

Maharashtra Board Solutions Class 9-Maths

(Part 1): Chapter 3.6- Polynomials

BOOK SOLUTIONS
CLASS 9
MATHS

CHAPTER 3.6
Polynomials



Maharashtra Board Solutions→

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Maharashtra Board Solutions Class 9-Maths

(Part 1): Chapter 3.6- Polynomials

Class 9: Maths Chapter 3.6 solutions. Complete Class 9 Maths Chapter 3.6 Notes.

Maharashtra Board Solutions Class 9-Maths (Part 1): Chapter 3.6- Polynomials

Maharashtra Board 9th Maths Chapter 3.6, Class 9 Maths Chapter 3.6 solutions

Question 1.

Find the factors of the polynomials given below:

i. $2x^2 + x - 1$

ii. $2m^2 + 5m - 3$

iii. $12x^2 + 61x + 77$

iv. $3y^2 - 2y - 1$

v. $\sqrt{3}x^2 + 4x + \sqrt{3}$

vi. $12x^2 - 3x + 4$

Solution:

i. $2x^2 + x - 1$

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

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

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

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$$\begin{array}{r}
 2 \times -1 = -2 \\
 \swarrow \quad \searrow \\
 2 \quad -1 \\
 2 \times -1 = -2 \\
 2 - 1 = 1
 \end{array}$$

ii. $2m^2 + 5m - 3$

$$= 2m^2 + 6m - m - 3$$

$$= 2m(m + 3) - 1(m + 3)$$

$$= (m + 3)(2m - 1)$$

$$\begin{array}{r}
 2 \times -3 = -6 \\
 \swarrow \quad \searrow \\
 6 \quad -1 \\
 6 \times -1 = -6 \\
 6 - 1 = 5
 \end{array}$$

iii. $12x^2 + 61x + 77$

$$= 12x^2 + 28x + 33x + 77$$

$$= 4x(3x + 7) + 11(3x + 7)$$

$$= (3x + 7)(4x + 11)$$

$$\begin{array}{r}
 12 \times 77 = 4 \times 3 \times 11 \times 7 \\
 = 28 \times 33 \\
 \swarrow \quad \searrow \\
 28 \quad 33 \\
 28 + 33 = 61 \\
 28 \times 33 = 924
 \end{array}$$

iv. $3y^2 - 2y - 1$

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

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

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

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$$\begin{array}{r}
 3 \times -1 = -3 \\
 \swarrow \quad \searrow \\
 -3 \quad 1 \\
 -3 \times 1 = -3 \\
 -3 + 1 = -2
 \end{array}$$

$$\begin{aligned}
 \text{v. } & \sqrt{3} \times 2 + 4x + \sqrt{3} \\
 &= \sqrt{3} \times 2 + 3x + x + \sqrt{3} \\
 &= \sqrt{3} \times 2 + \sqrt{3} \times \sqrt{3}x + x + \sqrt{3} \\
 &= \sqrt{3}x(x + \sqrt{3}) + 1(x + \sqrt{3}) \\
 &= (x + \sqrt{3})(\sqrt{3}x + 1)
 \end{aligned}$$

$$\begin{array}{r}
 \sqrt{3} \times \sqrt{3} = 3 \\
 \swarrow \quad \searrow \\
 3 \quad 1 \\
 3 \times 1 = 3 \\
 3 + 1 = 4
 \end{array}$$

$$\begin{aligned}
 \text{vi. } & 12x^2 - 3x + 4 \\
 &= 12x^2 - 2x - x + 4 \\
 &= 12x^2 - 2 \times 2x - x + 4 \\
 &= 12x(x - 4) - 1(x - 4) \\
 &= (x - 4)(12x - 1)
 \end{aligned}$$

$$\begin{array}{r}
 \frac{1}{2} \times 4 = 2 \\
 \swarrow \quad \searrow \\
 -2 \quad -1 \\
 -2 \times -1 = 2 \\
 -2 - 1 = -3
 \end{array}$$

Alternate method

$$\begin{aligned}
 12x^2 - 3x + 4 &= 12(x^2 - 6x + 8) \\
 &= 12(x^2 - 4x - 2x + 8)
 \end{aligned}$$

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$$= 12 [x(x - 4) - 2(x - 4)]$$

$$= 12 (x - 2)(x - 4)$$

$$\begin{array}{cc} & 8 \\ & \swarrow \searrow \\ -4 & -2 \\ -4 \times -2 = 8 \\ -4 - 2 = -6 \end{array}$$

Question 2.

Factorize the following polynomials.

i. $(x^2 - x)^2 - 8(x^2 - x) + 12$

iii. $(x^2 - 6x)^2 - 8(x^2 - 6x + 8) - 64$

v. $(y + 2)(y - 3)(y + 8)(y + 3) + 56$

vii. $(x - 3)(x - 4)^2(x - 5) - 6$

Solution:

i. $(x^2 - x)^2 - 8(x^2 - x) + 12$

$$= m^2 - 8m + 12 \dots [\text{Putting } x^2 - x = m]$$

$$= m^2 - 6m - 2m + 12$$

$$= m(m - 6) - 2(m - 6)$$

$$= (m - 6)(m - 2)$$

$$= (x^2 - x - 6)(x^2 - x - 2) \dots [\text{Replacing } m = x^2 - x]$$

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

$$= [x(x - 3) + 2(x - 3)][x(x - 2) + 1(x - 2)]$$

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

ii. $(x - 5)^2 - (5x - 25) - 24$

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$$= (x - 5)^2 - (5x - 25) - 24$$

$$= (x - 5)^2 - 5(x - 5) - 24$$

$$= m^2 - 5m - 24 \dots [\text{Putting } x - 5 = m]$$

$$= m^2 - 8m + 3m - 24$$

$$= m(m - 8) + 3(m - 8)$$

$$= (m - 8)(m + 3)$$

$$= (x - 5 - 8)(x - 5 + 3) \dots [\text{Replacing } m = x - 5]$$

$$= (x - 13)(x - 2)$$

$$\begin{array}{c} -24 \\ \swarrow \quad \searrow \\ -8 \quad 3 \\ -8 + 3 = -5 \\ -8 \times 3 = -24 \end{array}$$

$$\text{iii. } (x^2 - 6x)^2 - 8(x^2 - 6x + 8) - 64$$

$$= m^2 - 8(m + 8) - 64 \dots [\text{Putting } x^2 - 6x = m]$$

$$= m^2 - 8m - 64 - 64$$

$$= m^2 - 8m - 128$$

$$= m^2 - 16m + 8m - 128$$

$$= m(m - 16) + 8(m - 16)$$

$$= (m - 16)(m + 8)$$

$$= (x^2 - 6x - 16)(x^2 - 6x + 8) \dots [\text{Replacing } m = x^2 - 6x]$$

$$= (x^2 - 8x + 2x - 16)(x^2 - 4x - 2x + 8)$$

$$= [x(x - 8) + 2(x - 8)][x(x - 4) - 2(x - 4)]$$

$$= (x - 8)(x + 2)(x - 4)(x - 2)$$

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$$\begin{aligned}\text{iv. } & (x^2 - 2x + 3)(x^2 - 2x + 5) - 35 \\ &= (m + 3)(m + 5) - 35 \dots [\text{Putting } x^2 - 2x = m] \\ &= m(m + 5) + 3(m + 5) - 35 \\ &= m^2 + 5m + 3m + 15 - 35 \\ &= m^2 + 8m - 20 \\ &= m^2 + 10m - 2m - 20 \\ &= m(m + 10) - 2(m + 10) \\ &= (m + 10)(m - 2) \\ &= (x^2 - 2x + 10)(x^2 - 2x - 2) \dots [\text{Replacing } m = x^2 - 2x]\end{aligned}$$

$$\begin{array}{cc} & -20 \\ & \wedge \\ 10 & -2 \\ 10 \times -2 = -20 \\ 10 - 2 = 8 \end{array}$$

$$\begin{aligned}\text{v. } & (y + 2)(y - 3)(y + 8)(y + 3) + 56 \\ &= (y + 2)(y + 3)(y - 3)(y + 8) + 56 \\ &= (y^2 + 3y + 2y + 6)(y^2 + 8y - 3y - 24) + 56 \\ &= (y^2 + 5y + 6)(y^2 + 5y - 24) + 56 \\ &= (m + 6)(m - 24) + 56 \dots [\text{Putting } y^2 + 5y = m] \\ &= m(m - 24) + 6(m - 24) + 56 \\ &= m^2 - 24m + 6m - 144 + 56 \\ &= m^2 - 18m - 88 \\ &= m^2 - 22m + 4m - 88 \\ &= m(m - 22) + 4(m - 22)\end{aligned}$$

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$$= (m - 22)(m + 4)$$

$$= (y^2 + 5y - 22)(y^2 + 5y + 4) \dots [\text{Replacing } m = y^2 + 5y]$$

$$= (y^2 + 5y - 22)(y^2 + 4y + y + 4)$$

$$= (y^2 + 5y - 22)[y(y + 4) + 1(y + 4)]$$

$$= (y^2 + 5y - 22)(y + 4)(y + 1)$$

$$\text{vi. } (y^2 + 5y)(y^2 + 5y - 2) - 24$$

$$= (m)(m - 2) - 24 \dots [\text{Putting } y^2 + 5y = m]$$

$$= m^2 - 2m - 24$$

$$= m^2 - 6m + 4m - 24$$

$$= m(m - 6) + 4(m - 6)$$

$$= (m - 6)(m + 4)$$

$$= (y^2 + 5y - 6)(y^2 + 5y + 4) \dots [\text{Replacing } m = y^2 + 5y]$$

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

$$= [y(y + 6) - 1(y + 6)][y(y + 4) + 1(y + 4)]$$

$$= (y + 6)(y - 1)(y + 4)(y + 1)$$

$$\text{vii. } (x - 3)(x - 4)^2(x - 5) - 6$$

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

$$= (x^2 - 5x - 3x + 15)(x^2 - 8x + 16) - 6$$

$$= (x^2 - 8x + 15)(x^2 - 8x + 16) - 6$$

$$= (m + 15)(m + 16) - 6 \dots [\text{Putting } x^2 - 8x = m]$$

$$= m(m + 16) + 15(m + 16) - 6$$

$$= m^2 + 16m + 15m + 240 - 6$$

$$= m^2 + 31m + 234$$

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$$= m^2 + 18m + 13m + 234$$

$$= m(m + 18) + 13(m + 18)$$

$$= (m + 18)(m + 13)$$

$$= (x^2 - 8x + 18)(x^2 - 8x + 13) \dots [\text{Replacing } m = x^2 - 8x]$$



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- Chapter 7.5- Statistics

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The Maharashtra State Board of Secondary and Higher Secondary Education or MSBSHSE (Marathi: महाराष्ट्र राज्य माध्यमिक आणि उच्च माध्यमिक शिक्षण मंडळ), is an **autonomous and statutory body established in 1965**. The board was amended in the year 1977 under the provisions of the Maharashtra Act No. 41 of 1965.

The Maharashtra State Board of Secondary & Higher Secondary Education (MSBSHSE), Pune is an independent body of the Maharashtra Government. There are more than 1.4 million students that appear in the examination every year. The Maha State Board conducts the board examination twice a year. This board conducts the examination for SSC and HSC.

The Maharashtra government established the Maharashtra State Bureau of Textbook Production and Curriculum Research, also commonly referred to as Ebalbharati, in 1967 to take up the responsibility of providing quality textbooks to students from all classes studying under the Maharashtra State Board. MSBHSE prepares and updates the curriculum to provide holistic development for students. It is designed to tackle the difficulty in understanding the

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concepts with simple language with simple illustrations. Every year around 10 lakh students are enrolled in schools that are affiliated with the Maharashtra State Board.

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As of now, the MSCERT and Balbharti are responsible for the syllabus and textbooks of Classes 1 to 8, while Classes 9 and 10 are under the Maharashtra State Board of Secondary and Higher Secondary Education (MSBSHSE).

How many state boards are there in Maharashtra?

The Maharashtra State Board of Secondary & Higher Secondary Education, conducts the HSC and SSC Examinations in the state of Maharashtra through its nine Divisional Boards located at Pune, Mumbai, Aurangabad, Nasik, Kolhapur, Amravati, Latur, Nagpur and Ratnagiri.

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