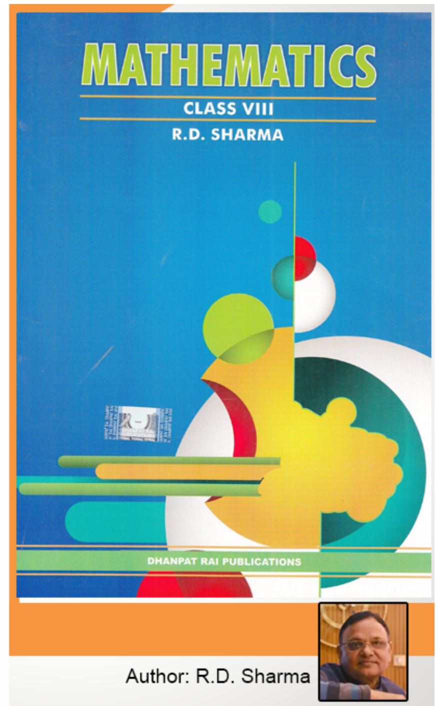
Class 8 - Chapter 8 Division of Algebraic Expressions



RD Sharma Solutions for Class 8 Maths Chapter 8–Division of Algebraic Expressions

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EXERCISE 8.1 PAGE NO: 8.2

1. Write the degree of each of the following polynomials:

(i) $2x^3 + 5x^2 – 7$

(ii) $5x^2 – 3x + 2$

(iii) $2x + x^2 – 8$

(iv) $1/2y^7 – 12y^6 + 48y^5 – 10$

(v) $3x^3 + 1$

(vi) 5

(vii) $20x^3 + 12x^2y^2 – 10y^2 + 20$

Solution:

(i) $2x^3 + 5x^2 – 7$

We know that in a polynomial, degree is the highest power of the variable.

The degree of the polynomial, $2x^3 + 5x^2 – 7$ is 3.

(ii) $5x^2 – 3x + 2$

The degree of the polynomial, $5x^2 – 3x + 2$ is 2.

(iii) $2x + x^2 – 8$

The degree of the polynomial, $2x + x^2 – 8$ is 2.

(iv) $1/2y^7 – 12y^6 + 48y^5 – 10$

The degree of the polynomial, $1/2y^7 – 12y^6 + 48y^5 – 10$ is 7.

(v) $3x^3 + 1$

The degree of the polynomial, $3x^3 + 1$ is 3

(vi) 5

The degree of the polynomial, 5 is 0 (since 5 is a constant number).

(vii) $20x^3 + 12x^2y^2 – 10y^2 + 20$

The degree of the polynomial, $20x^3 + 12x^2y^2 – 10y^2 + 20$ is 4.

2. Which of the following expressions are not polynomials?

(i) $x^2 + 2x^{-2}$

(ii) $\sqrt{(ax)} + x^2 – x^3$

(iii) $3y^3 – \sqrt{5}y + 9$

(iv) $ax^{1/2} + ax + 9x^2 + 4$

(v) $3x^{-3} + 2x^{-1} + 4x + 5$

Solution:

(i) $x^2 + 2x^{-2}$

The given expression is not a polynomial.

Because a polynomial does not contain any negative powers or fractions.

(ii) $\sqrt{(ax)} + x^2 – x^3$

The given expression is a polynomial.

Because the polynomial has positive powers.

(iii) $3y^3 – \sqrt{5}y + 9$

The given expression is a polynomial.

Because the polynomial has positive powers.

(iv) $ax^{1/2} + ax + 9x^2 + 4$

The given expression is not a polynomial.

Because a polynomial does not contain any negative powers or fractions.

(v) $3x^{-3} + 2x^{-1} + 4x + 5$

The given expression is not a polynomial.

Because a polynomial does not contain any negative powers or fractions.

3. Write each of the following polynomials in the standard from. Also, write their degree:

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

(ii) $a^2 + 4 + 5a^6$

(iii) $(x^3 – 1) (x^3 – 4)$

(iv) $(y^3 – 2) (y^3 + 11)$

(v) $(a^3 – 3/8) (a^3 + 16/17)$

(vi) $(a + 3/4) (a + 4/3)$

Solution:

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

The standard form of the polynomial is written in either increasing or decreasing order of their powers.

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

The degree of the given polynomial is 4.

(ii) $a^2 + 4 + 5a^6$

The standard form of the polynomial is written in either increasing or decreasing order of their powers.

$4 + a^2 + 5a^6$ or $5a^6 + a^2 + 4$

The degree of the given polynomial is 6.

(iii) $(x^3 – 1) (x^3 – 4)$

$x^6 – 4x^3 – x^3 + 4$

$x^6 – 5x^3 + 4$

The standard form of the polynomial is written in either increasing or decreasing order of their powers.

$x^6 – 5x^3 + 4$ or $4 – 5x^3 + x^6$

The degree of the given polynomial is 6.

(iv) $(y^3 – 2) (y^3 + 11)$

$y^6 + 11y^3 – 2y^3 – 22$

$y^6 + 9y^3 – 22$

The standard form of the polynomial is written in either increasing or decreasing order of their powers.

$y^6 + 9y^3 – 22$ or $-22 + 9y^3 + y^6$

The degree of the given polynomial is 6.

(v) $(a^3 – 3/8) (a^3 + 16/17)$

$a^6 + 16a^3/17 – 3a^3/8 – 6/17$

$a^6 + 77/136a^3 – 48/136$

The standard form of the polynomial is written in either increasing or decreasing order of their powers.

$a^6 + 77/136a^3 – 48/136$ or $-48/136 + 77/136a^3 + a^6$

The degree of the given polynomial is 6.

(vi) $(a + 3/4) (a + 4/3)$

$a^2 + 4a/3 + 3a/4 + 1$

$a^2 + 25a/12 + 1$

The standard form of the polynomial is written in either increasing or decreasing order of their powers.

$a^2 + 25a/12 + 1$ or $1 + 25a/12 + a^2$

The degree of the given polynomial is 2.

EXERCISE 8.2 PAGE NO: 8.4

Divide:

1. $6x^3y^2z^2$ by $3x^2yz$

Solution:

We have,

$6x^3y^2z^2 / 3x^2yz$

By using the formula $a^n / a^m = a^{n-m}$

$6/3\ x^{3-2}\ y^{2-1}\ z^{2-1}$

$2xyz$

2. $15m^2n^3$ by $5m^2n^2$

Solution:

We have,

$15m^2n^3 / 5m^2n^2$

By using the formula $a^n / a^m = a^{n-m}$

$15/5\ m^{2-2}\ n^{3-2}$

$3n$

3. $24a^3b^3$ by $-8ab$

Solution:

We have,

$24a^3b^3$ / $-8ab$

By using the formula a^n / a^m = a^{n-m}

$24/-8\ a^{3-1}\ b^{3-1}$

$-3a^2b^2$

4. $-21abc^2$ by $7abc$

Solution:

We have,

$-21abc^2$ / $7abc$

By using the formula a^n / a^m = a^{n-m}

$-21/7\ a^{1-1}\ b^{1-1}\ c^{2-1}$

$-3c$

5. $72xyz^2$ by $-9xz$

Solution:

We have,

$72xyz^2$ / $-9xz$

By using the formula a^n / a^m = a^{n-m}

$72/-9\ x^{1-1}\ y\ z^{2-1}$

$-8yz$

6. $-72a^4b^5c^8$ by $-9a^2b^2c^3$

Solution:

We have,

$-72a^4b^5c^8$ / $-9a^2b^2c^3$

By using the formula $a^n / a^m = a^{n-m}$

$-72/-9\ a^{4-2}\ b^{5-2}\ c^{8-3}$

$8a^2b^3c^5$

Simplify:

7. $16m^3y^2 / 4m^2y$

Solution:

We have,

$16m^3y^2 / 4m^2y$

By using the formula $a^n / a^m = a^{n-m}$

$16/4\ m^{3-2}\ y^{2-1}$

$4my$

8. $32m^2n^3p^2 / 4mnp$

Solution:

We have,

$32m^2n^3p^2 / 4mnp$

By using the formula $a^n / a^m = a^{n-m}$

$32/4\ m^{2-1}\ n^{3-1}\ p^{2-1}$

$8mn^2p$

EXERCISE 8.3 PAGE NO: 8.6

Divide:

1. $x + 2x^2 + 3x^4 – x^5$ by $2x$

Solution:

We have,

$(x + 2x^2 + 3x^4 – x^5) / 2x$

$x/2x + 2x^2/2x + 3x^4/2x – x^5/2x$

By using the formula $a^n / a^m = a^{n-m}$

$1/2\ x^{1-1} + x^{2-1} + 3/2\ x^{4-1} – 1/2\ x^{5-1}$

$1/2 + x + 3/2\ x^3 – 1/2\ x^4$

2. $y^4 – 3y^3 + 1/2y^2$ by 3y

Solution:

We have,

$(y^4 – 3y^3 + 1/2y^2)/ 3y$

$y^4/3y – 3y^3/3y + (½)y^2/3y$

By using the formula $a^n / a^m = a^{n-m}$

$1/3\ y^{4-1} – y^{3-1} + 1/6\ y^{2-1}$

$1/3y^3 – y^2 + 1/6y$

3. $-4a^3 + 4a^2 + a$ by 2a

Solution:

We have,

$(-4a^3 + 4a^2 + a) / 2a$

$-4a^3/2a + 4a^2/2a + a/2a$

By using the formula $a^n / a^m = a^{n-m}$

$-2a^{3-1} + 2a^{2-1} + 1/2\ a^{1-1}$

$-2a^2 + 2a + ½$

4. $–x^6 + 2x^4 + 4x^3 + 2x^2$ by $\sqrt{2}x^2$

Solution:

We have,

$(–x^6 + 2x^4 + 4x^3 + 2x^2) / \sqrt{2}x^2$

$-x^6/\sqrt{2}x^2 + 2x^4/\sqrt{2}x^2 + 4x^3/\sqrt{2}x^2 + 2x^2/\sqrt{2}x^2$

By using the formula $a^n / a^m = a^{n-m}$

$-1/\sqrt{2}\ x^{6-2} + 2/\sqrt{2}\ x^{4-2} + 4/\sqrt{2}\ x^{3-2} + 2/\sqrt{2}\ x^{2-2}$

$-1/\sqrt{2}\ x^4 + \sqrt{2}x^2 + 2\sqrt{2}x + \sqrt{2}$

5. $-4a^3 + 4a^2 + a$ by $2a$

Solution:

We have,

$(-4a^3 + 4a^2 + a) / 2a$

$-4a^3/2a + 4a^2/2a + a/2a$

By using the formula $a^n / a^m = a^{n-m}$

$-2a^{3-1} + 2a^{2-1} + 1/2a^{1-1}$

$-2a^2 + 2a + ½$

6. $\sqrt{3}a^4 + 2\sqrt{3}a^3 + 3a^2 – 6a$ by $3a$

Solution:

We have,

$(\sqrt{3}a^4 + 2\sqrt{3}a^3 + 3a^2 – 6a) / 3a$

$\sqrt{3}a^4/3a + 2\sqrt{3}a^3/3a + 3a^2/3a – 6a/3a$

By using the formula $a^n / a^m = a^{n-m}$

$\sqrt{3}/3\ a^{4-1} + 2\sqrt{3}/3\ a^{3-1} + a^{2-1} – 2a^{1-1}$

$1/\sqrt{3}\ a^3 + 2/\sqrt{3}\ a^2 + a – 2$

EXERCISE 8.4 PAGE NO: 8.11

Divide:

1. $5x^3 – 15x^2 + 25x$ by $5x$

Solution:

We have,

$(5x^3 – 15x^2 + 25x) / 5x$

$5x^3/5x – 15x^2/5x + 25x/5x$

By using the formula $a^n / a^m = a^{n-m}$

$5/5\ x^{3-1} – 15/5\ x^{2-1} + 25/5\ x^{1-1}$

$x^2 – 3x + 5$

2. $4z^3 + 6z^2 – z$ by $-1/2z$

Solution:

We have,

$(4z^3 + 6z^2 – z) / -1/2z$

$4z^3/(-1/2z) + 6z^2/(-1/2z) – z/(-1/2z)$

By using the formula $a^n / a^m = a^{n-m}$

$-8\ z^{3-1} – 12z^{2-1} + 2\ z^{1-1}$

$-8z^2 – 12z + 2$

3. $9x^2y - 6xy + 12xy^2$ by $-3/2xy$

Solution:

We have,

$(9x^2y - 6xy + 12xy^2) / -3/2xy$

$9x^2y/(-3/2xy) - 6xy/(-3/2xy) + 12xy^2/(-3/2xy)$

By using the formula $a^n / a^m = a^{n-m}$

$(-9\times2)/3\ x^{2-1}y^{1-1} - (-6\times2)/3\ x^{1-1}y^{1-1} + (-12\times2)/3\ x^{1-1}y^{2-1}$

$-6x + 4 - 8y$

4. $3x^3y^2 + 2x^2y + 15xy$ by $3xy$

Solution:

We have,

$(3x^3y^2 + 2x^2y + 15xy) / 3xy$

$3x^3y^2/3xy + 2x^2y/3xy + 15xy/3xy$

By using the formula $a^n / a^m = a^{n-m}$

$3/3\ x^{3-1}y^{2-1} + 2/3\ x^{2-1}y^{1-1} + 15/3\ x^{1-1}y^{1-1}$

$x^2y + 2/3x + 5$

5. $x^2 + 7x + 12$ by $x + 4$

Solution:

We have,

$(x^2 + 7x + 12) / (x + 4)$

By using long division method

$\therefore (x^2 + 7x + 12) / (x + 4) = x + 3$

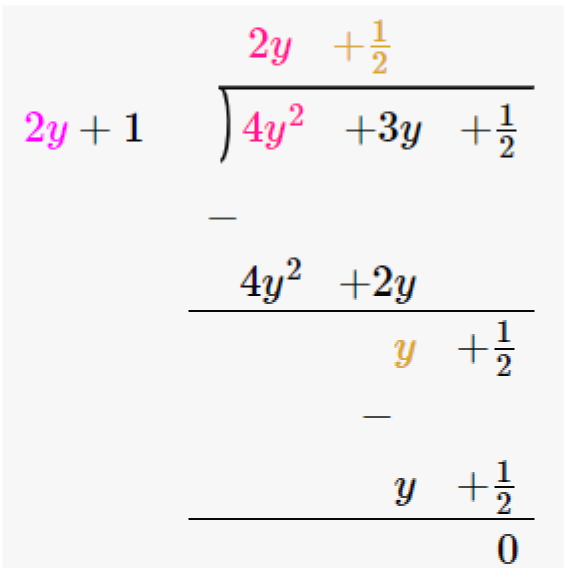
6. $4y^2 + 3y + 1/2$ by $2y + 1$

Solution:

We have,

$4y^2 + 3y + 1/2$ by $(2y + 1)$

By using long division method



∴ $(4y^2 + 3y + 1/2) / (2y + 1) = 2y + 1/2$

7. $3x^3 + 4x^2 + 5x + 18$ by $x + 2$

Solution:

We have,

$(3x^3 + 4x^2 + 5x + 18) / (x + 2)$

By using long division method

$$
\begin{array}{r|l}
 & 3x^2 \quad -2x \quad +9 \\
x+2 & 3x^3 \quad +4x^2 \quad +5x \quad +18 \\
 & - \\
 & 3x^3 \quad +6x^2 \\
\hline
 & \quad -2x^2 \quad +5x \quad +18 \\
 & - \\
 & \quad -2x^2 \quad -4x \\
\hline
 & \quad 9x \quad +18 \\
 & - \\
 & \quad 9x \quad +18 \\
\hline
 & 0
\end{array}
$$

∴ $(3x^3 + 4x^2 + 5x + 18) / (x + 2) = 3x^2 – 2x + 9$

8. $14x^2 – 53x + 45$ by $7x – 9$

Solution:

We have,

$(14x^2 – 53x + 45) / (7x – 9)$

By using long division method

$$
\begin{array}{r|llll}
 & 2x & -5 & & \\
7x-9 & 14x^2 & -53x & +45 & \\
 & - & & & \\
 & 14x^2 & -18x & & \\
\hline
 & & -35x & +45 & \\
 & & - & & \\
 & & -35x & +45 & \\
\hline
 & & & 0 &
\end{array}
$$

∴ $(14x^2 – 53x + 45) / (7x – 9) = 2x – 5$

9. -21 + 71x – 31x² – 24x³ by 3 – 8x

Solution:

We have,

$-21 + 71x – 31x^2 – 24x^3$ by $3 – 8x$

$(-24x^3 – 31x^2 + 71x – 21) / (3 – 8x)$

By using long division method

$$
\begin{array}{r|llll}
 & 3x^2 & +5x & -7 & \\
\hline
-8x+3 & -24x^3 & -31x^2 & +71x & -21 \\
 & - & & & \\
 & -24x^3 & +9x^2 & & \\
\hline
 & & -40x^2 & +71x & -21 \\
 & & - & & \\
 & & -40x^2 & +15x & \\
\hline
 & & & 56x & -21 \\
 & & & - & \\
 & & & 56x & -21 \\
\hline
 & & & & 0
\end{array}
$$

∴ $(-24x^3 - 31x^2 + 71x - 21) / (3 - 8x) = 3x^2 + 5x - 7$

10. $3y^4 - 3y^3 - 4y^2 - 4y$ by $y^2 - 2y$

Solution:

We have,

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

By using long division method

$$
\begin{array}{r|l}
 & \quad 3y^2 \quad +3y \quad +2 \\
\hline
y^2 - 2y & 3y^4 \quad -3y^3 \quad -4y^2 \quad -4y \quad +0 \\
 & - \\
 & 3y^4 \quad -6y^3 \\
\hline
 & \qquad\quad 3y^3 \quad -4y^2 \quad -4y \quad +0 \\
 & \qquad\quad - \\
 & \qquad\quad 3y^3 \quad -6y^2 \\
\hline
 & \qquad\qquad\qquad 2y^2 \quad -4y \quad +0 \\
 & \qquad\qquad\qquad - \\
 & \qquad\qquad\qquad 2y^2 \quad -4y \\
\hline
 & \qquad\qquad\qquad\qquad\qquad 0
\end{array}
$$

∴ $(3y^4 – 3y^3 – 4y^2 – 4y) / (y^2 – 2y) = 3y^2 + 3y + 2$

11. $2y^5 + 10y^4 + 6y^3 + y^2 + 5y + 3$ by $2y^3 + 1$

Solution:

We have,

$(2y^5 + 10y^4 + 6y^3 + y^2 + 5y + 3) / (2y^3 + 1)$

By using long division method

$$
\begin{array}{r|rrrrrr}
 & y^2 & +5y & +3 & & & \\
\hline
2y^3+1 & 2y^5 & +10y^4 & +6y^3 & +y^2 & +5y & +3 \\
 & - & & & & & \\
 & 2y^5 & +0y^4 & +0y^3 & +y^2 & & \\
\hline
 & & 10y^4 & +6y^3 & +0y^2 & +5y & +3 \\
 & & - & & & & \\
 & & 10y^4 & +0y^3 & +0y^2 & +5y & \\
\hline
 & & & 6y^3 & +0y^2 & +0y & +3 \\
 & & & - & & & \\
 & & & 6y^3 & +0y^2 & +0y & +3 \\
\hline
 & & & & & & 0
\end{array}
$$

∴ $(2y^5 + 10y^4 + 6y^3 + y^2 + 5y + 3) / (2y^3 + 1) = y^2 + 5y + 3$

12. $x^4 - 2x^3 + 2x^2 + x + 4$ by $x^2 + x + 1$

Solution:

We have,

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

By using long division method

$$
\begin{array}{r|lllll}
 & x^2 & -3x & +4 & & \\
\hline
x^2+x+1 & x^4 & -2x^3 & +2x^2 & +x & +4 \\
 & - & & & & \\
 & x^4 & +x^3 & +x^2 & & \\
\hline
 & & -3x^3 & +x^2 & +x & +4 \\
 & & - & & & \\
 & & -3x^3 & -3x^2 & -3x & \\
\hline
 & & & 4x^2 & +4x & +4 \\
 & & & - & & \\
 & & & 4x^2 & +4x & +4 \\
\hline
 & & & & & 0
\end{array}
$$

∴ $(x^4 – 2x^3 + 2x^2 + x + 4) / (x^2 + x + 1) = x^2 – 3x + 4$

13. $m^3 – 14m^2 + 37m – 26$ by $m^2 – 12m + 13$

Solution:

We have,

$(m^3 – 14m^2 + 37m – 26) / (m^2 – 12m + 13)$

By using long division method

$$
\begin{array}{r|rrrr}
 & m & -2 & & \\
\hline
m^2 - 12m + 13 & m^3 & -14m^2 & +37m & -26 \\
 & - & & & \\
 & m^3 & -12m^2 & +13m & \\
\hline
 & & -2m^2 & +24m & -26 \\
 & & - & & \\
 & & -2m^2 & +24m & -26 \\
\hline
 & & & & 0
\end{array}
$$

∴ $(m^3 - 14m^2 + 37m - 26) / (m^2 - 12m + 13) = m - 2$

14. $x^4 + x^2 + 1$ by $x^2 + x + 1$

Solution:

We have,

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

By using long division method

$$
\begin{array}{r|rrrrr}
 & x^2 & -x & +1 & & \\
\hline
x^2+x+1 & x^4 & +0x^3 & +x^2 & +0x & +1 \\
 & - & & & & \\
 & x^4 & +x^3 & +x^2 & & \\
\hline
 & & -x^3 & +0x^2 & +0x & +1 \\
 & & - & & & \\
 & & -x^3 & -x^2 & -x & \\
\hline
 & & & x^2 & +x & +1 \\
 & & & - & & \\
 & & & x^2 & +x & +1 \\
\hline
 & & & & & 0
\end{array}
$$

∴ $(x^4 + x^2 + 1) / (x^2 + x + 1) = x^2 – x + 1$

15. $x^5 + x^4 + x^3 + x^2 + x + 1$ by $x^3 + 1$

Solution:

We have,

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

By using long division method

$$
\begin{array}{r|l}
 & x^2 \quad +x \quad +1 \\
x^3+1 & x^5 \quad +x^4 \quad +x^3 \quad +x^2 \quad +x \quad +1 \\
 & - \\
 & x^5 \quad +0x^4 \quad +0x^3 \quad +x^2 \\
\hline
 & \qquad\qquad +x^3 \quad +0x^2 \quad +x \quad +1 \\
 & \qquad - \\
 & \qquad x^4 \quad +0x^3 \quad +0x^2 \quad +x \\
\hline
 & \qquad\qquad x^3 \quad +0x^2 \quad +0x \quad +1 \\
 & \qquad\qquad - \\
 & \qquad\qquad x^3 \quad +0x^2 \quad +0x \quad +1 \\
\hline
 & \qquad\qquad\qquad\qquad\qquad 0
\end{array}
$$

∴ $(x^5 + x^4 + x^3 + x^2 + x + 1) / (x^3 + 1) = x^2 + x + 1$

Divide each of the following and find the quotient and remainder:

16. $14x^3 – 5x^2 + 9x – 1$ by $2x – 1$

Solution:

We have,

$(14x^3 – 5x^2 + 9x – 1) / (2x – 1)$

By using long division method

$$
\begin{array}{r|llll}
 & 7x^2 & +x & +5 & \\
\hline
2x-1 & 14x^3 & -5x^2 & +9x & -1 \\
 & - & & & \\
 & 14x^3 & -7x^2 & & \\
\hline
 & & 2x^2 & +9x & -1 \\
 & & - & & \\
 & & 2x^2 & -x & \\
\hline
 & & & 10x & -1 \\
 & & & - & \\
 & & & 10x & -5 \\
\hline
 & & & & 4
\end{array}
$$

∴ Quotient is $7x^2 + x + 5$ and the Remainder is 4.

17. $6x^3 – x^2 – 10x – 3$ by $2x – 3$

Solution:

We have,

$(6x^3 – x^2 – 10x – 3) / (2x – 3)$

By using long division method

$$
\begin{array}{r|llll}
 & 3x^2 & +4x & +1 & \\
\hline
2x-3 & 6x^3 & -x^2 & -10x & -3 \\
 & - & & & \\
 & 6x^3 & -9x^2 & & \\
\hline
 & & 8x^2 & -10x & -3 \\
 & & - & & \\
 & & 8x^2 & -12x & \\
\hline
 & & & 2x & -3 \\
 & & & - & \\
 & & & 2x & -3 \\
\hline
 & & & & 0
\end{array}
$$

∴ Quotient is $3x^2 + 4x + 1$ and the Remainder is 0.

18. $6x^3 + 11x^2 – 39x – 65$ by $3x^2 + 13x + 13$

Solution:

We have,

$(6x^3 + 11x^2 – 39x – 65) / (3x^2 + 13x + 13)$

By using long division method

$$
\begin{array}{r|llll}
 & 2x & -5 & & \\
\cline{2-5}
3x^2 + 13x + 13 & 6x^3 & +11x^2 & -39x & -65 \\
 & - & & & \\
 & 6x^3 & +26x^2 & +26x & \\
\cline{2-5}
 & & -15x^2 & -65x & -65 \\
 & & - & & \\
 & & -15x^2 & -65x & -65 \\
\cline{2-5}
 & & & & 0
\end{array}
$$

∴ Quotient is 2x – 5 and the Remainder is 0.

19. $30x^4 + 11x^3 – 82x^2 – 12x + 48$ by $3x^2 + 2x – 4$

Solution:

We have,

$(30x^4 + 11x^3 – 82x^2 – 12x + 48) / (3x^2 + 2x – 4)$

By using long division method

$$
\begin{array}{r|llllll}
 & 10x^2 & -3x & -12 & & \\
\hline
3x^2+2x-4 & 30x^4 & +11x^3 & -82x^2 & -12x & +48 \\
 & - & & & & \\
 & 30x^4 & +20x^3 & -40x^2 & & \\
\hline
 & & -9x^3 & -42x^2 & -12x & +48 \\
 & & - & & & \\
 & & -9x^3 & -6x^2 & +12x & \\
\hline
 & & & -36x^2 & -24x & +48 \\
 & & & - & & \\
 & & & -36x^2 & -24x & +48 \\
\hline
 & & & & & 0
\end{array}
$$

∴ Quotient is $10x^2 – 3x – 12$ and the Remainder is 0.

20. $9x^4 – 4x^2 + 4$ by $3x^2 – 4x + 2$

Solution:

We have,

$(9x^4 – 4x^2 + 4) / (3x^2 – 4x + 2)$

By using long division method

$$
\begin{array}{r|lllll}
 & 3x^2 & +4x & +2 & & \\
\hline
3x^2 - 4x + 2 & 9x^4 & +0x^3 & -4x^2 & +0x & +4 \\
 & - & & & & \\
 & 9x^4 & -12x^3 & +6x^2 & & \\
\hline
 & & 12x^3 & -10x^2 & +0x & +4 \\
 & & - & & & \\
 & & 12x^3 & -16x^2 & +8x & \\
\hline
 & & & 6x^2 & -8x & +4 \\
 & & & - & & \\
 & & & 6x^2 & -8x & +4 \\
\hline
 & & & & & 0
\end{array}
$$

∴ Quotient is $3x^2 + 4x + 2$ and the Remainder is 0.

21. Verify division algorithm i.e. Dividend = Divisor × Quotient + Remainder, in each of the following. Also, write the quotient and remainder:

Dividend divisor

(i) $14x^2 + 13x – 15$ $7x – 4$

(ii) $15z^3 – 20z^2 + 13z – 12$ $3z – 6$

(iii) $6y^5 – 28y^3 + 3y^2 + 30y – 9$ $2x^2 – 6$

(iv) $34x – 22x^3 – 12x^4 – 10x^2 – 75$ $3x + 7$

(v) $15y^4 – 16y^3 + 9y^2 – 10/3y + 6$ $3y – 2$

(vi) $4y^3 + 8y + 8y^2 + 7$ $2y^2 – y + 1$

(vii) $6y^4 + 4y^4 + 4y^3 + 7y^2 + 27y + 6$ $2y^3 + 1$

Solution:

(i) Dividend divisor

$14x^2 + 13x – 15$ $7x – 4$

By using long division method

$$
\begin{array}{r|llll}
 & 2x & +3 & & \\
\hline
7x-4 & 14x^2 & +13x & -15 & \\
 & - & & & \\
 & 14x^2 & -8x & & \\
\hline
 & & 21x & -15 & \\
 & & - & & \\
 & & 21x & -12 & \\
\hline
 & & & -3 & \\
\end{array}
$$

Let us verify, Dividend = Divisor × Quotient + Remainder

$14x^2 + 13x – 15 = (7x – 4) × (2x + 3) + (-3)$

$= 14x^2 + 21x – 8x -12 -3$

$= 14x^2 + 13x – 15$

Hence, verified.

∴ Quotient is 2x + 3 and the Remainder is -3.

(ii) Dividend divisor

$15z^3 – 20z^2 + 13z – 12$ $3z – 6$

By using long division method

$$\begin{array}{r|llll}
 & 5z^2 & +\frac{10z}{3} & +11 & \\
\hline
3z-6 & 15z^3 & -20z^2 & +13z & -12 \\
 & - & & & \\
 & 15z^3 & -30z^2 & & \\
\hline
 & & 10z^2 & +13z & -12 \\
 & & - & & \\
 & & 10z^2 & -20z & \\
\hline
 & & & 33z & -12 \\
 & & & - & \\
 & & & 33z & -66 \\
\hline
 & & & & 54
\end{array}$$

Let us verify, Dividend = Divisor × Quotient + Remainder

$15z^3 – 20z^2 + 13z – 12 = (3z – 6) × (5z^2 + 10z/3 + 11) + 54$

$= 15z^3 + 10z^2 + 33z – 30z^2 – 20z + 54$

$= 15z^2 – 20z^2 + 13z – 12$

Hence, verified.

∴ Quotient is $5z^2 + 10z/3 + 11$ and the Remainder is 54.

(iii) Dividend divisor

$6y^5 – 28y^3 + 3y^2 + 30y – 9$ $2x^2 – 6$

By using long division method

$$
\begin{array}{rllllll}
 & 3y^3 & -5y & +\frac{3}{2} & & & \\
\hline
2y^2-6 \,\big) & 6y^5 & +0y^4 & -28y^3 & +3y^2 & +30y & -9 \\
- & 6y^5 & +0y^4 & -18y^3 & & & \\
\hline
 & & & -10y^3 & +3y^2 & +30y & -9 \\
 & & - & -10y^3 & +0y^2 & +30y & \\
\hline
 & & & & 3y^2 & +0y & -9 \\
 & & & - & 3y^2 & +0y & -9 \\
\hline
 & & & & & & 0
\end{array}
$$

Let us verify, Dividend = Divisor × Quotient + Remainder

$6y^5 – 28y^3 + 3y^2 + 30y – 9 = (2x^2 – 6) \times (3y^3 – 5y + 3/2) + 0$

$= 6y^5 – 10y^3 + 3y^2 – 18y^3 + 30y – 9$

$= 6y^5 – 28y^3 + 3y^2 + 30y – 9$

Hence, verified.

∴ Quotient is $3y^3 – 5y + 3/2$ and the Remainder is 0.

(iv) Dividend divisor

$34x – 22x^3 – 12x^4 – 10x^2 – 75\ 3x + 7$

$-12x^4 – 22x^3 – 10x^2 + 34x – 75$

By using long division method

$$
\begin{array}{r|l}
 & -4x^3 \quad +2x^2 \quad -8x \quad +30 \\
\hline
3x+7 & -12x^4 \quad -22x^3 \quad -10x^2 \quad +34x \quad -75 \\
 & - \\
 & -12x^4 \quad -28x^3 \\
\hline
 & 6x^3 \quad -10x^2 \quad +34x \quad -75 \\
 & - \\
 & 6x^3 \quad +14x^2 \\
\hline
 & -24x^2 \quad +34x \quad -75 \\
 & - \\
 & -24x^2 \quad -56x \\
\hline
 & 90x \quad -75 \\
 & - \\
 & 90x \quad +210 \\
\hline
 & -285
\end{array}
$$

Let us verify, Dividend = Divisor × Quotient + Remainder

$-12x^4 – 22x^3 – 10x^2 + 34x – 75 = (3x + 7) × (-4x^3 + 2x^2 – 8x + 30) – 285$

$= -12x^4 + 6x^3 – 24x^2 – 28x^3 + 14x^2 + 90x – 56x + 210 -285$

$= -12x^4 – 22x^3 – 10x^2 + 34x – 75$

Hence, verified.

∴ Quotient is $-4x^3 + 2x^2 – 8x + 30$ and the Remainder is -285.

(v) Dividend divisor

$15y^4 – 16y^3 + 9y^2 – 10/3y + 6$ $3y – 2$

By using long division method

$$
\begin{array}{r|llllll}
 & 5y^3 & -2y^2 & +\frac{5y}{3} & & \\
\hline
3y-2 & 15y^4 & -16y^3 & +9y^2 & -\frac{10y}{3} & +6 \\
 & - & & & & \\
 & 15y^4 & -10y^3 & & & \\
\hline
 & & -6y^3 & +9y^2 & -\frac{10y}{3} & +6 \\
 & & - & & & \\
 & & -6y^3 & +4y^2 & & \\
\hline
 & & & 5y^2 & -\frac{10y}{3} & +6 \\
 & & & - & & \\
 & & & 5y^2 & -\frac{10y}{3} & \\
\hline
 & & & & 0 & 6
\end{array}
$$

Let us verify, Dividend = Divisor × Quotient + Remainder

$15y^4 - 16y^3 + 9y^2 - 10/3y + 6 = (3y - 2) \times (5y^3 - 2y^2 + 5y/3) + 6$

$= 15y^4 - 6y^3 + 5y^2 - 10y^3 + 4y^2 - 10y/3 + 6$

$= 15y^4 - 16y^3 + 9y^2 - 10/3y + 6$

Hence, verified.

∴ Quotient is $5y^3 - 2y^2 + 5y/3$ and the Remainder is 6.

(vi) Dividend divisor

$4y^3 + 8y + 8y^2 + 7$ $2y^2 - y + 1$

$4y^3 + 8y^2 + 8y + 7$

By using long division method

$$
\begin{array}{r l}
 & \quad 2y \quad +5 \\
2y^2 - y + 1 & \overline{)\,4y^3 \quad +8y^2 \quad +8y \quad +7} \\
 & - \\
 & \quad 4y^3 \quad -2y^2 \quad +2y \\
\hline
 & \qquad\qquad 10y^2 \quad +6y \quad +7 \\
 & \qquad\qquad - \\
 & \qquad\qquad 10y^2 \quad -5y \quad +5 \\
\hline
 & \qquad\qquad\qquad 11y \quad +2
\end{array}
$$

Let us verify, Dividend = Divisor × Quotient + Remainder

$4y^3 + 8y^2 + 8y + 7 = (2y^2 – y + 1) × (2y + 5) + 11y + 2$

$= 4y^3 + 10y^2 – 2y^2 – 5y + 2y + 5 + 11y + 2$

$= 4y^3 + 8y^2 + 8y + 7$

Hence, verified.

∴ Quotient is 2y + 5 and the Remainder is 11y + 2.

(vii) Dividend divisor

$6y^5 + 4y^4 + 4y^3 + 7y^2 + 27y + 6$ $2y^3 + 1$

By using long division method

$$
\begin{array}{r|llllll}
 & 3y^2 & +2y & +2 & & & \\
\hline
2y^3+1 & 6y^5 & +4y^4 & +4y^3 & +7y^2 & +27y & +6 \\
 & - & & & & & \\
 & 6y^5 & +0y^4 & +0y^3 & +3y^2 & & \\
\hline
 & & 4y^4 & +4y^3 & +4y^2 & +27y & +6 \\
 & & - & & & & \\
 & & 4y^4 & +0y^3 & +0y^2 & +2y & \\
\hline
 & & & 4y^3 & +4y^2 & +25y & +6 \\
 & & & - & & & \\
 & & & 4y^3 & +0y^2 & +0y & +2 \\
\hline
 & & & & 4y^2 & +25y & +4
\end{array}
$$

Let us verify, Dividend = Divisor × Quotient + Remainder

$6y^5 + 4y^4 + 4y^3 + 7y^2 + 27y + 6 = (2y^3 + 1) \times (3y^2 + 2y + 2) + 4y^2 + 25y + 4$

$= 6y^5 + 4y^4 + 4y^3 + 3y^2 + 2y + 2 + 4y^2 + 25y + 4$

$= 6y^5 + 4y^4 + 4y^3 + 7y^2 + 27y + 6$

Hence, verified.

∴ Quotient is $3y^2 + 2y + 2$ and the Remainder is $4y^2 + 25y + 4$.

22. Divide $15y^4 + 16y^3 + 10/3y – 9y^2 – 6$ by $3y – 2$ Write down the coefficients of the terms in the quotient.

Solution:

We have,

$(15y^4 + 16y^3 + 10/3y – 9y^2 – 6) / (3y – 2)$

By using long division method

$$
\begin{array}{r|llllll}
 & 5y^3 & +\frac{26y^2}{3} & +\frac{25y}{9} & +\frac{80}{27} & & \\
\hline
3y-2 & 15y^4 & +16y^3 & -9y^2 & +\frac{10y}{3} & -6 & \\
 & - & & & & & \\
 & 15y^4 & -10y^3 & & & & \\
\hline
 & & 26y^3 & -9y^2 & +\frac{10y}{3} & -6 & \\
 & & - & & & & \\
 & & 26y^3 & -\frac{52y^2}{3} & & & \\
\hline
 & & & \frac{25y^2}{3} & +\frac{10y}{3} & -6 & \\
 & & & - & & & \\
 & & & \frac{25y^2}{3} & -\frac{50y}{9} & & \\
\hline
 & & & & \frac{80y}{9} & -6 & \\
 & & & & - & & \\
 & & & & \frac{80y}{9} & -\frac{160}{27} & \\
\hline
 & & & & & -\frac{2}{27} &
\end{array}
$$

∴ Quotient is $5y^3 + 26y^2/3 + 25y/9 + 80/27$

So the coefficients of the terms in the quotient are:

Coefficient of y^3 = 5

Coefficient of y^2 = 26/3

Coefficient of y = 25/9

Constant term = 80/27

23. Using division of polynomials state whether

(i) x + 6 is a factor of x^2 – x – 42

(ii) 4x – 1 is a factor of $4x^2$ – 13x – 12

(iii) 2y – 5 is a factor of $4y^4$ – $10y^3$ – $10y^2$ + 30y – 15

(iv) $3y^2$ + 5 is a factor of $6y^5$ + $15y^4$ + $16y^3$ + $4y^2$ + 10y – 35

(v) z^2 + 3 is a factor of z^5 – 9z

(vi) $2x^2$ – x + 3 is a factor of $6x^5$ – x^4 + $4x^3$ – $5x^2$ – x – 15

Solution:

(i) x + 6 is a factor of x^2 – x – 42

Firstly let us perform long division method

$$
\begin{array}{r|lll}
 & x & -7 & \\
\hline
x+6 & x^2 & -x & -42 \\
- & x^2 & +6x & \\
\hline
 & & -7x & -42 \\
 & - & & \\
 & & -7x & -42 \\
\hline
 & & & 0
\end{array}
$$

Since the remainder is 0, we can say that x + 6 is a factor of x^2 – x – 42

(ii) 4x – 1 is a factor of $4x^2$ – 13x – 12

Firstly let us perform long division method

$$
\begin{array}{r|llll}
 & x & -3 & & \\
\hline
4x-1 & 4x^2 & -13x & -12 & \\
 & - & & & \\
 & 4x^2 & -x & & \\
\hline
 & & -12x & -12 & \\
 & & - & & \\
 & & -12x & +3 & \\
\hline
 & & & -15 &
\end{array}
$$

Since the remainder is -15, 4x – 1 is not a factor of $4x^2 – 13x – 12$

(iii) 2y – 5 is a factor of $4y^4 – 10y^3 – 10y^2 + 30y – 15$

Firstly let us perform long division method

$$
\begin{array}{r|lllll}
 & 2y^3 & -5y & +\frac{5}{2} & & \\
\hline
2y-5 & 4y^4 & -10y^3 & -10y^2 & +30y & -15 \\
 & - & & & & \\
 & 4y^4 & -10y^3 & & & \\
\hline
 & & 0 & -10y^2 & +30y & -15 \\
 & & - & & & \\
 & & -10y^3 & +25y^2 & & \\
\hline
 & & 10y^3 & -35y^2 & +30y & -15 \\
 & & - & & & \\
 & & 5y^3 & -\frac{25y^2}{2} & & \\
\hline
 & & 5y^3 & -\frac{45y^2}{2} & +30y & -15
\end{array}
$$

Since the remainder is $5y^3 - 45y^2/2 + 30y - 15$, $2y - 5$ is not a factor of $4y^4 - 10y^3 - 10y^2 + 30y - 15$

(iv) $3y^2 + 5$ is a factor of $6y^5 + 15y^4 + 16y^3 + 4y^2 + 10y - 35$

Firstly let us perform long division method

$$
\begin{array}{r|llllll}
 & 2y^3 & +5y^2 & +2y & -7 & & \\
\hline
3y^2+5 & 6y^5 & +15y^4 & +16y^3 & +4y^2 & +10y & -35 \\
 & - & & & & & \\
 & 6y^5 & +0y^4 & +10y^3 & & & \\
\hline
 & & 15y^4 & +6y^3 & +4y^2 & +10y & -35 \\
 & & - & & & & \\
 & & 15y^4 & +0y^3 & +25y^2 & & \\
\hline
 & & & 6y^3 & -21y^2 & +10y & -35 \\
 & & & - & & & \\
 & & & 6y^3 & +0y^2 & +10y & \\
\hline
 & & & & -21y^2 & +0y & -35 \\
 & & & & - & & \\
 & & & & -21y^2 & +0y & -35 \\
\hline
 & & & & & & 0
\end{array}
$$

Since the remainder is 0, $3y^2 + 5$ is a factor of $6y^5 + 15y^4 + 16y^3 + 4y^2 + 10y - 35$

(v) $z^2 + 3$ is a factor of $z^5 - 9z$

Firstly let us perform long division method

$$
\begin{array}{r|llllll}
 & z^3 & -3z & & & & \\
\hline
z^2+3 & z^5 & +0z^4 & +0z^3 & +0z^2 & -9z & +0 \\
 & - & & & & & \\
 & z^5 & +0z^4 & +3z^3 & & & \\
\hline
 & & & -3z^3 & +0z^2 & -9z & +0 \\
 & & & - & & & \\
 & & & -3z^3 & +0z^2 & -9z & \\
\hline
 & & & & & 0 & 0
\end{array}
$$

Since the remainder is 0, $z^2 + 3$ is a factor of $z^5 - 9z$

(vi) $2x^2 - x + 3$ is a factor of $6x^5 - x^4 + 4x^3 - 5x^2 - x - 15$

Firstly let us perform long division method

$$
\begin{array}{r|llllll}
 & 3x^3 & +x^2 & -2x & -5 & & \\
\hline
2x^2 - x + 3 & 6x^5 & -x^4 & +4x^3 & -5x^2 & -x & -15 \\
 - & 6x^5 & -3x^4 & +9x^3 & & & \\
\hline
 & & 2x^4 & -5x^3 & -5x^2 & -x & -15 \\
 - & & 2x^4 & -x^3 & +3x^2 & & \\
\hline
 & & & -4x^3 & -8x^2 & -x & -15 \\
 - & & & -4x^3 & +2x^2 & -6x & \\
\hline
 & & & & -10x^2 & +5x & -15 \\
 - & & & & -10x^2 & +5x & -15 \\
\hline
 & & & & & & 0
\end{array}
$$

Since the remainder is 0, $2x^2 - x + 3$ is a factor of $6x^5 - x^4 + 4x^3 - 5x^2 - x - 15$

24. Find the value of a, if x + 2 is a factor of $4x^4 + 2x^3 - 3x^2 + 8x + 5a$

Solution:

We know that x + 2 is a factor of $4x^4 + 2x^3 - 3x^2 + 8x + 5a$

Let us equate x + 2 = 0

x = -2

Now let us substitute x = -2 in the equation $4x^4 + 2x^3 - 3x^2 + 8x + 5a$

$4(-2)^4 + 2(-2)^3 - 3(-2)^2 + 8(-2) + 5a = 0$

64 – 16 – 12 – 16 + 5a = 0

20 + 5a = 0

5a = -20

a = -20/5

= -4

25. What must be added to $x^4 + 2x^3 - 2x^2 + x - 1$ so that the resulting polynomial is exactly divisible by $x^2 + 2x - 3$.

Solution:

Firstly let us perform long division method

$$
\begin{array}{r|rrrrr}
 & x^2 & & +1 & & \\
\hline
x^2+2x-3 & x^4 & +2x^3 & -2x^2 & +x & -1 \\
- & x^4 & +2x^3 & -3x^2 & & \\
\hline
 & & & x^2 & +x & -1 \\
 & & - & x^2 & +2x & -3 \\
\hline
 & & & & -x & +2
\end{array}
$$

By long division method we got remainder as –x + 2,

∴ x – 2 has to be added to $x^4 + 2x^3 - 2x^2 + x - 1$ so that the resulting polynomial is exactly divisible by $x^2 + 2x - 3$.

EXERCISE 8.5 PAGE NO: 8.15

1. Divide the first polynomial by the second polynomial in each of the following. Also, write the quotient and remainder:

(i) $3x^2 + 4x + 5, x – 2$

(ii) $10x^2 – 7x + 8, 5x – 3$

(iii) $5y^3 – 6y^2 + 6y – 1, 5y – 1$

(iv) $x^4 – x^3 + 5x, x – 1$

(v) $y^4 + y^2, y^2 – 2$

Solution:

(i) $3x^2 + 4x + 5, x – 2$

By using long division method

$$
\begin{array}{r|lll}
 & 3x & +10 & \\
x-2 & 3x^2 & +4x & +5 \\
- & 3x^2 & -6x & \\
\hline
 & & 10x & +5 \\
- & & 10x & -20 \\
\hline
 & & & 25
\end{array}
$$

∴ the Quotient is $3x + 10$ and the Remainder is 25.

(ii) $10x^2 – 7x + 8, 5x – 3$

By using long division method

$$
\begin{array}{r|llll}
 & 2x & -\frac{1}{5} & & \\
\hline
5x-3 & 10x^2 & -7x & +8 & \\
 & - & & & \\
 & 10x^2 & -6x & & \\
\hline
 & & -x & +8 & \\
 & & - & & \\
 & & -x & +\frac{3}{5} & \\
\hline
 & & & \frac{37}{5} &
\end{array}
$$

∴ the Quotient is 2x – 1/5 and the Remainder is 37/5.

(iii) $5y^3 - 6y^2 + 6y - 1$, $5y - 1$

By using long division method

$$
\begin{array}{r|llll}
 & y^2 & -y & +1 & \\
\hline
5y-1 & 5y^3 & -6y^2 & +6y & -1 \\
 & - & & & \\
 & 5y^3 & -y^2 & & \\
\hline
 & & -5y^2 & +6y & -1 \\
 & & - & & \\
 & & -5y^2 & +y & \\
\hline
 & & & 5y & -1 \\
 & & & - & \\
 & & & 5y & -1 \\
\hline
 & & & & 0
\end{array}
$$

∴ the Quotient is $y^2 - y + 1$ and the Remainder is 0.

(iv) $x^4 - x^3 + 5x$, $x - 1$

By using long division method

$$
\begin{array}{r|lllll}
 & x^3 & +5 & & & \\
\hline
x-1 & x^4 & -x^3 & +0x^2 & +5x & +0 \\
 & - & & & & \\
 & x^4 & -x^3 & & & \\
\hline
 & & 0 & +0x^2 & +5x & +0 \\
 & & - & & & \\
 & & 5x^3 & -5x^2 & & \\
\hline
 & & -5x^3 & +5x^2 & +5x & +0
\end{array}
$$

∴ the Quotient is $x^3 + 5$ and the Remainder is 5.

(v) $y^4 + y^2$, $y^2 - 2$

By using long division method

$$
\begin{array}{r|lllll}
 & y^2 & +3 & & & \\
\hline
y^2-2 & y^4 & +0y^3 & +y^2 & +0y & +0 \\
 & - & & & & \\
 & y^4 & +0y^3 & -2y^2 & & \\
\hline
 & & & 3y^2 & +0y & +0 \\
 & & & - & & \\
 & & & 3y^2 & +0y & -6 \\
\hline
 & & & & & 6
\end{array}
$$

∴ the Quotient is $y^2 + 3$ and the Remainder is 6.

2. Find Whether or not the first polynomial is a factor of the second:

(i) $x + 1$, $2x^2 + 5x + 4$

(ii) $y - 2$, $3y^3 + 5y^2 + 5y + 2$

(iii) $4x^2 - 5$, $4x^4 + 7x^2 + 15$

(iv) $4 - z$, $3z^2 - 13z + 4$

(v) $2a - 3$, $10a^2 - 9a - 5$

(vi) $4y + 1$, $8y^2 - 2y + 1$

Solution:

(i) $x + 1$, $2x^2 + 5x + 4$

Let us perform long division method,

$$
\begin{array}{r|lll}
 & 2x & +3 & \\
\hline
x+1 & 2x^2 & +5x & +4 \\
- & 2x^2 & +2x & \\
\hline
 & & 3x & +4 \\
 & - & 3x & +3 \\
\hline
 & & & 1
\end{array}
$$

Since remainder is 1 therefore the first polynomial is not a factor of the second polynomial.

(ii) $y - 2$, $3y^3 + 5y^2 + 5y + 2$

Let us perform long division method,

$$
\begin{array}{r|l}
y-2 & \overline{3y^3 \quad +5y^2 \quad +5y \quad +2} \\
\end{array}
$$

Quotient: $3y^2 + 11y + 27$

$$
\begin{array}{llll}
 & 3y^3 + 5y^2 + 5y + 2 & & \\
- & 3y^3 - 6y^2 & & \\
\hline
 & \quad 11y^2 + 5y + 2 & & \\
- & \quad 11y^2 - 22y & & \\
\hline
 & \qquad 27y + 2 & & \\
- & \qquad 27y - 54 & & \\
\hline
 & \qquad\qquad 56 & &
\end{array}
$$

Since remainder is 56 therefore the first polynomial is not a factor of the second polynomial.

(iii) $4x^2 – 5$, $4x^4 + 7x^2 + 15$

Let us perform long division method,

$$
\begin{array}{r|l}
4x^2-5 & \overline{4x^4 \quad +0x^3 \quad +7x^2 \quad +0x \quad +15} \\
\end{array}
$$

Quotient: $x^2 + 3$

$$
\begin{array}{ll}
 & 4x^4 + 0x^3 + 7x^2 + 0x + 15 \\
- & 4x^4 + 0x^3 - 5x^2 \\
\hline
 & \qquad 12x^2 + 0x + 15 \\
- & \qquad 12x^2 + 0x - 15 \\
\hline
 & \qquad\qquad 30
\end{array}
$$

Since remainder is 30 therefore the first polynomial is not a factor of the second polynomial.

(iv) $4 - z$, $3z^2 - 13z + 4$

Let us perform long division method,

$$\begin{array}{r|rrr} & -3z & +1 & \\ \hline -z+4 & 3z^2 & -13z & +4 \\ - & 3z^2 & -12z & \\ \hline & & -z & +4 \\ & - & -z & +4 \\ \hline & & & 0 \end{array}$$

Since remainder is 0 therefore the first polynomial is a factor of the second polynomial.

(v) $2a - 3$, $10a^2 - 9a - 5$

Let us perform long division method,

$$\begin{array}{r|rrr} & 5a & +3 & \\ \hline 2a-3 & 10a^2 & -9a & -5 \\ - & 10a^2 & -15a & \\ \hline & & 6a & -5 \\ & - & 6a & -9 \\ \hline & & & 4 \end{array}$$

Since remainder is 4 therefore the first polynomial is not a factor of the second polynomial.

(vi) $4y + 1$, $8y^2 - 2y + 1$

Let us perform long division method,

$$
\begin{array}{r|rrr}
 & 2y & -1 & \\
\hline
4y+1 & 8y^2 & -2y & +1 \\
 & - & & \\
 & 8y^2 & +2y & \\
\hline
 & & -4y & +1 \\
 & & - & \\
 & & -4y & -1 \\
\hline
 & & & 2
\end{array}
$$

Since remainder is 2 therefore the first polynomial is not a factor of the second polynomial.

EXERCISE 8.6 PAGE NO: 8.17

Divide:

1. $x^2 - 5x + 6$ by $x - 3$

Solution:

We have,

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

Let us perform long division method,

$$
\begin{array}{r|l}
 & x \quad -2 \\
x-3 & x^2 \quad -5x \quad +6 \\
 & - \\
 & x^2 \quad -3x \\
\hline
 & \qquad -2x \quad +6 \\
 & \qquad - \\
 & \qquad -2x \quad +6 \\
\hline
 & \qquad\qquad 0
\end{array}
$$

∴ the Quotient is x – 2

2. $ax^2 – ay^2$ by ax+ay

Solution:

We have,

$(ax^2 – ay^2)/ (ax+ay)$

$(ax^2 – ay^2)/ (ax+ay) = (x – y) + 0/(ax+ay)$

= (x – y)

∴ the answer is (x – y)

3. $x^4 – y^4$ by $x^2 – y^2$

Solution:

We have,

$(x^4 – y^4)/ (x^2 – y^2)$

$(x^4 – y^4)/ (x^2 – y^2) = x^2 + y^2 + 0/(x^2 – y^2)$

$= x^2 + y^2$

∴ the answer is $(x^2 + y^2)$

4. $acx^2 + (bc + ad)x + bd$ by $(ax + b)$

Solution:

We have,

$(acx^2 + (bc + ad) x + bd) / (ax + b)$

$(acx^2 + (bc + ad) x + bd) / (ax + b) = cx + d + 0/ (ax + b)$

$= cx + d$

∴ the answer is $(cx + d)$

5. $(a^2 + 2ab + b^2) – (a^2 + 2ac + c^2)$ by $2a + b + c$

Solution:

We have,$[(a^2 + 2ab + b^2) – (a^2 + 2ac + c^2)] / (2a + b + c)[(a^2 + 2ab + b^2) – (a^2 + 2ac + c^2)] / (2a + b + c) = b – c + 0/(2a + b + c)$

$= b – c$

∴ the answer is $(b – c)$

6. $1/4x^2 – 1/2x – 12$ by $1/2x – 4$

Solution:

We have,

$(1/4x^2 – 1/2x – 12) / (1/2x – 4)$

Let us perform long division method,

$$
\begin{array}{r|l}
 & \frac{x}{2} \quad +3 \\
\hline
\frac{x}{2} - 4 & \frac{x^2}{4} \quad -\frac{x}{2} \quad +0 \\
 & - \\
 & \frac{x^2}{4} \quad -2x \\
\hline
 & \qquad \frac{3x}{2} \quad +0 \\
 & \qquad - \\
 & \qquad \frac{3x}{2} \quad -12 \\
\hline
 & \qquad\qquad 12
\end{array}
$$

∴ the Quotient is x/2 + 3

IndCareer

Chapterwise RD Sharma Solutions for Class 8 Maths :

- Chapter 1–Rational Numbers
- Chapter 2–Powers
- Chapter 3–Squares and Square Roots
- Chapter 4–Cubes and Cube Roots
- Chapter 5–Playing with Numbers
- Chapter 6–Algebraic Expressions and Identities
- Chapter 7–Factorization
- Chapter 8–Division of Algebraic Expressions
- Chapter 9–Linear Equation in One Variable
- Chapter 10–Direct and Inverse Variations
- Chapter 11–Time and Work
- Chapter 12–Percentage
- Chapter 13–Profit, Loss, Discount and Value Added Tax (VAT)
- Chapter 14–Compound Interest
- Chapter 15–Understanding Shapes- I (Polygons)

- Chapter 16–Understanding Shapes- II (Quadrilaterals)
- Chapter 17–Understanding Shapes- III (Special Types of Quadrilaterals)
- Chapter 18–Practical Geometry (Constructions)
- Chapter 19–Visualising Shapes
- Chapter 20–Mensuration - I (Area of a Trapezium and a Polygon)
- Chapter 21–Mensuration - II (Volumes and Surface Areas of a Cuboid and a cube)
- Chapter 22–Mensuration - III (Surface Area and Volume of a Right Circular Cylinder)
- Chapter 23–Data Handling - I (Classification and Tabulation of Data)
- Chapter 24–Data Handling - II (Graphical Representation of Data as Histogram)
- Chapter 25–Data Handling - III (Pictorial Representation of Data as Pie Charts or Circle Graphs)
- Chapter 26–Data Handling - IV (Probability)
- Chapter 27–Introduction to Graphs

About RD Sharma

RD Sharma i*sn't the kind of author you'd bump into at lit fests. But his bestselling books have helped many* CBSE *students lose their dread of* maths. *Sunday Times profiles the tutor turned internet star*

He dreams of algorithms that would give most people nightmares. And, spends every waking hour thinking of ways to explain concepts like 'series solution of linear differential equations'. Meet Dr Ravi Dutt Sharma — mathematics teacher and author of 25 reference books — whose name evokes as much awe as the subject he teaches. And though students have used his thick tomes for the last 31 years to ace the dreaded maths exam, it's only recently that a spoof video turned the tutor into a YouTube star.

R D Sharma had a good laugh but said he shared little with his on-screen persona except for the love for maths. "I like to spend all my time thinking and writing about maths problems. I find it relaxing," he says. When he is not writing books explaining mathematical concepts for classes 6 to 12 and engineering students, Sharma is busy dispensing his duty as vice-principal and head of department of science and humanities at Delhi government's Guru Nanak Dev Institute of Technology.