

Practice Set 6.1 8th Std Maths Answers Chapter 6 Factorisation of Algebraic Expressions

Question 1.

Factorize:

i. $x^2 + 9x + 18$

ii. $x^2 - 10x + 9$

iii. $y^2 + 24y + 144$

iv. $5y^2 + 5y - 10$

v. $p^2 - 2p - 35$

vi. $p^2 - 7p - 44$

vii. $m^2 - 23m + 120$

viii. $m^2 - 25m + 100$

ix. $3x^2 + 14x + 15$

x. $2x^2 + x - 45$

xi. $20x^2 - 26x + 8$

xii. $44x^2 - x - 3$

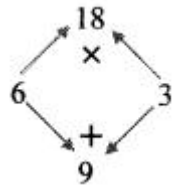
Solution:

i. $x^2 + 9x + 18$

$= x^2 + 6x + 3x + 18$

$= x(x + 6) + 3(x + 6)$

$= (x + 6)(x + 3)$

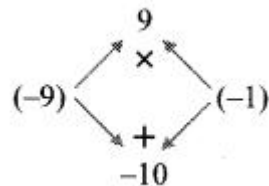


ii. $x^2 - 10x + 9$

$= x^2 - 9x - x + 9$

$= x(x - 9) - 1(x - 9)$

$= (x - 9)(x - 1)$



iii. $y^2 + 24y + 144$

$= y^2 + 12y + 12y + 144$

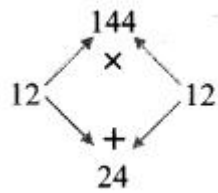
$= y(y + 12) + 12(y + 12)$

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$$= (y + 12)(y + 12)$$



iv. $5y^2 + 5y - 10$

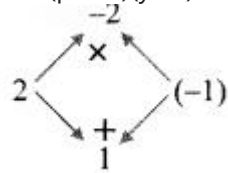
$$= 5(y^2 + y - 2)$$

... [Taking out the common factor 5]

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

$$= 5[y(y + 2) - 1(y + 2)]$$

$$= 5(p + 2)(y - 1)$$

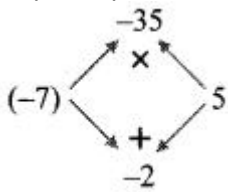


v. $p^2 - 2p - 35$

$$= p^2 - 7p + 5p - 35$$

$$= p(p - 7) + 5(p - 7)$$

$$= (p - 7)(p + 5)$$

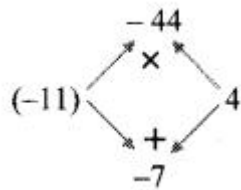


vi. $p^2 - 7p - 44$

$$= p^2 - 11p + 4p - 44$$

$$= p(p - 11) + 4(p - 11)$$

$$= (p - 11)(p + 4)$$



vii. $m^2 - 23m + 120$

$$= m^2 - 15m - 8m + 120$$

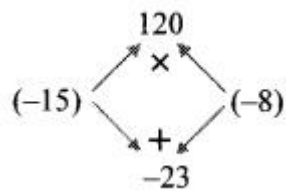
$$= m(m - 15) - 8(m - 15)$$

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$$= (m - 15) (m - 8)$$

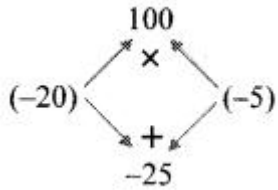


$$\text{viii. } m^2 - 25m + 100$$

$$= m^2 - 20m - 5m + 100$$

$$= m(m - 20) - 5(m - 20)$$

$$= (m - 20) (m - 5)$$

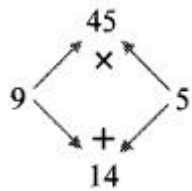


$$\text{ix. } 3x^2 + 14x + 15 \quad 3 \times 15 = 45$$

$$= 3x^2 + 9x + 5x + 15$$

$$= 3x(x + 3) + 5(x + 3)$$

$$= (x + 3) (3x + 5)$$

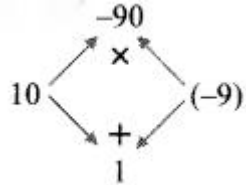


$$\text{x. } 2x^2 + x - 45 \quad 2 \times (-45) = -90$$

$$= 2x^2 + 10x - 9x - 45$$

$$= 2x(x + 5) - 9(x + 5)$$

$$= (x + 5) (2x - 9)$$



$$\text{xi. } 20x^2 - 26x + 8$$

$$= 2(10x^2 - 13x + 4) \quad 10 \times 4 = 40$$

... [Taking out the common factor 2]

$$= 2(10x^2 - 8x - 5x + 4)$$

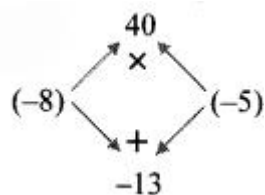
$$= 2[2x(5x - 4) - 1(5x - 4)]$$

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$$= 2(5x - 4)(2x - 1)$$

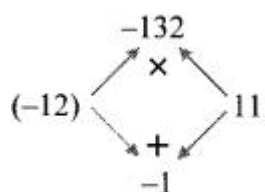


$$\text{xii. } 44x^2 - x - 3 \quad 44 \times (-3) = -132$$

$$= 44x^2 - 12x + 11x - 3$$

$$= 4x(11x - 3) + 1(11x - 3)$$

$$= (11x - 3)(4x + 1)$$



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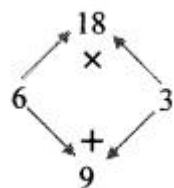
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ii. $x^2 - 10x + 9$

$$= x^2 - 9x - x + 9$$

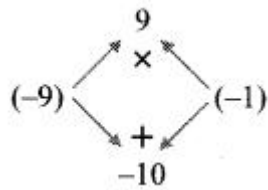
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$$= x(x - 9) - 1(x - 9)$$

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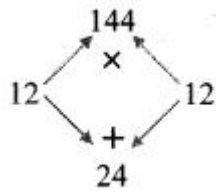


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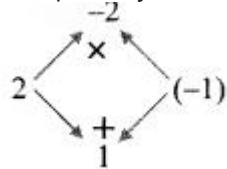
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$$= 5[y(y + 2) - 1(y + 2)]$$

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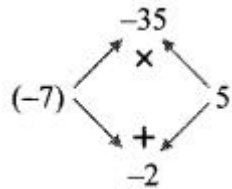


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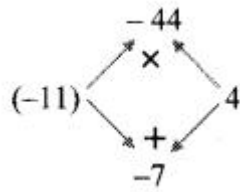
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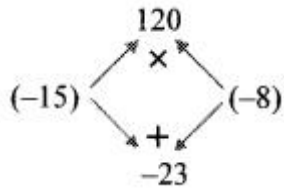


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$$= m(m - 15) - 8(m - 15)$$

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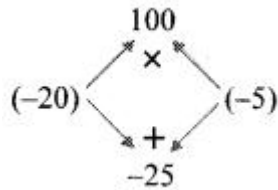


viii. $m^2 - 25m + 100$

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$$= m(m - 20) - 5(m - 20)$$

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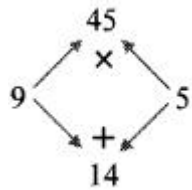


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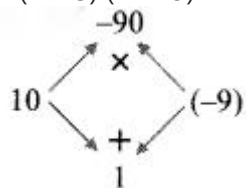


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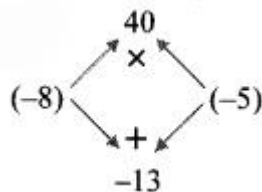
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... [Taking out the common factor 2]

$= 2(10x^2 - 8x - 5x + 4)$

$= 2[2x(5x - 4) - 1(5x - 4)]$

$= 2(5x - 4)(2x - 1)$

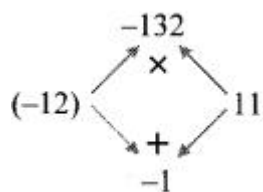


xii. $44x^2 - x - 3$ $44 \times (-3) = -132$

$= 44x^2 - 12x + 11x - 3$

$= 4x(11x - 3) + 1(11x - 3)$

$= (11x - 3)(4x + 1)$



Practice Set 6.2 8th Std Maths Answers Chapter 6 Factorisation of Algebraic Expressions

Question 1.

Factorise:

i. $x^3 + 64y^3$

ii. $125p^3 + q^3$

iii. $125k^3 + 27m^3$

iv. $2l^3 + 432m^3$

v. $24a^3 + 81b^3$

vi. $y^3 + 18y^3$

vii. $a^3 + 8a^3$

viii. $1 + q^3$

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Solution:

i. $x^3 + 64y^3$

$$= x^3 + (4y)^3$$

Here, $a = x$ and $b = 4y$

$$\therefore x^3 + 64y^3 = (x + 4y) [x^2 - x(4y) + (4y)^2]$$

$$\dots [\because a^3 + b^3 = (a + b)(a^2 - ab + b^2)]$$

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

ii. $125p^3 + q^3$

$$= (5p)^3 + q^3$$

Here, $a = 5p$ and $b = q$

$$\therefore 125p^3 + q^3 = (5p + q)[(5p)^2 - (5p)(q) + q^2]$$

$$\dots [\because a^3 + b^3 = (a + b)(a^2 - ab + b^2)]$$

$$= (5p + q)(25p^2 - 5pq + q^2)$$

iii. $125k^3 + 27m^3$

$$= (5k)^3 + (3m)^3$$

Here, $a = 5k$ and $b = 3m$

$$\therefore 125k^3 + 27m^3$$

$$= (5k + 3m) [(5k)^2 - (5k)(3m) + (3m)^2]$$

$$\dots [\because a^3 + b^3 = (a + b)(a^2 - ab + b^2)]$$

$$= (5k + 3m)(25k^2 - 15km + 9m^2)$$

iv. $2l^3 + 432m^3$

$$= 2(l^3 + 216m^3)$$

... [Taking out the common factor 2]

$$= 2[l^3 + (6m)^3]$$

Here, $a = l$ and $b = 6m$

$$2l^3 + 432m^3 = 2 \{ (l + 6m)[l^2 - l(6m) + (6m)^2] \}$$

$$\dots [\because a^3 + b^3 = (a + b)(a^2 - ab + b^2)]$$

$$= 2(l + 6m)(l^2 - 6lm + 36m^2)$$

v. $24a^3 + 81b^3$

...[Taking out the common factor 3]

$$= 3 [(2a)^3 + (3b)^3]$$

Here, $A = 2a$ and $B = 3b$

$$\therefore 24a^3 + 81b^3$$

$$= 3 \{ (2a + 3b) [(2a)^2 - (2a)(3b) + (3b)^2] \}$$

$$\dots [\because A^3 + B^3 = (A + B)(A^2 - AB + B^2)]$$

$$= 3(2a + 3b)(4a^2 - 6ab + 9b^2)$$

Practice Set 6.3 8th Std Maths Answers Chapter 6 Factorisation of Algebraic Expressions

Question 1.

Factorize

i. $y^3 - 27$

ii. $x^3 - 64y^3$

iii. $27m^3 - 216n^3$

iv. $125y^3 - 1$

v. $8p^3 - 27q^3$

vi. $343a^3 - 512b^3$

vii. $64x^3 - 729y^3$

viii. $16a^3 - 128b^3$

Solution:

i. $y^3 - 27$

$= y^3 - (3)^3$

Here, $a = y$ and $b = 3$

$\therefore y^3 - 27 = (y - 3)[y^2 + y(3) + (3)^2]$

...[* $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$]

$= (y - 3)(y^2 + 3y + 9)$

ii. $x^3 - 64y^3$

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

Here, $a = x$ and $b = 4y$

$\therefore x^3 - 64y^3 = (x - 4y)[x^2 + x(4y) + (4y)^2]$

...[* $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$]

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

iii. $27m^3 - 216n^3$

$= 27(m^3 - 8n^3)$

... [Taking out the common factor 27]

$= 27[m^3 - (2n)^3]$

Here, $a = m$ and $b = 2n$

$\therefore 27m^3 - 216n^3$

$= 27\{(m - 2n)[m^2 + m(2n) + (2n)^2]\}$

....[* $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$]

$= 27(m - 2n)(m^2 + 2mn + 4n^2)$

iv. $125y^3 - 1$

$= (5y)^3 - 1^3$

Here, $a = 5y$ and $b = 1$

$\therefore 125y^3 - 1 = (5y - 1)[(5y)^2 + (5y)(1) + (1)^2]$

...[* $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$]

$= (5y - 1)(25y^2 + 5y + 1)$

v. $8p^3 - 27p^3$

$$= (2p)^3 - \left(\frac{3}{p}\right)^3$$

Here, $a = 2p$ and $b = \frac{3}{p}$

$$\begin{aligned} \therefore 8p^3 - \frac{27}{p^3} &= \left(2p - \frac{3}{p}\right) \left[(2p)^2 + (2p)\left(\frac{3}{p}\right) + \left(\frac{3}{p}\right)^2\right] \\ &\dots [\because a^3 - b^3 = (a - b)(a^2 + ab + b^2)] \\ &= \left(2p - \frac{3}{p}\right) \left(4p^2 + 6 + \frac{9}{p^2}\right) \end{aligned}$$

vi. $343a^3 - 512b^3$

$$= (7a)^3 - (8b)^3$$

Here, $A = 7a$ and $B = 8b$

$$\therefore 343a^3 - 512b^3$$

$$= (7a - 8b) [(7a)^2 + (7a)(8b) + (8b)^2]$$

$$\dots [\because A^3 - B^3 = (A - B)(A^2 + AB + B^2)]$$

$$= (7a - 8b) (49a^2 + 56ab + 64b^2)$$

vii. $64x^3 - 729y^3$

$$= (4x)^3 - (9y)^3$$

Here, $a = 4x$ and $b = 9y$

$$\therefore 64x^3 - 729y^3$$

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

$$\dots [\because a^3 - b^3 = (a - b)(a^2 + ab + b^2)]$$

$$= (4x - 9y) (16x^2 + 36xy + 81y^2)$$

viii. $16a^3 - 128b^3$

$$= 16 \left(a^3 - \frac{8}{b^3} \right)$$

...[Taking out the common factor 16]

$$= 16 \left[a^3 - \left(\frac{2}{b} \right)^3 \right]$$

$$\text{Here, } A = a \text{ and } B = \frac{2}{b}$$

$$\therefore 16a^3 - \frac{128}{b^3} = 16 \left(a - \frac{2}{b} \right) \left[a^2 + a \left(\frac{2}{b} \right) + \left(\frac{2}{b} \right)^2 \right]$$

$$\dots [\because A^3 - B^3 = (A - B)(A^2 + AB + B^2)]$$

$$= 16 \left(a - \frac{2}{b} \right) \left(a^2 + \frac{2a}{b} + \frac{4}{b^2} \right)$$

Question 2.

Simplify:

i. $(x + y)^3 - (x - y)^3$

ii. $(3a + 5b)^3 - (3a - 5b)^3$

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

iv. $p^3 - (p + 1)^3$

v. $(3xy - 2ab)^3 - (3xy + 2ab)^3$

Solution:

i. $(x + y)^3 - (x - y)^3$

Here, $a = x + y$ and $b = x - y$

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

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

$$\dots [a^3 - b^3 = (a - b)(a^2 + ab + b^2)]$$

$$= (x + y - x + y) [(x^2 + 2xy + y^2) + (x^2 - y^2) + (x^2 - 2xy + y^2)]$$

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

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

$$= 6x^2y + 2y^3$$

ii. $(3a + 5b)^3 - (3a - 5b)^3$

Here, $A = 3a + 5b$ and $B = 3a - 5b$

$$= [(3a + 5b) - (3a - 5b)] [(3a + 5b)^2 + (3a + 5b)(3a - 5b) + (3a - 5b)^2]$$

$$\dots [\because A^3 - B^3 = (A - B)(A^2 + AB + B^2)]$$

$$= (3a + 5b - 3a + 5b) [(9a^2 + 30ab + 25b^2) + (9a^2 - 25b^2) + (9a^2 - 30ab + 25b^2)]$$

$$= 10b(9a^2 + 9a^2 + 9a^2 + 30ab - 30ab + 25b^2 - 25b^2 + 25b^2)$$

$$= 10b(27a^2 + 25b^2)$$

$$= 270a^2b + 250b^3$$

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$$\begin{aligned}\text{iii. } (a + b)^3 - a^3 - b^3 \\&= a^3 + 3a^2b + 3ab^2 + b^3 - a^3 - b^3 \\&= 3a^2b + 3ab^2\end{aligned}$$

$$\begin{aligned}\text{iv. } p^3 - (p + 1)^3 \\&= p^3 - (p^3 + 3p^2 + 3p + 1) \dots [\because (a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3] \\&= p^3 - p^3 - 3p^2 - 3p - 1 \\&= -3p^2 - 3p - 1\end{aligned}$$

$$\begin{aligned}\text{v. } (3xy - 2ab)^3 - (3xy + 2ab)^3 \\ \text{Here, } A = 3xy - 2ab \text{ and } B = 3xy + 2ab \\ \therefore (3xy - 2ab)^3 - (3xy + 2ab)^3 \\&= [(3xy - 2ab) - (3xy + 2ab)] [(3xy - 2ab)^2 + (3xy - 2ab)(3xy + 2ab) + (3xy + 2ab)^2] \\&\dots [\because A^3 - B^3 = (A - B)(A^2 + AB + B^2)] \\&= (3xy - 2ab - 3xy - 2ab) [(9x^2y^2 - 12xyab + 4a^2b^2) + (9x^2y^2 - 4a^2b^2) + (9x^2y^2 + 12xyab + 4a^2b^2)] \\&= (-4ab)(9x^2y^2 + 9x^2y^2 + 9x^2y^2 - 12xyab + 12xyab + 4a^2b^2 - 4a^2b^2 + 4a^2b^2) \\&= (-4ab)(27x^2y^2 + 4a^2b^2) \\&= -108x^2y^2ab - 16a^3b^3\end{aligned}$$

$$\text{vi. } y^3 + \frac{1}{8y^3}$$

$$= y^3 + \left(\frac{1}{2y}\right)^3$$

$$\text{Here, } a = y \text{ and } b = \frac{1}{2y}$$

$$\begin{aligned}\therefore y^3 + \frac{1}{8y^3} &= \left(y + \frac{1}{2y}\right) \left[y^2 - y\left(\frac{1}{2y}\right) + \left(\frac{1}{2y}\right)^2\right] \\&\dots [\because a^3 + b^3 = (a + b)(a^2 - ab + b^2)] \\&= \left(y + \frac{1}{2y}\right) \left(y^2 - \frac{1}{2} + \frac{1}{4y^2}\right)\end{aligned}$$

vii. $a^3 + 8a^3$

$$= a^3 + \left(\frac{2}{a}\right)^3$$

Here, $A = a$ and $B = \frac{2}{a}$

$$\therefore a^3 + \frac{8}{a^3} = \left(a + \frac{2}{a}\right) \left[a^2 - a\left(\frac{2}{a}\right) + \left(\frac{2}{a}\right)^2\right]$$

$$\dots [\because A^3 + B^3 = (A + B)(A^2 - AB + B^2)]$$

$$= \left(a + \frac{2}{a}\right) \left(a^2 - 2 + \frac{4}{a^2}\right)$$

viii. $1 + \frac{q^3}{125}$

$$= 1^3 + \left(\frac{q}{5}\right)^3$$

Here, $a = 1$ and $b = \frac{q}{5}$

$$\therefore 1 + \frac{q^3}{125} = \left(1 + \frac{q}{5}\right) \left[1^2 - 1\left(\frac{q}{5}\right) + \left(\frac{q}{5}\right)^2\right]$$

$$\dots [\because a^3 + b^3 = (a + b)(a^2 - ab + b^2)]$$

$$= \left(1 + \frac{q}{5}\right) \left(1 - \frac{q}{5} + \frac{q^2}{25}\right)$$

Practice Set 6.4 8th Std Maths Answers Chapter 6 Factorisation of Algebraic Expressions

Question 1.

Simplify:

i. $m^2 - n^2(m+n)^2 \times m^2 + mn + n^2 m^3 - n^3$

ii. $a^2 + 10a + 21 a^2 + 6a - 7 \times a^2 - 1a + 3$

iii. $8x^3 - 27y^3 4x^2 - 9y^2$

iv. $x^2 - 5x - 24(x+3)(x+8) \times x^2 - 64(x-8)^2$

v. $3x^2 - x - 2x^2 - 7x + 12 \div 3x^2 - 7x - 6x^2 - 4$

vi. $4x^2 - 11x + 6 16x^2 - 9$

vii. $a^3 - 275a^2 - 16a + 3 \div a^2 + 3a + 9 25a^2 - 1$

viii. $1 - 2x + x^2 1 - x^3 \times 1 + x + x^2 1 + x$

Solution:

i. $m^2 - n^2(m+n)^2 \times m^2 + mn + n^2 m^3 - n^3$

$$\begin{aligned} & \frac{m^2 - n^2}{(m+n)^2} \times \frac{m^2 + mn + n^2}{m^3 - n^3} \\ &= \frac{(m+n)(m-n)}{(m+n)(m+n)} \times \frac{m^2 + mn + n^2}{(m-n)(m^2 + mn + n^2)} \\ &= \frac{1}{m+n} \end{aligned}$$

ii. $a^2 + 10a + 21 a^2 + 6a - 7 \times a^2 - 1a + 3$

$$\begin{aligned} & \frac{a^2 + 10a + 21}{a^2 + 6a - 7} \times \frac{a^2 - 1}{a + 3} \\ &= \frac{a^2 + 7a + 3a + 21}{a^2 + 7a - a - 7} \times \frac{a^2 - 1^2}{a + 3} \\ &= \frac{a(a+7) + 3(a+7)}{a(a+7) - 1(a+7)} \times \frac{(a+1)(a-1)}{a+3} \\ &= \frac{(a+7)(a+3)}{(a+7)(a-1)} \times \frac{(a+1)(a-1)}{a+3} = a + 1 \end{aligned}$$

iii. $8x^3 - 27y^3 \div 4x^2 - 9y^2$

$$\begin{aligned} & \frac{8x^3 - 27y^3}{4x^2 - 9y^2} \\ &= \frac{(2x)^3 - (3y)^3}{(2x)^2 - (3y)^2} \\ &= \frac{(2x - 3y) [(2x)^2 + (2x)(3y) + (3y)^2]}{(2x + 3y)(2x - 3y)} \\ &= \frac{(2x)^2 + (2x)(3y) + (3y)^2}{2x + 3y} \\ &= \frac{4x^2 + 6xy + 9y^2}{2x + 3y} \end{aligned}$$

iv. $x^2 - 5x - 24 \div (x+3)(x+8) \times x^2 - 64 \div (x-8)^2$

$$\begin{aligned} & \frac{x^2 - 5x - 24}{(x+3)(x+8)} \times \frac{x^2 - 64}{(x-8)^2} \\ &= \frac{x^2 - 8x + 3x - 24}{(x+3)(x+8)} \times \frac{x^2 - (8)^2}{(x-8)^2} \\ &= \frac{x(x-8) + 3(x-8)}{(x+3)(x+8)} \times \frac{(x+8)(x-8)}{(x-8)(x-8)} \\ &= \frac{(x-8)(x+3)}{(x+3)(x+8)} \times \frac{(x+8)(x-8)}{(x-8)(x-8)} \\ &= 1 \end{aligned}$$

V. $3x^2 - x - 2 \div 3x^2 - 7x - 6$

$$\begin{aligned} & \frac{3x^2 - x - 2}{x^2 - 7x + 12} \div \frac{3x^2 - 7x - 6}{x^2 - 4} \\ &= \frac{3x^2 - x - 2}{x^2 - 7x + 12} \times \frac{x^2 - 4}{3x^2 - 7x - 6} \\ &= \frac{3x^2 - 3x + 2x - 2}{x^2 - 4x - 3x + 12} \times \frac{x^2 - (2)^2}{3x^2 - 9x + 2x - 6} \\ &= \frac{3x(x-1) + 2(x-1)}{x(x-4) - 3(x-4)} \times \frac{(x+2)(x-2)}{3x(x-3) + 2(x-3)} \\ &\stackrel{2}{=} \frac{(x-1)(3x+2)}{(x-4)(x-3)} \times \frac{(x+2)(x-2)}{(x-3)(3x+2)} \\ &= \frac{(x-1)(x-2)(x+2)}{(x-3)^2(x-4)} \end{aligned}$$

Vi. $4x^2 - 11x + 6 \div 16x^2 - 9$

$$\begin{aligned} & \frac{4x^2 - 11x + 6}{16x^2 - 9} \\ &= \frac{4x^2 - 8x - 3x + 6}{(4x)^2 - (3)^2} \\ &= \frac{4x(x-2) - 3(x-2)}{(4x+3)(4x-3)} \\ &= \frac{(x-2)(4x-3)}{(4x+3)(4x-3)} \\ &= \frac{x-2}{4x+3} \end{aligned}$$

vii. $a^3 - 27 \div 5a^2 - 16a + 3 \div a^2 + 3a + 9$

$$\begin{aligned}
 & \frac{a^3 - 27}{5a^2 - 16a + 3} \div \frac{a^2 + 3a + 9}{25a^2 - 1} \\
 &= \frac{a^3 - 27}{5a^2 - 16a + 3} \times \frac{25a^2 - 1}{a^2 + 3a + 9} \\
 &= \frac{a^3 - (3)^3}{5a^2 - 15a - a + 3} \times \frac{(5a)^2 - 1^2}{a^2 + 3a + 9} \\
 &= \frac{(a - 3)[a^2 + (a)(3) + (3)^2]}{5a(a - 3) - 1(a - 3)} \times \frac{(5a + 1)(5a - 1)}{a^2 + 3a + 9} \\
 &= \frac{(a - 3)(a^2 + 3a + 9)}{(a - 3)(5a - 1)} \times \frac{(5a + 1)(5a - 1)}{a^2 + 3a + 9} \\
 &= \mathbf{5a + 1}
 \end{aligned}$$

viii. $1 - 2x + x^2 \div 1 - x^3 \times 1 + x + x^2 \div 1 + x$

$$\begin{aligned}
 & \frac{1 - 2x + x^2}{1 - x^3} \times \frac{1 + x + x^2}{1 + x} \\
 &= \frac{1 - x - x + x^2}{1^3 - x^3} \times \frac{1 + x + x^2}{1 + x} \\
 &= \frac{1(1 - x) - x(1 - x)}{(1 - x)[1^2 + (1)(x) + x^2]} \times \frac{1 + x + x^2}{1 + x} \\
 &= \frac{(1 - x)(1 - x)}{(1 - x)(1 + x + x^2)} \times \frac{1 + x + x^2}{1 + x} \\
 &= \mathbf{\frac{1 - x}{1 + x}}
 \end{aligned}$$