefore, HCF of $6(x + 2y)^3$ and $8(x + 2y)^2$ is $2(x + 2y)^2$.

(ii) $14(a - 3b)^3 - 21p(a - 3b)$

Solution:-

$$14(a - 3b)^3 - 21p(a - 3b)$$

Take out common in all terms,

$$\text{Then, } 7(a - 3b) [2(a - 3b)^2 - 3p]$$

Therefore, HCF of $14(a - 3b)^3$ and $21p(a - 3b)$ is $7(a - 3b)$.

9.

(i) $10a(2p + q)^3 - 15b(2p + q)^2 + 35(2p + q)$

Solution:-

$$10a(2p + q)^3 - 15b(2p + q)^2 + 35(2p + q)$$

Take out common in all terms,

$$\text{Then, } 5(2p + q) [2a(2p + q)^2 - 3b(2p + q) + 7]$$

Therefore, HCF of $10a(2p + q)^3$, $15b(2p + q)^2$ and $35(2p + q)$ is $5(2p + q)$.

(ii) $x(x^2 + y^2 - z^2) + y(-x^2 - y^2 + z^2) - z(x^2 + y - z^2)$

Solution:-

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

Take out common in all terms,

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Then, $(x^2 + y^2 - z^2) [x - y - z]$

Therefore, HCF of $x(x^2 + y^2 - z^2)$, $y(-x^2 - y^2 + z^2)$ and $z(x^2 + y - z^2)$ is $(x^2 + y^2 - z^2)$

Exercise 4.2

Factorise the following (1 to 13):

1.

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

Solution:-

$$x^2 + xy - x - y$$

Take out common in all terms,

$$x(x + y) - 1(x + y)$$

$$(x + y)(x - 1)$$

(ii) $y^2 - yz - 5y + 5z$

Solution:-

$$y^2 - yz - 5y + 5z$$

Take out common in all terms,

$$y(y - z) - 5(y - z)$$

$$(y - z)(y - 5)$$

2.

(i) $5xy + 7y - 5y^2 - 7x$

Solution:-

$$5xy - 7x - 5y^2 + 7y$$

Take out common in all terms,

$$x(5y - 7) - y(5y - 7)$$

$$(5y - 7)(x - y)$$

(ii) $5p^2 - 8pq - 10p + 16q$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Solution:-

$$5p^2 - 8pq - 10p + 16q$$

Take out common in all terms,

$$p(5p - 8q) - 2(5p - 8q)$$

$$(5p - 8q)(p - 2)$$

3.

(i) $a^2b - ab^2 + 3a - 3b$

Solution:-

$$a^2b - ab^2 + 3a - 3b$$

Take out common in all terms,

$$ab(a - b) + 3(a - b)$$

$$(a - b)(ab + 3)$$

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

Solution:-

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

Take out common in all terms,

$$x^2(x - 3) + 1(x - 3)$$

$$(x - 3)(x^2 + 1)$$

4.

(i) $6xy^2 - 3xy - 10y + 5$

Solution:-

$$6xy^2 - 3xy - 10y + 5$$

Take out common in all terms,

$$3xy(2y - 1) - 5(2y - 1)$$

$$(2y - 1)(3xy - 5)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

(ii) $3ax - 6ay - 8by + 4bx$

Solution:-

$$3ax - 6ay - 8by + 4bx$$

Take out common in all terms,

$$3a(x - 2y) + 4b(x - 2y)$$

$$(x - 2y)(3a + 4b)$$

5.

(i) $1 - a - b + ab$

Solution:-

$$1 - a - b + ab$$

Take out common in all terms,

$$1(1 - a) - b(1 - a)$$

$$(1 - a)(1 - b)$$

(ii) $a(a - 2b - c) + 2bc$

Solution:-

$$a(a - 2b - c) + 2bc$$

Above question can be written as,

$$a^2 - 2ab - ac + 2bc$$

Take out common in all terms,

$$a(a - 2b) - c(a - 2b)$$

$$(a - 2b)(a - c)$$

6.

(i) $x^2 + xy(1 + y) + y^3$

Solution:-

$$x^2 + xy(1 + y) + y^3$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Above question can be written as,

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

Take out common in all terms,

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

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

$$(ii) y^2 - xy(1 - x) - x^3$$

Solution:-

$$y^2 - xy(1 - x) - x^3$$

Above question can be written as,

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

Take out common in all terms,

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

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

7.

$$(i) ab^2 + (a - 1)b - 1$$

Solution:-

$$ab^2 + (a - 1)b - 1$$

Above question can be written as,

$$ab^2 + ab - b - 1$$

Take out common in all terms,

$$ab(b + 1) - 1(b + 1)$$

$$(b + 1)(ab - 1)$$

$$(ii) 2a - 4b - xa + 2bx$$

Solution:-

$$2a - 4b - xa + 2bx$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Take out common in all terms,

$$2(a - 2b) - x(a - 2b)$$

$$(a - 2b)(2 - x)$$

8.

(i) $5ph - 10qk + 2rph - 4qrk$

Solution:-

$$5ph - 10qk + 2rph - 4qrk$$

Re-arranging the given question we get,

$$5ph + 2rph - 10qk - 4qrk$$

Take out common in all terms,

$$ph(5 + 2r) - 2qk(5 + 2r)$$

$$(5 + 2r)(ph - 2qk)$$

(ii) $x^2 - x(a + 2b) + 2ab$

Solution:-

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

Above question can be written as,

$$x^2 - xa - 2xb + 2ab$$

Take out common in all terms,

$$x(x - a) - 2b(x - a)$$

$$(x - a)(x - 2b)$$

9.

(i) $ab(x^2 + y^2) - xy(a^2 + b^2)$

Solution:-

$$ab(x^2 + y^2) - xy(a^2 + b^2)$$

Above question can be written as,

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$abx^2 + aby^2 - xya^2 - xyb^2$$

Re-arranging the above we get,

$$abx^2 - xyb^2 + aby^2 - xya^2$$

Take out common in all terms,

$$bx(ax - by) + ay(by - ax)$$

$$bx(ax - by) - ay(ax - by)$$

$$(ax - by)(bx - ay)$$

$$(ii) (ax + by)^2 + (bx - ay)^2$$

Solution:-

By expanding the give question, we get,

$$(ax)^2 + (by)^2 + 2axby + (bx)^2 + (ay)^2 - 2bxay$$

$$a^2x^2 + b^2y^2 + b^2x^2 + a^2y^2$$

Re-arranging the above we get,

$$a^2x^2 + a^2y^2 + b^2y^2 + b^2x^2$$

Take out common in all terms,

$$a^2(x^2 + y^2) + b^2(x^2 + y^2)$$

$$(x^2 + y^2)(a^2 + b^2)$$

10.

$$(i) a^3 + ab(1 - 2a) - 2b^2$$

Solution:-

$$a^3 + ab(1 - 2a) - 2b^2$$

Above question can be written as,

$$a^3 + ab - 2a^2b - 2b^2$$

Re-arranging the above we get,

$$a^3 - 2a^2b + ab - 2b^2$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Take out common in all terms,

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

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

$$(ii) 3x^2y - 3xy + 12x - 12$$

Solution:-

$$3x^2y - 3xy + 12x - 12$$

Take out common in all terms,

$$3xy(x - 1) + 12(x - 1)$$

$$(x - 1)(3xy + 12)$$

$$11. a^2b + ab^2 - abc - b^2c + axy + bxy$$

Solution:-

$$a^2b + ab^2 - abc - b^2c + axy + bxy$$

Re-arranging the above we get,

$$a^2b - abc + axy + ab^2 - b^2c + bxy$$

Take out common in all terms,

$$a(ab - bc + xy) + b(ab - bc + xy)$$

$$(a + b)(ab - bc + xy)$$

$$12. ax^2 - bx^2 + ay^2 - by^2 + az^2 - bz^2$$

Solution:-

$$ax^2 - bx^2 + ay^2 - by^2 + az^2 - bz^2$$

Re-arranging the above we get,

$$ax^2 + ay^2 + az^2 - bx^2 - by^2 - bz^2$$

Take out common in all terms,

$$a(x^2 + y^2 + z^2) - b(x^2 + y^2 + z^2)$$

$$(x^2 + y^2 + z^2)(a - b)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

13. $x - 1 - (x - 1)^2 + ax - a$

Solution:-

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

By expanding the above we get,

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

$$x - 1 - x^2 - 1 + 2x + ax - a$$

$$2x - x^2 + ax - 2 + x - a$$

Take out common in all terms,

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

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

Exercise 4.3

Factorise the following (1 to 17):

1. $4x^2 - 25y^2$

Solution:-

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$\text{So, } (2x)^2 - (5y)^2$$

$$\text{Then, } (2x + y)(2x - 5y)$$

(ii) $9x^2 - 1$

Solution:-

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$\text{So, } (3x)^2 - 1^2$$

$$\text{Then, } (3x + 1)(3x - 1)$$

2.

(i) $150 - 6a^2$

Solution:-

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$150 - 6a^2$$

Take out common in all terms,

$$6(25 - a^2)$$

$$6(5^2 - a^2)$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$\text{So, } 6(5 + a)(5 - a)$$

$$\text{(ii) } 32x^2 - 18y^2$$

Solution:-

$$32x^2 - 18y^2$$

Take out common in all terms,

$$2(16x^2 - 9y^2)$$

$$2((4x)^2 - (3y)^2)$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$2(4x + 3y)(4x - 3y)$$

3.

$$\text{(ii) } (x - y)^2 - 9$$

Solution:-

$$(x - y)^2 - 9$$

$$(x - y)^2 - 3^2$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$(x - y + 3)(x - y - 3)$$

$$\text{(ii) } 9(x + y)^2 - x^2$$

Solution:-

$$9[(x + y)^2 - x^2]$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$9[(x + y + x)(x + y - x)]$$

$$\text{So, } 9(2x + y)y$$

$$9y(2x + y)$$

4.

(i) $20x^2 - 45y^2$

Solution:-

$$20x^2 - 45y^2$$

Take out common in all terms,

$$5(4x^2 - 9y^2)$$

$$5((2x)^2 - (3y)^2)$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$5(2x + 3y)(2x - 3y)$$

(ii) $9x^2 - 4(y + 2x)^2$

Solution:-

$$9x^2 - 4(y + 2x)^2$$

Above question can be written as,

$$(3x)^2 - [2(y + 2x)]^2$$

$$(3x)^2 - (2y + 4x)^2$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$(3x + 2y + 4x)(3x - 2y - 4x)$$

$$(7x + 2y)(-x - 2y)$$

5.

(i) $2(x - 2y)^2 - 50y^2$

Solution:-

$$2(x - 2y)^2 - 50y^2$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Take out common in all terms,

$$2[(x - 2y)^2 - 25y^2]$$

$$2[(x - 2y)^2 - (5y)^2]$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$2[(x - 2y + 5y)(x - 2y - 5y)]$$

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

$$2(x + 3y)(x - 7y)$$

(ii) $32 - 2(x - 4)^2$

Solution:-

$$32 - 2(x - 4)^2$$

Take out common in all terms,

$$2[16 - (x - 4)^2]$$

$$2[4^2 - (x - 4)^2]$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$2[(4 + x - 4)(4 - x + 4)]$$

$$2[(x)(8 - x)]$$

$$2x(8 - x)$$

6.

(i) $108a^2 - 3(b - c)^2$

Solution:-

$$108a^2 - 3(b - c)^2$$

Take out common in all terms,

$$3[36a^2 - (b - c)^2]$$

$$3[(6a)^2 - (b - c)^2]$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$3[(6a + b - c)(6a - b + c)]$$

(ii) $\pi a^5 - \pi^3 ab^2$

Solution:-

$$\pi a^5 - \pi^3 ab^2$$

Take out common in all terms,

$$\pi a(a^4 - \pi^2 b^2)$$

$$\pi a((a^2)^2 - (\pi b)^2)$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$\pi a(a^2 + \pi b)(a^2 - \pi b)$$

7.

(i) $50x^2 - 2(x - 2)^2$

Solution:-

$$50x^2 - 2(x - 2)^2$$

Take out common in all terms,

$$2[25x^2 - (x - 2)^2]$$

$$2[(5x)^2 - (x - 2)^2]$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$2[(5x + x - 2)(5x - x + 2)]$$

$$2[(6x - 2)(4x + 2)]$$

$$2(6x - 2)(4x + 2)$$

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

Solution:-

We know that, $a^2 - b^2 = (a + b)(a - b)$

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

$$x^2 - 4 + 3$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$X^2 - 1$$

Then,

$$(x + 1)(x - 1)$$

8.

(i) $x - 2y - x^2 + 4y^2$

Solution:-

$$x - 2y - x^2 + 4y^2$$

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

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$x - 2y - [(x + 2y)(x - 2y)]$$

Take out common in all terms,

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

$$(x - 2y)(1 - x - 2y)$$

(ii) $4a^2 - b^2 + 2a + b$

Solution:-

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

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

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$((2a + b)(2a - b)) + 1(2a + b)$$

Take out common in all terms,

$$(2a + b)(2a - b + 1)$$

9.

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

Solution:-

$$a(a - 2) - b(b - 2)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Above question can be written as,

$$a^2 - 2a - b^2 - 2b$$

Rearranging the above terms, we get,

$$a^2 - b^2 - 2a - 2b$$

$$\text{We know that, } a^2 - b^2 = (a + b)(a - b)[(a + b)(a - b)] - 2(a - b)$$

Take out common in all terms,

$$(a - b)(a + b - 2)$$

$$\text{(ii) } a(a - 1) - b(b - 1)$$

Solution:-

$$a(a - 1) - b(b - 1)$$

Above question can be written as,

$$a^2 - a - b^2 + b$$

Rearranging the above terms, we get,

$$a^2 - b^2 - a + b$$

$$\text{We know that, } a^2 - b^2 = (a + b)(a - b)[(a + b)(a - b)] - 1(a - b)$$

Take out common in all terms,

$$(a - b)(a + b - 1)$$

10.

$$\text{(i) } 9 - x^2 + 2xy - y^2$$

Solution:-

$$9 - x^2 + 2xy - y^2$$

$$9 - x^2 + 2xy - y^2$$

Above terms can be written as,

$$9 - x^2 + xy + xy - y^2$$

Now,

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$9 - x^2 + xy + 3x - 3x + 3y - 3y + xy - y^2$$

Rearranging the above terms, we get,

$$9 - 3x + 3y + 3x - x^2 + xy + xy - 3y - y^2$$

Take out common in all terms,

$$3(3 - x + y) + x(3 - x + y) + y(-3 - y + x)$$

$$3(3 - x + y) + x(3 - x + y) - y(3 - x + y)$$

$$(3 - x + y)(3 + x - y)$$

$$(ii) 9x^4 - (x^2 + 2x + 1)$$

Solution:-

$$9x^4 - (x^2 + 2x + 1)$$

Above terms can be written as,

$$(3x^2)^2 - (x + 1)^2 \dots [\text{because } (a + b)^2 = a^2 + 2ab + b^2]$$

$$\text{We know that, } a^2 - b^2 = (a + b)(a - b)$$

$$\text{So, } (3x^2 + x + 1)(3x^2 - x - 1)$$

11.

$$(i) 9x^4 - x^2 - 12x - 36$$

Solution:-

$$9x^4 - x^2 - 12x - 36$$

Above terms can be written as,

$$9x^4 - (x^2 + 12x + 36)$$

$$\text{We know that, } (a + b)^2 = a^2 + 2ab + b^2$$

$$(3x^2)^2 - (x^2 + (2 \times 6 \times x) + 6^2)$$

$$\text{So, } (3x^2)^2 - (x + 6)^2$$

$$\text{We know that, } a^2 - b^2 = (a + b)(a - b)$$

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

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

(ii) $x^3 - 5x^2 - x + 5$

Solution:-

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

Take out common in all terms,

$$x^2(x - 5) - 1(x - 5)$$

$$(x - 5)(x^2 - 1)$$

$$(x - 5)(x^2 - 1^2)$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$(x - 5)(x + 1)(x - 1)$$

12.

(i) $a^4 - b^4 + 2b^2 - 1$

Solution:-

$$a^4 - b^4 + 2b^2 - 1$$

Above terms can be written as,

$$a^4 - (b^4 - 2b^2 + 1)$$

We know that, $(a - b)^2 = a^2 - 2ab + b^2$

$$a^4 - ((b^2)^2 - (2 \times b^2 \times 1) + 1^2)$$

$$(a^2)^2 - (b^2 - 1)^2$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$(a^2 + b^2 - 1)(a^2 - b^2 + 1)$$

(ii) $x^3 - 25x$

Solution:-

$$x^3 - 25x$$

Take out common in all terms,

$$x(x^2 - 25)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Above terms can be written as,

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

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$x(x + 5)(x - 5)$$

13.

(i) $2x^4 - 32$

Solution:-

$$2x^4 - 32$$

Take out common in all terms,

$$2(x^4 - 16)$$

Above terms can be written as,

$$2((x^2)^2 - 4^2)$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$2(x^2 + 4)(x^2 - 4)$$

$$2(x^2 + 4)(x^2 - 2^2)$$

$$2(x^2 + 4)(x + 2)(x - 2)$$

(ii) $a^2(b + c) - (b + c)^3$

Solution:-

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

Take out common in all terms,

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

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$(b + c)(a + b + c)(a - b - c)$$

14.

(i) $(a + b)^3 - a - b$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Solution:-

$$(a + b)^3 - a - b$$

Above terms can be written as,

$$(a + b)^3 - (a + b)$$

Take out common in all terms,

$$(a + b) [(a + b)^2 - 1]$$

$$(a + b) [(a + b)^2 - 1^2]$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$(a + b)(a + b + 1)(a + b - 1)$$

(ii) $x^2 - 2xy + y^2 - a^2 - 2ab - b^2$

Solution:-

$$x^2 - 2xy + y^2 - a^2 - 2ab - b^2$$

Above terms can be written as,

$$(x^2 - 2xy + y^2) - (a^2 + 2ab + b^2)$$

We know that, $(a + b)^2 = a^2 + 2ab + b^2$ and $(a - b)^2 = a^2 - 2ab + b^2$

$$(x^2 - (2 \times x \times y) + y^2) - (a^2 + (2 \times a \times b) + b^2)$$

$$(x - y)^2 - (a + b)^2$$

We know that, $a^2 - b^2 = (a + b)(a - b)$ $[(x - y) + (a + b)][(x - y) - (a + b)]$

$$(x - y + a + b)(x - y - a - b)$$

15.

(i) $(a^2 - b^2)(c^2 - d^2) - 4abcd$

Solution:-

$$(a^2 - b^2)(c^2 - d^2) - 4abcd$$

$$a^2(c^2 - d^2) - b^2(c^2 - d^2) - 4abcd$$

$$a^2c^2 - a^2d^2 - b^2c^2 + b^2d^2 - 4abcd$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$a^2c^2 + b^2d^2 - a^2d^2 - b^2c^2 - 2abcd - 2abcd$$

Rearranging the above terms, we get,

$$a^2c^2 + b^2d^2 - 2abcd - a^2d^2 - b^2c^2 - 2abcd$$

We know that, $(a + b)^2 = a^2 + 2ab + b^2$ and $(a - b)^2 = a^2 - 2ab + b^2$

$$(ac - bd)^2 - (ad - bc)^2$$

$$(ac - bd + ad - bc)(ac - bd - ad + bc)$$

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

Solution:-

$$4x^2 - y^2 - 3xy + 2x - 2y$$

Above terms can be written as,

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

Rearranging the above terms, we get,

$$(x^2 - y^2) + (3x^2 - 3xy) + (2x - 2y)$$

We know that, $a^2 - b^2 = (a + b)(a - b)$ and take out common terms,

$$(x + y)(x - y) + 3x(x - y) + 2(x - y)$$

$$(x - y)[(x + y) + 3x + 2]$$

$$(x - y)(x + y + 3x + 2)$$

$$(x - y)(4x + y + 2)$$

16.

$$(i) x^2 + 1/x^2 - 11$$

Solution:-

$$x^2 + 1/x^2 - 11$$

Above terms can be written as,

$$x^2 + (1/x^2) - 2 - 9$$

$$\text{Then, } (x^2 + (1/x^2) - 2) - 9$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

We know that, $(a - b)^2 = a^2 - 2ab + b^2$,

$$(x^2 - (2 \times x^2 \times (1/x^2)) + (1/x)^2)$$

$$(x - 1/x)^2 - 3^2$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$(x - 1/x + 3)(x - 1/x - 3)$$

(ii) $x^4 + 5x^2 + 9$

Solution:-

$$x^4 + 5x^2 + 9$$

$$x^4 + 6x^2 - x^2 + 9$$

$$(x^4 + 6x^2 + 9) - x^2$$

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

We know that, $(a + b)^2 = a^2 + 2ab + b^2$,

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

So, $(x^2 + 3)^2 - x^2$

We know that, $a^2 - b^2 = (a + b)(a - b)$

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

17.

(i) $a^4 + b^4 - 7a^2b^2$

Solution:-

$$a^4 + b^4 - 7a^2b^2$$

Above terms can be written as,

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

We know that, $(a + b)^2 = a^2 + 2ab + b^2$, $[(a^2)^2 + (b^2)^2 + (2 \times a^2 \times b^2)] - (3ab)^2$

$$(a^2 + b^2)^2 - (3ab)^2$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$(a^2 + b^2 + 3ab)(a^2 + b^2 - 3ab)$$

(ii) $x^4 - 14x^2 + 1$

Solution:-

$$x^4 - 14x^2 + 1$$

Above terms can be written as,

$$x^4 + 2x^2 + 1 - 16x^2$$

We know that, $(a + b)^2 = a^2 + 2ab + b^2$,

$$\text{So, } [(x^2)^2 + (2 \times x^2 \times 1) + 1^2] - 16x^2$$

$$(x^2 + 1)^2 - (4x)^2$$

We know that, $a^2 - b^2 = (a + b)(a - b)$

$$(x^2 + 1 + 4x)(x^2 + 1 - 4x)$$

18. Express each of the following as the difference of two squares:

(i) $(x^2 - 5x + 7)(x^2 + 5x + 7)$

Solution:-

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

Rearranging the above terms, we get,

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

As, we know that, $a^2 - b^2 = (a + b)(a - b)$

$$\text{So, } (x^2 + 7)^2 - (5x)^2$$

$$(x^2 + 7)^2 - 25x^2$$

(ii) $(x^2 - 5x + 7)(x^2 - 5x - 7)$

Solution:-

$$(x^2 - 5x + 7)(x^2 - 5x - 7)[(x^2 - 5x) + 7][(x^2 - 5x) - 7]$$

As, we know that, $a^2 - b^2 = (a + b)(a - b)$

$$(x^2 - 5x)^2 - 7^2$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$(x^2 - 5x)^2 - 49$$

$$(iii) (x^2 + 5x - 7) (x^2 - 5x + 7)$$

Solution:-

$$(x^2 + 5x - 7) (x^2 - 5x + 7) [x^2 + (5x - 7)] [x^2 - (5x - 7)]$$

As, we know that, $a^2 - b^2 = (a + b) (a - b)$

$$x^2 - (5x - 7)^2$$

We know that, $(a - b)^2 = a^2 - 2ab + b^2$,

$$X^2 - [(5x)^2 - (2 \times 5x \times 7) + 7^2]$$

$$X^2 - (25x^2 - 70x + 49)$$

$$X^2 - 25x^2 + 70x - 49$$

$$-24x^2 + 70x - 49$$

19. Evaluate the following by using factors:

$$(i) (979)^2 - (21)^2$$

$$(ii) (99.9)^2 - (0.1)^2$$

Solution:

$$(i) (979)^2 - (21)^2$$

We know that

$$= (979 + 21) (979 - 21)$$

So we get

$$= 1000 \times 958$$

$$= 958000$$

$$(ii) (99.9)^2 - (0.1)^2$$

We know that

$$= (99.9 + 0.1) (99.9 - 0.1)$$

So we get

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$= 100 \times 99.8$$

$$= 9980$$

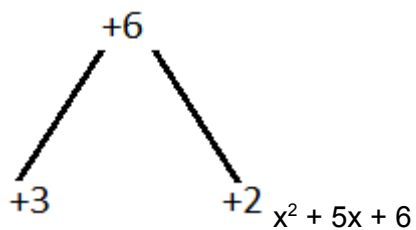
Exercise 4.4

Factorise the following (1 to 18):

1.

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

Solution:-



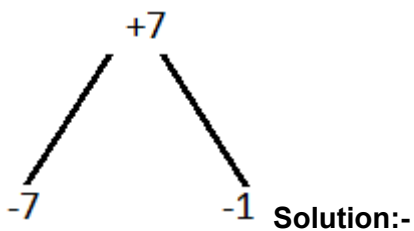
$$x^2 + 3x + 2x + 6$$

Take out common in all terms we get,

$$x(x + 3) + 2(x + 3)$$

$$(x + 3)(x + 2)$$

(ii) $x^2 - 8x + 7$



$$x^2 - 8x + 7$$

$$x^2 - 7x - x + 7$$

Take out common in all terms we get,

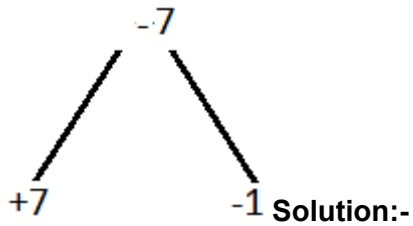
$$x(x - 7) - 1(x - 7)$$

$$(x - 7)(x - 1)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

2.

(i) $x^2 + 6x - 7$



$$x^2 + 6x - 7$$

$$x^2 + 7x - x - 7$$

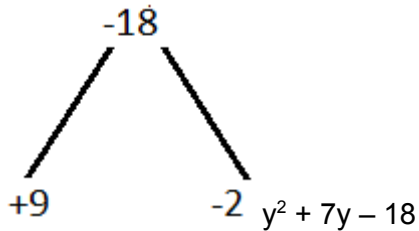
Take out common in all terms we get,

$$x(x + 7) - 1(x + 7)$$

$$(x + 7)(x - 1)$$

(ii) $y^2 + 7y - 18$

Solution:-



$$y^2 + 9y - 2y - 18$$

Take out common in all terms we get,

$$y(y + 9) - 2(y + 9)$$

$$(y + 9)(y - 2)$$

3.

(i) $y^2 - 7y - 18$

Solution:-

$$y^2 - 7y - 18$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$y^2 + 2y - 9y - 18$$

Take out common in all terms we get,

$$y(y + 2) - 9(y + 2)$$

$$(y + 2)(y - 9)$$

(ii) $a^2 - 3a - 54$

Solution:-

$$a^2 - 3a - 54$$

$$a^2 + 6a - 9a - 54$$

Take out common in all terms we get,

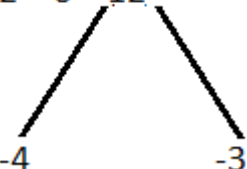
$$a(a + 6) - 9(a + 6)$$

So, $(a + 6)(a - 9)$

4.

(i) $2x^2 - 7x + 6$

$2 \times 6 = 12$



Solution:-

$$2x^2 - 7x + 6$$

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

Take out common in all terms we get,

$$2x(x - 2) - 3(x - 2)$$

$$(x - 2)(2x - 3)$$

(ii) $6x^2 + 13x - 5$

Solution:-

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$\begin{array}{c}
 6 \times 5 = 30 \\
 \swarrow \quad \searrow \\
 15 \quad \quad 2
 \end{array}$$

$6x^2 + 13x - 5$

$$6x^2 + 15x - 2x - 5$$

Take out common in all terms we get,

$$3x(2x + 5) - 1(2x + 5)$$

$$(2x + 5)(3x - 1)$$

5.

$$\begin{array}{c}
 6 \times 10 = 60 \\
 \swarrow \quad \searrow \\
 +15 \quad \quad -4
 \end{array}$$

(i) $6x^2 + 11x - 10$

Solution:-

$$6x^2 + 11x - 10$$

$$6x^2 + 15x - 4x - 10$$

Take out common in all terms we get,

$$3x(2x + 5) - 2(2x + 5)$$

$$(2x + 5)(3x - 2)$$

(ii) $6x^2 - 7x - 3$

Solution:-

$$\begin{array}{c}
 6 \times 3 = 18 \\
 \swarrow \quad \searrow \\
 9 \quad \quad 2
 \end{array}$$

$6x^2 - 7x - 3$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$6x^2 - 9x + 2x - 3$$

Take out common in all terms we get,

$$3x(2x - 3) + 1(2x - 3)$$

$$(2x - 3)(3x + 1)$$

6.

(i) $2x^2 - x - 6$

Solution:-

$$2x^2 - x - 6$$

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

Take out common in all terms we get,

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

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

(ii) $1 - 18y - 63y^2$

Solution:-

$$1 - 18y - 63y^2$$

$$1 - 21y + 3y - 63y^2$$

Take out common in all terms we get,

$$1(1 - 21y) + 3y(1 - 21y)$$

$$(1 - 21y)(1 + 3y)$$

7.

(i) $2y^2 + y - 45$

Solution:-

$$2y^2 + y - 45$$

$$2y^2 + 10y - 9y - 45$$

Take out common in all terms we get,

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$2y(y + 5) - 9(y + 5)$$

$$(y + 5)(2y - 9)$$

(ii) $5 - 4x - 12x^2$

Solution:-

$$5 - 4x - 12x^2$$

$$5 - 10x + 6x - 12x^2$$

Take out common in all terms we get,

$$5(1 - 2x) + 6x(1 - 2x)$$

$$(1 - 2x)(5 + 6x)$$

8.

(i) $x(12x + 7) - 10$

Solution:-

$$x(12x + 7) - 10$$

Above terms can be written as,

$$12x^2 + 7x - 10$$

$$12x^2 + 15x - 8x - 10$$

Take out common in all terms we get,

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

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

(ii) $(4 - x)^2 - 2x$

Solution:-

$$(4 - x)^2 - 2x$$

We know that, $(a - b)^2 = a^2 - 2ab + b^2$

$$\text{So, } (4^2 - (2 \times 4 \times x) + x^2) - 2x$$

$$16 - 8x + x^2 - 2x$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$x^2 - 10x + 16$$

$$x^2 - 8x - 2x + 16$$

Take out common in all terms we get,

$$x(x - 8) - 2(x - 8)$$

$$(x - 8)(x - 2)$$

9.

(i) $60x^2 - 70x - 30$

Solution:-

$$60x^2 - 70x - 30$$

Take out common in all terms we get,

$$10(6x^2 - 7x - 3)$$

$$10(6x^2 - 9x + 2x - 3)$$

Again, take out common in all terms we get,

$$10(3x(2x - 3) + 1(2x - 3))$$

$$10(2x - 3)(3x + 1)$$

(ii) $x^2 - 6xy - 7y^2$

Solution:-

$$x^2 - 6xy - 7y^2$$

$$x^2 - 7xy + xy - 7y^2$$

Take out common in all terms we get,

$$x(x - 7y) + y(x - 7y)$$

$$(x - 7y)(x + y)$$

10.

(i) $2x^2 + 13xy - 24y^2$

Solution:-

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$2x^2 + 13xy - 24y^2$$

$$2x^2 + 16xy - 3xy - 24y^2$$

Take out common in all terms we get,

$$2x(x + 8y) - 3y(x + 8y)$$

$$(x + 8y) (2x - 3y)$$

(ii) $6x^2 - 5xy - 6y^2$

Solution:-

$$6x^2 - 5xy - 6y^2$$

$$6x^2 - 9xy + 4xy - 6y^2$$

Take out common in all terms we get,

$$3x(2x - 3y) + 2y (2x - 3y)$$

$$(2x - 3y) (3x + 2y)$$

11.

(i) $5x^2 + 17xy - 12y^2$

Solution:-

$$5x^2 + 17xy - 12y^2$$

$$5x^2 + 20xy - 3xy - 12y^2$$

Take out common in all terms we get,

$$5x(x + 4y) - 3y(x + 4y)$$

$$(x + 4y) (5x - 3y)$$

(ii) $x^2y^2 - 8xy - 48$

Solution:-

$$x^2y^2 - 8xy - 48$$

$$x^2y^2 - 12xy + 4xy - 48$$

Take out common in all terms we get,

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$xy(xy - 12) + 4(xy - 12)$$

$$(xy - 12)(xy + 4)$$

12.

(i) $2a^2b^2 - 7ab - 30$

Solution:-

$$2a^2b^2 - 7ab - 30$$

$$2a^2b^2 - 12ab + 5ab - 30$$

Take out common in all terms we get,

$$2ab(ab - 6) + 5(ab - 6)$$

$$(ab - 6)(2ab + 5)$$

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

Solution:-

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

Above terms can be written as,

$$2a^2 - ab - b^2$$

$$2a^2 - 2ab + ab - b^2$$

Take out common in all terms we get,

$$2a(a - b) + b(a - b)$$

$$(a - b)(2a + b)$$

13.

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

Solution:-

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

Above terms can be written as,

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

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$(x - y)(x - y - 5) - 1(x - y - 5)$$

Then,

$$(x - y - 5)(x - y - 1)$$

(ii) $(2x - y)^2 - 11(2x - y) + 28$

Solution:-

$$(2x - y)^2 - 11(2x - y) + 28$$

Above terms can be written as,

$$(2x - y)^2 - 7(2x - y) - 4(2x - y) + 28$$

$$(2x - y)(2x - y - 7) - 4(2x - y - 7)$$

$$(2x - y - 7)(2x - y - 4)$$

14.

(i) $4(a - 1)^2 - 4(a - 1) - 3$

Solution:-

$$4(a - 1)^2 - 4(a - 1) - 3$$

Above terms can be written as,

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

Take out common in all terms we get,

$$2(a - 1)[2(a - 1) - 3] + 1[2(a - 1) - 3]$$

$$(2(a - 1) - 3)(2(a - 1) + 1)$$

$$(2a - 2 - 3)(2a - 2 + 1)$$

$$(2a - 5)(2a - 1)$$

(ii) $1 - 2a - 2b - 3(a + b)^2$

Solution:-

$$1 - 2a - 2b - 3(a + b)^2$$

Above terms can be written as,

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$1 - 2(a + b) - 3(a + b)^2$$

$$1 - 3(a + b) + (a + b) - 3(a + b)^2$$

Take out common in all terms we get,

$$1(1 - 3(a + b)) + (a + b)(1 - (a + b))$$

$$(1 - 3(a + b))(1 + (a + b))$$

$$(1 - 3a + 3b)(1 + a + b)$$

15.

(i) $3 - 5a - 5b - 12(a + b)^2$

Solution:-

$$3 - 5a - 5b - 12(a + b)^2$$

Above terms can be written as,

$$3 - 5(a + b) - 12(a + b)^2$$

$$3 - 9(a + b) + 4(a + b) - 12(a + b)^2$$

Take out common in all terms we get,

$$3(1 - 3(a + b)) + 4(a + b)(1 - 3(a + b))$$

$$(1 - 3(a + b))(3 + 4(a + b))$$

$$(1 - 3a - 3b)(3 + 4a + 4b)$$

(ii) $a^4 - 11a^2 + 10$

Solution:-

$$a^4 - 11a^2 + 10$$

Above terms can be written as,

$$a^4 - 10a^2 - a^2 + 10$$

Take out common in all terms we get,

$$a^2(a^2 - 10) - 1(a^2 - 10)$$

$$(a^2 - 10)(a^2 - 1)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

16.

(i) $(x + 4)^2 - 5xy - 20y - 6y^2$

Solution:-

$$(x + 4)^2 - 5xy - 20y - 6y^2$$

Above terms can be written as,

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

$$(x + 4)^2 - 6y(x + 4) + y(x + 4) - 6y^2$$

Take out common in all terms we get,

$$(x + 4)(x + 4 - 6y) + y(x + 4 - 6y)$$

$$(x - 6y + 4)(x + 4 + y)$$

(ii) $(x^2 - 2x^2) - 23(x^2 - 2x) + 120$

Solution:-

$$(x^2 - 2x^2) - 23(x^2 - 2x) + 120$$

Above terms can be written as,

$$(x^2 - 2x)^2 - 15(x^2 - 2x) - 8(x^2 - 2x) + 120$$

Take out common in all terms we get,

$$(x^2 - 2x)(x^2 - 2x - 15) - 8(x^2 - 2x - 15)$$

$$(x^2 - 2x - 15)(x^2 - 2x - 8)$$

17. $4(2a - 3)^2 - 3(2a - 3)(a - 1) - 7(a - 1)^2$

Solution:-

$$4(2a - 3)^2 - 3(2a - 3)(a - 1) - 7(a - 1)^2$$

Let us assume, $2a - 3 = p$ and $a - 1 = q$

$$\text{So, } 4p^2 - 3pq - 7q^2$$

$$\text{Then, } 4p^2 - 7pq + 4pq - 7q^2$$

Take out common in all terms we get,

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$P(4p - 7q) + q(4p - 7q)$$

$$(4p - 7q)(p + q)$$

Now, substitute the value of p and q we get,

$$(4(2a - 3) - 7(a - 1))(2a - 3 + a - 1)$$

$$(8a - 12 - 7a + 7)(3a - 4)$$

$$(a - 5)(3a - 4)$$

$$18. (2x^2 + 5x)(2x^2 + 5x - 19) + 84$$

Solution:-

$$(2x^2 + 5x)(2x^2 + 5x - 19) + 84$$

Let us assume, $2x^2 + 5x = p$

$$\text{So, } (p)(p - 19) + 84$$

$$p^2 - 19p + 84$$

$$p^2 - 12p - 7p + 84$$

$$p(p - 12) - 7(p - 12)$$

$$(p - 12)(p - 7)$$

Now, substitute the value of p we get,

$$(2x^2 + 5x - 12)(2x^2 + 5x - 7)$$

Exercise 4.5

Factorise the following (1 to 13):

1.

$$(i) 8x^3 + y^3$$

Solution:-

$$8x^3 + y^3$$

Above terms can be written as,

$$(2x)^3 + y^3$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

We know that, $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Where, $a = 2x$, $b = y$

Then, $(2x)^3 + y^3 = (2x + y)((2x)^2 - (2x \times y) + y^2)$

$$= (2x + y)(4x^2 - 2xy + y^2)$$

(ii) $64x^3 - 125y^3$

Solution:-

$$64x^3 - 125y^3$$

Above terms can be written as,

$$(4x)^3 - (5y)^3$$

We know that, $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Where, $a = 4x$, $b = 5y$

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

$$= (4x - 5y)(16x^2 + 20xy + 25y^2)$$

2.

(i) $64x^3 + 1$

Solution:-

$$64x^3 + 1$$

Above terms can be written as,

$$(4x)^3 + 1^3$$

We know that, $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Where, $a = 4x$, $b = 1$

Then, $(4x)^3 + 1^3 = (4x + 1)((4x)^2 - (4x \times 1) + 1^2)$

$$= (4x + 1)(16x^2 - 4x + 1)$$

(ii) $7a^3 + 56b^3$

Solution:-

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$7a^3 + 56b^3$$

Take out common in all terms we get,

$$7(a^3 + 8b^3)$$

Above terms can be written as,

$$7(a^3 + (2b)^3)$$

$$\text{We know that, } a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$\text{Where, } a = a, b = 2b$$

$$\text{Then, } 7[(a)^3 + (2b)^3] = 7[(a + 2b)((a)^2 - (a \times 2b) + (2b)^2)]$$

$$= 7(a + 2b)(a^2 - 2ab + 4b^2)$$

3.

$$(i) (x^6/343) + (343/x^6)$$

Solution:-

$$(x^6/343) + (343/x^6)$$

Above terms can be written as,

$$(x^2/7)^3 + (7/x^2)^3$$

$$\text{We know that, } a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$\text{Where, } a = (x^2/7), b = (7/x^2)$$

$$\text{Then, } (x^2/7)^3 + (7/x^2)^3 = [(x^2/7) + (7/x^2)][(x^2/7)^2 - ((x^2/7) \times (7/x^2)) + (7/x^2)^2]$$

$$= [(x^2/7) + (7/x^2)][(x^4/49) - 1 + (49/x^4)]$$

$$(ii) 8x^3 - 1/27y^3$$

Solution:-

$$8x^3 - 1/27y^3$$

Above terms can be written as,

$$(2x)^3 - (1/3y)^3$$

$$\text{We know that, } a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Where, $a = 2x$, $b = (1/3y)$

$$\begin{aligned}\text{Then, } (2x)^3 - (1/3y)^3 &= (2x - (1/3y)) ((2x)^2 + (2x \times (1/3y)) + (3y)^2) \\ &= (2x - (1/3y)) (4x^2 + (2x/3y) + 9y^2)\end{aligned}$$

4.

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

Solution:-

$$x^2 + x^5$$

Take out common in all terms we get,

$$x^2(1 + x^3)$$

$$x^2(1^3 + x^3)$$

$$\text{We know that, } a^3 + b^3 = (a + b) (a^2 - ab + b^2)$$

Where, $a = 1$, $b = x$

$$= x^2 [(1 + x) (1^2 - (1 \times x) + x^2)]$$

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

(ii) $32x^4 - 500x$

Solution:-

$$32x^4 - 500x$$

Take out common in all terms we get,

$$4x(8x^3 - 125)$$

Above terms can be written as,

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

$$\text{We know that, } a^3 - b^3 = (a - b) (a^2 + ab + b^2)$$

Where, $a = 2x$, $b = 5$

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

$$= 4x(2x - 5) (4x^2 + 10x + 25)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

5.

(i) $27x^3y^3 - 8$

Solution:-

$$27x^3y^3 - 8$$

Above terms can be written as,

$$(3xy)^3 - 2^3$$

We know that, $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Where, $a = 3xy$, $b = 2$

$$= (3xy - 2)((3xy)^2 + (3xy \times 2) + 2^2)$$

$$= (3xy - 2)(9x^2y^2 + 6xy + 4)$$

(ii) $27(x + y)^3 + 8(2x - y)^3$

Solution:-

$$27(x + y)^3 + 8(2x - y)^3$$

Above terms can be written as,

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

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

We know that, $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Where, $a = 3(x + y)$, $b = 2(2x - y)$

$$= [3(x + y) + 2(2x - y)][(3(x + y))^2 - (3(x + y) \times 2(2x - y)) + (2(2x - y))^2]$$

$$= [3x + 3y + 4x - 2y][9(x + y)^2 - 6(x + y)(2x - y) + 4(2x - y)^2]$$

$$= (7x - y)[9(x^2 + y^2 + 2xy) - 6(2x^2 - xy + 2xy - y^2) + 4(4x^2 + y^2 - 4xy)]$$

$$= (7x - y)[9x^2 + 9y^2 + 18xy - 12x^2 - 6xy - 6y^2 + 16x^2 + 4y^2 - 16xy]$$

$$= (7x - y)[13x^2 - 4xy + 19y^2]$$

6.

(i) $a^3 + b^3 + a + b$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Solution:-

$$a^3 + b^3 + a + b$$

$$(a^3 + b^3) + (a + b)$$

We know that, $a^3 + b^3 = (a + b) (a^2 - ab + b^2) [(a + b) (a^2 - ab + b^2)] + (a + b)$

$$(a + b) (a^2 - ab + b^2 + 1)$$

(ii) $a^3 - b^3 - a + b$

Solution:-

$$a^3 - b^3 - a + b$$

$$(a^3 - b^3) - (a - b)$$

We know that, $a^3 - b^3 = (a - b) (a^2 + ab + b^2) [(a - b) (a^2 + ab + b^2)] - (a - b)$

$$(a - b) (a^2 + ab + b^2 - 1)$$

7.

(i) $x^3 + x + 2$

Solution:-

$$x^3 + x + 2$$

Above terms can be written as,

$$x^3 + x + 1 + 1$$

Rearranging the above terms, we get

$$(x^3 + 1) (x + 1)$$

$$(x^3 + 1^3) (x + 1)$$

We know that, $a^3 + b^3 = (a + b) (a^2 - ab + b^2) [(x + 1) (x^2 - x + 1)] + (x + 1)$

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

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

(ii) $a^3 - a - 120$

Solution:-

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$a^3 - a - 120$$

Above terms can be written as,

$$a^3 - a - 125 + 5$$

Rearranging the above terms, we get

$$a^3 - 125 - a + 5$$

$$(a^3 - 125) - (a - 5)$$

$$(a^3 - 5^3) - (a - 5)$$

We know that, $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$ $[(a - 5)(a^2 + 5a + 5^2)] - (a - 5)$

$$(a - 5)(a^2 + 5a + 25) - (a - 5)$$

$$(a - 5)(a^2 + 5a + 25 - 1)$$

$$(a - 5)(a^2 + 5a + 24)$$

8.

$$(i) x^3 + 6x^2 + 12x + 16$$

Solution:-

$$x^3 + 6x^2 + 12x + 16$$

$$x^3 + 6x^2 + 12x + 8 + 8$$

Above terms can be written as,

$$(x^3 + (3 \times 2 \times x^2) + (3 \times 2^2 \times x) + 2^3) + 8$$

We know that, $(a + b)^3 = a^3 + b^3 + 3a^2b + 3ab^2$

Now $a = x$ and $b = 2$

$$\text{So, } (x + 2)^3 + 2^3$$

We know that, $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

$$(x + 2 + 2)((x + 2)^2 - (2 \times (x + 2)) + 2^2)$$

$$(x + 4)(x^2 + 4 + 4x - 2x - 4 + 4)$$

$$(x + 4)(x^2 + 2x + 4)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

(ii) $a^3 - 3a^2b + 3ab^2 - 2b^3$

Solution:-

$$a^3 - 3a^2b + 3ab^2 - 2b^3$$

Above terms can be written as,

$$a^3 - 3a^2b + 3ab^2 - b^3 - b^3$$

$$\text{We know that, } (a - b)^3 = a^3 - b^3 - 3a^2b + 3ab^2$$

$$\text{So, } (a - b)^3 + b^3$$

$$\text{We also know that, } a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$\text{Where, } a = a - b, b = b$$

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

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

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

9.

(i) $2a^3 + 16b^3 - 5a - 10b$

Solution:-

$$2a^3 + 16b^3 - 5a - 10b$$

Above terms can be written as,

$$2(a^3 + 8b^3) - 5(a + 2b)$$

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

$$\text{We know that, } a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$2[(a + 2b)(a^2 - 2ab + 4b^2)] - 5(a + 2b)$$

$$(a + 2b)(2a^2 - 4ab + 8b^2 - 5)$$

(ii) $a^3 - (1/a^3) - 2a + 2/a$

Solution:-

$$a^3 - (1/a^3) - 2a + 2/a$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$(a^3 - (1/a)^3) - 2a + 2/a$$

We know that, $a^3 - b^3 = (a - b)(a^2 + ab + b^2)[(a - 1/a) - (a^2 + (a \times 1/a) + (1/a)^2) - 2(a - 1/a)]$

$$(a - 1/a)(a^2 + 1 + 1/a^2) - 2(a - 1/a)$$

$$(a - 1/a)(a^2 + 1 + 1/a^2 - 2)$$

$$(a - 1/a)(a^2 + (1/a^2) - 1)$$

10.

(i) $a^6 - b^6$

Solution:-

$$a^6 - b^6$$

Above terms can be written as,

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

We know that, $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

$$\text{So, } a = a^2, b = b^2$$

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

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

(ii) $x^6 - 1$

Solution:-

$$x^6 - 1$$

Above terms can be written as,

$$(x^2)^3 - 1^3$$

We know that, $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

$$\text{So, } a = x^2, b = 1$$

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

$$(x^2 - 1)(x^4 + x^2 + 1)$$

11.

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

(i) $64x^6 - 729y^6$

Solution:-

$$64x^6 - 729y^6$$

Above terms can be written as,

$$(2x)^6 - (3y)^6[(2x)^2]^3 - [(3y)^2]^3$$

$$\text{We know that, } a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$\text{So, } a = (2x)^2, b = (3y)^2[(2x)^2 - (3y)^2] [((2x)^2)^2 + ((2x)^2 \times (3y)^2) + ((3y)^2)^2]$$

$$(4x^2 - 9y^2) [16x^4 + (4x^2 \times 9y^2) + (9y^2)^2]$$

$$(4x^2 - 9y^2) [16x^4 + 36x^2y^2 + 81y^4] [(2x)^2 - (3y)^2] [16x^4 + 36x^2y^2 + 81y^4]$$

$$(2x + 3y)(2x - 3y)(16x^4 + 36x^2y^2 + 81y^4)$$

(ii) $x^3 - (8/x)$

Solution:-

$$x^3 - (8/x)$$

Above terms can be written as,

$$(1/x)(x^3 - 8)$$

$$(1/x)[(x)^3 - (2)^3]$$

$$\text{We know that, } a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$\text{So, } a = x, b = 2$$

$$(1/x)(x - 2)(x^2 + 2x + 4)$$

12.

(i) $250(a - b)^3 + 2$

Solution:-

$$250(a - b)^3 + 2$$

Take out common in all terms we get,

$$2(125(a - b)^3 + 1)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$2[(5(a - b))^3 + 1^3]$$

We know that, $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

$$= 2[(5a - 5b + 1)((5a - 5b)^2 - (5a - 5b)1 + 1^2)]$$

$$= 2(5a - 5b + 1)(25a^2 + 25b^2 - 50ab - 5a + 5b + 1)$$

$$(ii) 32a^2x^3 - 8b^2x^3 - 4a^2y^3 + b^2y^3$$

Solution:-

$$32a^2x^3 - 8b^2x^3 - 4a^2y^3 + b^2y^3$$

Take out common in all terms we get,

$$8x^3(4a^2 - b^2) - y^3(4a^2 - b^2)$$

$$(4a^2 - b^2)(8x^3 - y^3)$$

Above terms can be written as,

$$((2a)^2 - b^2)((2x)^3 - y^3)$$

We know that, $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$ and $(a^2 - b^2) = (a + b)(a - b)$

$$(2a + b)(2a - b)[(2x - y)((2x)^2 + 2xy + y^2)]$$

$$(2a + b)(2a - b)(2x - y)(4x^2 + 2xy + y^2)$$

13.

$$(i) x^9 + y^9$$

Solution:-

$$x^9 + y^9$$

Above terms can be written as,

$$(x^3)^3 + (y^3)^3$$

We know that, $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Where, $a = x^3$, $b = y^3$

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

$$(x^3 + y^3)(x^6 - x^3y^3 + y^6)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Then, $(x^3 + y^3)$ in the form of $(a^3 + b^3)$

$$(x + y)(x^2 - xy + y^2) (x^6 - x^3y^3 + y^6)$$

(ii) $x^6 - 7x^3 - 8$

Solution:-

$$x^6 - 7x^3 - 8$$

Above terms can be written as,

$$(x^2)^3 - 7x^3 - x^3 + x^3 - 8$$

$$(x^2)^3 - 8x^3 + x^3 - 2^3$$

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

We know that, $a^3 - b^3 = (a - b) (a^2 + ab + b^2)$

$$(x^2 - 2x) ((x^2)^2 + (x^2 \times 2x) + (2x)^2) + (x - 2) (x^2 + 2x + 2^2)$$

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

$$x(x - 2) x^2(x^2 + 2x + 4) + (x - 2) (x^2 + 2x + 4)$$

Take out common in all terms we get,

$$(x - 2) (x^2 + 2x + 4) ((x \times x^2) + 1)$$

$$(x - 2) (x^2 + 2x + 4) (x^3 + 1)$$

So, above terms are in the form of $a^3 + b^3$

Therefore, $(x - 2) (x^2 + 2x + 4) (x + 1) (x^2 - x + 1)$

Chapter test

Factorise the following (1 to 12):

1.

(i) $15(2x - 3)^3 - 10(2x - 3)$

Solution:-

$$15(2x - 3)^3 - 10(2x - 3)$$

Take out common in both terms,

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Then, $5(2x - 3) [3(2x - 3)^2 - 2]$

(ii) $a(b - c)(b + c) - d(c - b)$

Solution:-

$$a(b - c)(b + c) - d(c - b)$$

Above terms can be written as,

$$a(b - c)(b + c) + d(b - c)$$

Take out common in both terms,

$$(b - c)[a(b + c) + d]$$

$$(b - c)(ab + ac + d)$$

2.

(i) $2a^2x - bx + 2a^2 - b$

Solution:-

$$2a^2x - bx + 2a^2 - b$$

Rearrange the above terms we get,

$$2a^2x + 2a - bx - b$$

Take out common in both terms,

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

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

(ii) $p^2 - (a + 2b)p + 2ab$

Solution:-

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

Above terms can be written as,

$$p^2 - ap - 2bp + 2ab$$

Take out common in both terms,

$$p(p - a) - 2b(p - a)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$(p - a) (p - 2b)$$

3.

(i) $(x^2 - y^2)z + (y^2 - z^2)x$

Solution:-

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

Above terms can be written as,

$$zx^2 - zy^2 + xy^2 - xz^2$$

Rearrange the above terms we get,

$$zx^2 - xz^2 + xy^2 - zy^2$$

Take out common in both terms,

$$zx(x - z) + y^2(x - z)$$

$$(x - z) (zx + y^2)$$

(ii) $5a^4 - 5a^3 + 30a^2 - 30a$

Solution:-

$$5a^4 - 5a^3 + 30a^2 - 30a$$

Take out common in both terms,

$$5a(a^3 - a^2 + 6a - 6)$$

$$5a[a^2(a - 1) + 6(a - 1)]$$

$$5a(a - 1) (a^2 + 6)$$

4.

(i) $b(c - d)^2 + a(d - c) + 3c - 3d$

Solution:-

$$b(c - d)^2 + a(d - c) + 3c - 3d$$

Above terms can be written as,

$$b(c - d)^2 - a(c - d) + 3c - 3d$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$b(c - d)^2 - a(c - d) + 3(c - d)$$

Take out common in both terms,

$$(c - d) [b(c - d) - a + 3]$$

$$(c - d) (bc - bd - a + 3)$$

$$(ii) x^3 - x^2 - xy + x + y - 1$$

Solution:-

$$x^3 - x^2 - xy + x + y - 1$$

Rearrange the above terms we get,

$$x^3 - x^2 - xy + y + x - 1$$

Take out common in both terms,

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

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

5.

$$(i) x(x + z) - y(y + z)$$

Solution:-

$$x(x + z) - y(y + z)$$

$$x^2 + xz - y^2 - yz$$

Rearrange the above terms we get,

$$x^2 - y^2 + xz - yz$$

We know that, $(a^2 - b^2) = (a + b)(a - b)$

So, $(x + y)(x - y) + z(x - y)$

$$(x - y)(x + y + z)$$

$$(ii) a^{12}x^4 - a^4x^{12}$$

Solution:-

$$a^{12}x^4 - a^4x^{12}$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Take out common in both terms,

$$a^4x^4 (a^8 - x^8)$$

$$a^4x^4((a^4)^2 - (x^4)^2)$$

We know that, $(a^2 - b^2) = (a + b)(a - b)$

$$a^4x^4 (a^4 + x^4) (a^4 - x^4)$$

$$a^4x^4 (a^4 + x^4) ((a^2)^2 - (x^2)^2)$$

$$a^4x^4(a^4 + x^4) (a^2 + x^2) (a^2 - x^2)$$

$$a^4x^4 (a^4 + x^4) (a^2 + x^2) (a + x) (a - x)$$

6.

(i) $9x^2 + 12x + 4 - 16y^2$

Solution:-

$$9x^2 + 12x + 4 - 16y^2$$

Above terms can be written as,

$$(3x)^2 + (2 \times 3x \times 2) + 2^2 - 16y^2$$

$$\text{Then, } (3x + 2)^2 + (4y)^2$$

$$(3x + 2 + 4y) (3x + 2 - 4y)$$

(ii) $x^4 + 3x^2 + 4$

Solution:-

$$x^4 + 3x^2 + 4$$

Above terms can be written as,

$$(x^2)^2 + 3(x^2) + 4$$

$$(x^2)^2 + (2)^2 + 4x^2 - x^2$$

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

We know that, $(a^2 - b^2) = (a + b)(a - b)$

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

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

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

7.

(i) $21x^2 - 59xy + 40y^2$

Solution:-

$$21x^2 - 59xy + 40y^2$$

By multiplying the first and last term we get, $21 \times 40 = 840$

Then, $(-35) \times (-24) = 840$

So, $21x^2 - 35xy - 24xy + 40y^2$

$$7x(3x - 5y) - 8y(3x - 5y)$$

$$(3x - 5y)(7x - 8y)$$

(ii) $4x^3y - 44x^2y + 112xy$

Solution:-

$$4x^3y - 44x^2y + 112xy$$

Take out common in all terms,

$$4xy(x^2 - 11x + 28)$$

Then, $4xy(x^2 - 7x - 4x + 28)$

$$4xy[x(x - 7) - 4(x + 7)]$$

$$4xy(x - 7)(x - 4)$$

8.

(i) $x^2y^2 - xy - 72$

Solution:-

$$x^2y^2 - xy - 72$$

$$x^2y^2 - 9xy + 8xy - 72$$

Take out common in all terms,

$$xy(xy - 9) + 8(xy - 9)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$(xy - 9)(xy + 8)$$

$$(ii) 9x^3y + 41x^2y^2 + 20xy^3$$

Solution:-

$$9x^3y + 41x^2y^2 + 20xy^3$$

Take out common in all terms,

$$xy(9x^2 + 41xy + y^2)$$

Above terms can be written as,

$$xy(9x^2 + 36xy + 5xy + 20y^2)$$

$$xy[9x(x + 4y) + 5y(x + 4y)]$$

$$xy(x + 4y)(9x + 5y)$$

9.

$$(i) (3a - 2b)^2 + 3(3a - 2b) - 10$$

Solution:-

$$(3a - 2b)^2 + 3(3a - 2b) - 10$$

Let us assume, $(3a - 2b) = p$

$$p^2 + 3p - 10$$

$$p^2 + 5p - 2p - 10$$

Take out common in all terms,

$$p(p + 5) - 2(p + 5)$$

$$(p + 5)(p - 2)$$

Now, substitute the value of p

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

$$(ii) (x^2 - 3x)(x^2 - 3x + 7) + 10$$

Solution:-

$$(x^2 - 3x)(x^2 - 3x + 7) + 10$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Let us assume, $(x^2 - 3x) = q$

$$q(q + 7) + 10$$

$$q^2 + 7q + 10$$

$$q^2 + 5q + 2q + 10$$

$$q(q + 5) + 2(q + 5)$$

$$(q + 5)(q + 2)$$

Now, substitute the value of q

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

10.

(i) $(x^2 - x)(4x^2 - 4x - 5) - 6$

Solution:-

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

$$(x^2 - x)[(4x^2 - 4x) - 5] - 6$$

$$(x^2 - x)[4(x^2 - x) - 5] - 6$$

Let us assume $x^2 - x = q$

$$\text{So, } q[4q - 5] - 6$$

$$4q^2 - 5q - 6$$

$$4q^2 - 8q + 3q - 6$$

$$4q(q - 2) + 3(q - 2)$$

$$(q - 2)(4q + 3)$$

Now, substitute the value of q

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

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

$$(x^2 - 2x + x - 2)(4x^2 - 4x + 3)[x(x - 2) + 1(x - 2)](4x^2 - 4x + 3)$$

$$(x - 2)(x + 1)(4x^2 - 4x + 3)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

(ii) $x^4 + 9x^2y^2 + 81y^4$

Solution:-

$$x^4 + 9x^2y^2 + 81y^4$$

Above terms can be written as,

$$x^4 + 18x^2y^2 + 81y^4 - 9x^2y^2$$

$$((x^2)^2 + (2 \times x^2 \times 9y^2) + (9y^2)^2) - 9x^2y^2$$

We know that, $(a + b)^2 = a^2 + 2ab + b^2$

$$(x^2 + 9y^2)^2 - (3xy)^2$$

$$(x^2 + 9y^2 + 3xy)(x^2 + 9y^2 - 3xy)$$

11.

(i) $(\frac{8}{27})x^3 - (\frac{1}{8})y^3$

Solution:-

$$(\frac{8}{27})x^3 - (\frac{1}{8})y^3$$

Above terms can be written as,

$$((\frac{2}{3})x)^3 - (\frac{1}{2}y)^3$$

We know that, $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

$$((\frac{2}{3})x - \frac{1}{2}y)[(\frac{2}{3})x + (\frac{2}{3})x(\frac{1}{2})y + ((\frac{1}{2})y)^2]$$

$$((\frac{2}{3})x - (\frac{1}{2})y)[(\frac{4}{9})x^2 + (xy/3) + (y^2/4)]$$

(ii) $x^6 + 63x^3 - 64$

Solution:-

$$x^6 + 63x^3 - 64$$

Above terms can be written as,

$$x^6 + 64x^3 - x^3 - 64$$

Take out common in all terms,

$$x^3(x^3 + 64) - 1(x^3 + 64)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$(x^3 + 64)(x^3 - 1)$$

$$(x^3 + 4^3)(x^3 - 1^3)$$

We know that, $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$ and $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

$$\text{So, } (x + 4)[x^2 - 4x + 4^2](x - 1)[x^2 + x + 1^2]$$

$$(x + 4)(x^2 - 4x + 16)(x - 1)(x^2 + x + 1)$$

12.

$$(i) x^3 + x^2 - (1/x^2) + (1/x^3)$$

Solution:-

$$x^3 + x^2 - (1/x^2) + (1/x^3)$$

Rearranging the above terms, we get,

$$x^3 + (1/x^3) + x^2 - (1/x^2)$$

We know that, $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$ and $(a^2 - b^2) = (a + b)(a - b)$

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

$$(x + 1/x)[x^2 - 1 + 1/x^2 + x - 1/x]$$

$$(ii) (x + 1)^6 - (x - 1)^6$$

Solution:-

$$(x + 1)^6 - (x - 1)^6$$

Above terms can be written as,

$$((x + 1)^3)^2 - ((x - 1)^3)^2$$

We know that, $(a^2 - b^2) = (a + b)(a - b)[(x + 1)^3 + (x - 1)^3][x^3 - (x - 1)^3][(x + 1) + (x - 1)][(x + 1)^2 - (x - 1)(x + 1) + (x - 1)^2][(x + 1) - (x - 1)][(x + 1)^2 + (x - 1)(x + 1) + (x - 1)^2]$

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

By simplifying we get,

$$2x(x^2 + 3) 2(3x^2 + 1)$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

$$4x(x^2 + 3)(3x^2 + 1)$$

13. Show that $(97)^3 + (14)^3$ is divisible by 111

Solution:-

From the question,

$$(97)^3 + (14)^3$$

$$\text{We know that, } a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$\text{So, } (97 + 14)[(97)^2 - (97 \times 14) + (14)^2]$$

$$111[(97)^2 - (97 \times 14) + (14)^2]$$

Therefore, it is clear that the given expression is divisible by 111.

14. If $a + b = 8$ and $ab = 15$, find the value of $a^4 + a^2b^2 + b^4$.

Solution:-

$$a^4 + a^2b^2 + b^4$$

Above terms can be written as,

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

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

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

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

$$a + b = 8, ab = 15$$

$$\text{So, } (a + b)^2 = 8^2$$

$$a^2 + 2ab + b^2 = 64$$

$$a^2 + 2(15) + b^2 = 64$$

$$a^2 + b^2 + 30 = 64$$

By transposing,

$$a^2 + b^2 = 64 - 30$$

$$a^2 + b^2 = 34$$

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

Then, $a^4 + a^2b^2 + b^4$

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

$$= (34 + 15)(34 - 15)$$

$$= 49 \times 19$$

$$= 931$$



ML Aggarwal Solutions Class 9 Maths

- Chapter 1- Rational and Irrational Numbers
- Chapter 2- Compound Interest
- Chapter 3- Expansions
- Chapter 4- Factorization
- Chapter 5- Simultaneous Linear Equations
- Chapter 6- Problems on Simultaneous Linear Equations
- Chapter 7- Quadratic Equations
- Chapter 8- Indices
- Chapter 9- Logarithms
- Chapter 10- Triangles
- Chapter 11- Mid Point Theorem
- Chapter 12- Pythagoras Theorem
- Chapter 13- Rectilinear Figures
- Chapter 14- Theorems on Area
- Chapter 15- Circle
- Chapter 16- Mensuration
- Chapter 17- Trigonometric Ratios
- Chapter 18- Trigonometric Ratios and Standard Angles
- Chapter 19- Coordinate Geometry
- Chapter 20- Statistics

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

About ML Aggarwal

M. L. Aggarwal, is an Indian mechanical engineer, educator. His achievements include research in solutions of industrial problems related to fatigue design. Recipient Best Paper award, Manipal Institute of Technology, 2004. Member of TSTE.

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>

About IndCareer

IndCareer.com is a leading developer of online career guidance resources for the Indian marketplace. Established in 2007, IndCareer.com is currently used by over thousands of institutions across India, including schools, employment agencies, libraries, colleges and universities.

IndCareer.com is designed to assist you in making the right career decision - a decision that meets your unique interests and personality.

For any clarifications or questions you can write to **info@indcareer.com**

Postal Address

IndCareer.com
52, Shilpa Nagar,
Somalwada
Nagpur - 440015
Maharashtra, India

WhatsApp: +91 9561 204 888

Website: <https://www.indcareer.com>

<https://www.indcareer.com/schools/ml-aggarwal-solutions-for-class-9-maths-chapter-4-factorization/>