

Maharashtra Board Solutions Class 9-Maths

(Part 1): Chapter 3.3- Polynomials

BOOK SOLUTIONS
CLASS 9
MATHS

CHAPTER 3.3
Polynomials



Maharashtra Board Solutions→

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Maharashtra Board Solutions Class 9-Maths

(Part 1): Chapter 3.3- Polynomials

Class 9: Maths Chapter 3.3 solutions. Complete Class 9 Maths Chapter 3.3 Notes.

Maharashtra Board Solutions Class 9-Maths (Part 1): Chapter 3.3- Polynomials

Maharashtra Board 9th Maths Chapter 3.3, Class 9 Maths Chapter 3.3 solutions

Question 1.

Divide each of the following polynomials by synthetic division method and also by linear division method. Write the quotient and the remainder.

i. $(2m^2 - 3m + 10) \div (m - 5)$

ii. $(x^4 + 2x^3 + 3x^2 + 4x + 5) \div (x + 2)$

iii. $(y^3 - 216) \div (y - 6)$

iv. $(2x^4 + 3x^3 + 4x - 2x^2) \div (x + 3)$

v. $(x^4 - 3x^2 - 8) \div (x + 4)$

vi. $(y^3 - 3y^2 + 5y - 1) \div (y - 1)$

Solution:

i. Synthetic division:

$$(2m^2 - 3m + 10) \div (m - 5)$$

$$\text{Dividend} = 2m^2 - 3m + 10$$

$$\therefore \text{Coefficient form of dividend} = (2, -3, 10)$$

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$$\text{Divisor} = m - 5$$

$\therefore$ Opposite of -5 is 5.

5	2	-3	10
		10	35
	2	7	45

Coefficient form of quotient = (2, 7)

$\therefore$ Quotient = $2m + 7$,

Remainder = 45

Linear division method:

$$2m^2 - 3m + 10$$

To get the term $2m^2$, multiply $(m - 5)$ by $2m$ and add $10m$,

$$= 2m(m - 5) + 10m - 3m + 10$$

$$= 2m(m - 5) + 7m + 10$$

To get the term $7m$, multiply $(m - 5)$ by 7 and add 35

$$= 2m(m - 5) + 7(m - 5) + 35 + 10$$

$$= (m - 5)(2m + 7) + 45$$

$\therefore$ Quotient = $2m + 7$,

Remainder = 45

ii. Synthetic division:

$$(x^4 + 2x^3 + 3x^2 + 4x + 5) \div (x + 2)$$

$$\text{Dividend} = x^4 + 2x^3 + 3x^2 + 4x + 5$$

$\therefore$ Coefficient form of dividend = (1, 2, 3, 4, 5)

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Divisor = $x + 2$

$\therefore$ Opposite of $+2$ is -2 .

-2	1	2	3	4	5
		-2	0	-6	4
	1	0	3	-2	9

Coefficient form of quotient = $(1, 0, 3, -2)$

$\therefore$ Quotient = $x^3 + 3x - 2$,

Remainder = 9

Linear division method:

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

To get the term x^4 , multiply $(x + 2)$ by x^3 and subtract $2x^3$,

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

$$= x^3(x + 2) + 3x^2 + 4x + 5$$

To get the term $3x^2$, multiply $(x + 2)$ by $3x$ and subtract $6x$,

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

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

To get the term $-2x$, multiply $(x + 2)$ by -2 and add 4 ,

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

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

$\therefore$ Quotient = $x^3 + 3x - 2$,

Remainder = 9

iii. Synthetic division:

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$$(y^3 - 216) \div (y - 6)$$

$$\text{Dividend} = y^3 - 216$$

$$\therefore \text{Index form} = y^3 + 0y^2 + 0y - 216$$

$$\therefore \text{Coefficient form of dividend} = (1, 0, 0, -216)$$

$$\text{Divisor} = y - 6$$

$$\therefore \text{Opposite of } -6 \text{ is } 6.$$

6	1	0	0	-216
		6	36	216
	1	6	36	0

$$\text{Coefficient form of quotient} = (1, 6, 36)$$

$$\therefore \text{Quotient} = y^2 + 6y + 36,$$

$$\text{Remainder} = 0$$

Linear division method:

$$y^3 - 216$$

To get the term y^3 , multiply $(y - 6)$ by y^2 and add $6y^2$,

$$= y^2(y - 6) + 6y^2 - 216$$

$$= y^2(y - 6) + 6y^2 - 216$$

To get the term $6y^2$ multiply $(y - 6)$ by $6y$ and add $36y$,

$$= y^2(y - 6) + 6y(y - 6) + 36y - 216$$

$$= y^2(y - 6) + 6y(y - 6) + 36y - 216$$

To get the term $36y$, multiply $(y - 6)$ by 36 and add 216 ,

$$= y^2(y - 6) + 6y(y - 6) + 36(y - 6) + 216 - 216$$

$$= (y - 6)(y^2 + 6y + 36) + 0$$

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$$\text{Quotient} = y^2 + 6y + 36$$

$$\text{Remainder} = 0$$

iv. Synthetic division:

$$(2x^4 + 3x^3 + 4x - 2x^2) \div (x + 3)$$

$$\text{Dividend} = 2x^4 + 3x^3 + 4x - 2x^2$$

$$\therefore \text{Index form} = 2x^4 + 3x^3 - 2x^2 + 4x + 0$$

$$\therefore \text{Coefficient form of the dividend} = (2, 3, -2, 4, 0)$$

$$\text{Divisor} = x + 3$$

$$\therefore \text{Opposite of } +3 \text{ is } -3$$

-3	2	3	-2	4	0
		-6	9	-21	51
	2	-3	7	-17	51

$$\text{Coefficient form of quotient} = (2, -3, 7, -17)$$

$$\therefore \text{Quotient} = 2x^3 - 3x^2 + 7x - 17,$$

$$\text{Remainder} = 51$$

Linear division method:

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

To get the term $2x^4$, multiply $(x + 3)$ by $2x^3$ and subtract $6x^3$,

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

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

To get the term $-3x^3$, multiply $(x + 3)$ by $-3x^2$ and add $9x^2$,

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

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

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To get the term $7x^2$, multiply $(x + 3)$ by $7x$ and subtract $21x$,

$$= 2x^3(x + 3) - 3x^2(x + 3) + 7x(x + 3) - 21x + 4x$$

$$= 2x^3(x + 3) - 3x^2(x + 3) + 7x(x + 3) - 17x$$

To get the term $-17x$, multiply $(x + 3)$ by -17 and add 51 ,

$$= 2x^3(x + 3) - 3x^2(x + 3) + 7x(x + 3) - 17(x + 3) + 51$$

$$= (x + 3)(2x^3 - 3x^2 + 7x - 17) + 51$$

$$\therefore \text{Quotient} = 2x^3 - 3x^2 + 7x - 17,$$

$$\text{Remainder} = 51$$

v. Synthetic division:

$$(x^4 - 3x^2 - 8) \div (x + 4)$$

$$\text{Dividend} = x^4 - 3x^2 - 8$$

$$\therefore \text{Index form} = x^4 + 0x^3 - 3x^2 + 0x - 8$$

$$\therefore \text{Coefficient form of the dividend} = (1, 0, -3, 0, -8)$$

$$\text{Divisor} = x + 4$$

$$\therefore \text{Opposite of } +4 \text{ is } -4$$

-4	1	0	-3	0	-8
		-4	16	-52	208
	1	-4	13	-52	200

$$\therefore \text{Coefficient form of quotient} = (1, -4, 13, -52)$$

$$\therefore \text{Quotient} = x^3 - 4x^2 + 13x - 52,$$

$$\text{Remainder} = 200$$

Linear division method:

$$x^4 - 3x^2 - 8$$

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To get the term x^4 , multiply $(x + 4)$ by x^3 and subtract $4x^3$,

$$= x^3(x + 4) - 4x^3 - 3x^2 - 8$$

$$= x^3(x + 4) - 4x^3 - 3x^2 - 8$$

To get the term $-4x^3$, multiply $(x + 4)$ by $-4x^2$ and add $16x^2$,

$$= x^3(x + 4) - 4x^2(x + 4) + 16x^2 - 3x^2 - 8$$

$$= x^3(x + 4) - 4x^2(x + 4) + 13x^2 - 8$$

To get the term $13x^2$, multiply $(x + 4)$ by $13x$ and subtract $52x$,

$$= x^3(x + 4) - 4x^2(x + 4) + 13x(x + 4) - 52x - 8$$

$$= x^3(x + 4) - 4x^2(x + 4) + 13x(x + 4) - 52x - 8$$

To get the term $-52x$, multiply $(x + 4)$ by -52 and add 208 ,

$$= x^3(x + 4) - 4x^2(x + 4) + 13x(x + 4) - 52(x + 4) + 208 - 8$$

$$= (x + 4)(x^3 - 4x^2 + 13x - 52) + 200$$

$$\therefore \text{Quotient} = x^3 - 4x^2 + 13x - 52,$$

Remainder 200

vi. Synthetic division:

$$(y^3 - 3y^2 + 5y - 1) \div (y - 1)$$

$$\text{Dividend} = y^3 - 3y^2 + 5y - 1$$

$$\text{Coefficient form of the dividend} = (1, -3, 5, -1)$$

$$\text{Divisor} = y - 1$$

$$\therefore \text{Opposite of } -1 \text{ is } 1.$$

$$\begin{array}{r|rrrrr}
 1 & 1 & -3 & 5 & -1 & \\
 & & 1 & -2 & 3 & \\
 \hline
 & 1 & -2 & 3 & 2 &
 \end{array}$$

$\therefore$ Coefficient form of quotient = (1, -2, 3)

$\therefore$ Quotient = $y^2 - 2y + 3$,

Remainder = 2

Linear division method:

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

To get the term y^3 , multiply $(y - 1)$ by y^2 and add y^2

$$= y^2(y - 1) + y^2 - 3y^2 + 5y - 1$$

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

To get the term $-2y^2$, multiply $(y - 1)$ by $-2y$ and subtract $2y$,

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

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

To get the term $3y$, multiply $(y - 1)$ by 3 and add 3 ,

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

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

$\therefore$ Quotient = $y^2 - 2y + 3$,

Remainder = 2.



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- Chapter 7.5- Statistics

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