RD SHARMA
Solutions
Class 8 Maths
Chapter 8
Ex8.4

Divide.

1. $5x^3 - 15x^2 + 25x$ by $5x$.

$$\frac{5x^3 - 15x^2 + 25x}{5x} = \frac{5x^3}{5x} + \left(\frac{-15}{5}\right)\cdot\frac{x^2}{x} + \frac{25}{5}\cdot\frac{x}{x}$$

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

2. $4z^3 + 6z^2 - z$ by $-\frac{1}{2}z$

$$\frac{4z^3 + 6z^2 - z}{-\frac{1}{2}z} = \frac{4z^3\cdot(2)}{-z} - \frac{6z^2\cdot 2}{z} + \frac{z\cdot 2}{z}$$

$$= -8z^2 - 12z + 2.$$

3. $9x^2y - 6xy + 12xy^2$ by $\frac{-3}{2}xy$.

$$\frac{9x^2y - 6xy + 12xy^2}{-\frac{3}{2}xy} = \frac{9x^2y}{-3x\cdot y}\cdot 2 + \frac{6xy\cdot 2}{3\cdot x\cdot y} + \frac{12x\cdot y^2\cdot 2}{-3xy}$$

$$= -6x + 4 - 8y.$$

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

$$\frac{3x^3\cdot y^2 + 2x^2\cdot y + 15xy}{3xy} = \frac{3\cdot x^3\cdot y^2}{3xy} + \frac{2x^2\cdot y}{3xy} + \frac{15xy}{3xy}$$

$$= x^2y + \frac{2}{3}x + 5.$$

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

step 1:-

we devide the first term x^2 of the dividend by the first term x of the divisor and obtain $\frac{x^2}{x} = x$ as the

$$\begin{array}{r|l} & \quad x + 3 \\ \hline x+4 & x^2 + 7x + 12 \\ & \underline{\overset{}{-}x^2 \underline{+} 4x} \\ & \quad\quad 3x + 12 \\ & \quad\quad 3x + 12 \end{array}$$

first term of the quotient.

Step -2 :-

we multiply the divisor $x+4$ by the first term x of the quotient and subtract the result from the dividend $x^2+7x+12$. we obtain $3x+12$ as the remainder

step-3 :-

Now we treat $3x+12$ as the new dividend and divide the first term $3x$ by the first term x of the divisor to obtain $\frac{3x}{x} = 3$ as the third term of the quotient.

step- IV :-

we multiply the divisor $x+4$ and the ~~third~~ second term 3 of the quotient and subtract the result $3x+12$ from the new dividend. we obtain 0 as the remainder.

Thus, we can say that

$$\frac{x^2+7x+12}{x+4} = x+3.$$

Solution-06:-

$4y^2+3y+\frac{1}{2}$ by $2y+1$

$$\begin{array}{r|l} & 2y+\frac{1}{2} \\ \hline 2y+1 & 4y^2+3y+\frac{1}{2} \\ & \underset{-}{4y^2}\underset{-}{+}2y \\ \hline & \quad y+\frac{1}{2} \\ & \quad y+\frac{1}{2} \\ \hline & \quad (0) \end{array}$$

Solution-07.

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

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

Solution-08:-

$$\begin{array}{r|l} & 2x-5 \\ \hline 7x-9 & 14x^2-53x+45 \\ & \underset{-}{14x^2}\underset{+}{-}18x \\ \hline & \quad -35x+45 \\ & \quad \underset{+}{-}35x\underset{-}{+}45 \\ \hline & \qquad (0). \end{array}$$

Solution - 09.

$$\frac{-(-21+71x-31x^2-24x^3)}{-(3-8x)} = \frac{21-71x+31x^2+24x^3}{8x-3}.$$

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

Solution-10:-

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

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

$(y^2-2y)(3y^2+3y+2)=3y^4-3y^3-4y^2-4y.$

Solution-11

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

$$\begin{array}{r|l}
 & y^2+5y+3 \\ \cline{2-2}
2y^3+1 & 2y^5+10y^4+6y^3+y^2+5y+3 \\
 & \underset{-}{2y^5}+0+0\underset{-}{+y^2} \\ \cline{2-2}
 & 10y^4+6y^3+0+5y \\
 & \underset{-}{10y^4}+0+0\pm5y \\ \cline{2-2}
 & 6y^3+0+0+3 \\
 & \underset{-}{6y^3}+0+0\underset{-}{+}3 \\ \cline{2-2}
 & \textcircled{0}
\end{array}$$

Solution -12:-

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

$$\begin{array}{r|l}
 & x^2-3x+4 \\ \cline{2-2}
x^2+x+1 & x^4-2x^3+2x^2+x+4. \\
 & \underset{-}{x^4}\underset{-}{+x^3}\underset{-}{+x^2} \\ \cline{2-2}
 & -3x^3+x^2+x \\
 & \underset{+}{-3x^3}\underset{+}{-3x^2}\underset{+}{-3x} \\ \cline{2-2}
 & 4x^2+4x+4 \\
 & \underset{-}{4x^2}\underset{-}{+4x}\underset{-}{+4} \\ \cline{2-2}
 & \textcircled{0}.
\end{array}$$

Solution-13 :-

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

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

Solution-014 :-

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

solution-14 :-

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

Solution-15:-

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

16:- Divide the following and find the quotient and remainder.

Solution-16:-

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

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

$\therefore Q=7x^2+x+5$; $R=4$.

Solution-17:-

$$3x^2+4x+1$$

$$2x-3 \,\overline{\big)\, 6x^3-x^2-10x-3}$$

$$\underset{-}{}6x^3\underset{+}{-}9x^2$$

$$8x^2-10x$$

$$8x^2-8x$$

$$2x-3$$

$$\underset{-}{}2x\underset{+}{-}3$$

$$\textcircled{0}$$

$\therefore$ Quotient $= 3x^2+4x+1$; Remainder $= 0$.

Solution-18:-

$6x^3+11x^2-39x-65$ by $3x^2+13x+13$

$$2x-5$$

$$3x^2+13x+13 \,\overline{\big)\, 6x^3+11x^2-39x-65}$$

$$\underset{-}{6x^3}+\underset{-}{26x^2}+\underset{-}{26x}$$

$$-15x^2-65x-65$$

$$\underset{+}{-15x^2}\underset{+}{-65x}\underset{+}{-65}$$

$$\textcircled{0}.$$

$\therefore$ Quotient $= 2x-5$; Remainder $= 0$.

Solution-19:-

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

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

$\therefore$ Quotient $= 10x^2-3x-12$; Remainder $=0$.

Solution-20:-

$9x^4-4x^2+4$ by $3x^2-4x+2$.

$$
\begin{array}{r|l}
 & 3x^2+4x+2 \\
\hline
3x^2-4x+2 & 9x^4-0+(-4x^2)+0+4 \\
 & \underline{\overset{9x^4}{-} \; \overset{-12x^3}{+} \; \overset{+6x^2}{-}} \\
 & \quad +12x^3-10x^2+0+4 \\
 & \quad \underline{\overset{12x^3}{-} \; \overset{-16x^2}{+} \; \overset{+8x}{-} \; \overset{+0}{-}} \\
 & \qquad 6x^2-8x+4 \\
 & \qquad \underline{\overset{6x^2}{-} \; \overset{-8x}{+} \; \overset{+4}{-}} \\
 & \qquad \qquad ⓪
\end{array}
$$

Quotient $= 3x^2-4x+1$; Remainder $=0$.

Solution - 21.

(i) Dividend = $14x^2+13x-15$.

Divisor = $7x-4$

$$\begin{array}{r|l} & 2x+3 \\ \hline 7x-4 & 14x^2+13x-15 \\ & 14x^2\underset{+}{-}8x \\ \cline{2-2} & \qquad 21x-15 \\ & \qquad 21x\underset{+}{-}12 \\ \cline{2-2} & \qquad\qquad (-3) \end{array}$$

$\therefore$ Quotient = $2x+3$; Remainder = -3.

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

$= 14x^2+21x-8x-12-3$

$= 14x^2+13x-15$.

$\therefore$ LHS = RHS.

(ii)

$$\begin{array}{r|l} & 5z^2+\frac{10}{3}z+11 \\ \hline 3z-6 & 15z^3-20z^2+13z-12 \\ & 15z^3-30z^2 \\ \cline{2-2} & \qquad 10z^2+13z \\ & \qquad 10z^2\underset{+}{-}20z \\ \cline{2-2} & \qquad\qquad 33z-12 \\ & \qquad\qquad \underset{-}{3}3z\underset{+}{-}66 \\ \cline{2-2} & \qquad\qquad\quad (54) \end{array}$$

$\therefore \quad 15z^3-20z^2+13z-12 = (3z-6)(5z^2+\frac{10z}{3}+11)+54$

$= 15z^3-20z^2+13z-66+54$

$= 15z^3-20z^2+13z-12$.

Solution - 21 :-

(iii)

$$\underset{\text{divisor}}{\underset{\downarrow}{2y^2-6}} \qquad \underset{\text{dividend}}{\underset{\downarrow}{6y^5-28y^3+3y^2+30y-9}}$$

$$\begin{array}{r|l} & 3y^3-5y+\frac{3}{2} \\ \hline 2y^2-6 & 6y^5+0-28y^3+3y^2+30y-9 \\ & 6y^5+0 \underset{+}{-18y^3} \\ \cline{2-2} & \quad -10y^3+3y^2+30y \\ & \quad \underset{+}{-10y^3} \underset{-}{+0} +30y \\ \cline{2-2} & \qquad 3y^2-9 \\ & \qquad \underset{-}{3y^2} \underset{+}{-9} \\ \cline{2-2} & \qquad \quad (0) \end{array}$$

$$6y^5-28y^3+3y^2+30y-9 = (2y^2-6)(3y^3-5y+\tfrac{3}{2})+0$$

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

$$= 6y^5-28y^3+3y^2+30y-9$$

(iv)

$$\begin{array}{r|l} & -4x^3+2x^2-8x+30 \\ \hline 3x+7 & -12x^4-22x^3-10x^2+34x-75 \\ & \underset{+}{-12x^4} \underset{+}{-28x^3} \\ \cline{2-2} & \quad 6x^3-10x^2+34x \\ & \quad 6x^3 \underset{-}{+14x^2}+0 \\ \cline{2-2} & \qquad -24x^2+34x-75 \\ & \qquad -24x^2 \underset{+}{-56x} \\ \cline{2-2} & \qquad \quad 90x-75 \\ & \qquad \quad 90x+210 \\ \cline{2-2} & \qquad \qquad (-289) \end{array}$$

Quotient $= -4x^3 + 2x^2 - 8x + 30$

$R = -285$

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

$= -12x^4 - 22x^4 - 10x^2 + 34x - 75.$

(v)

$$
\begin{array}{r|l}
 & \cancel{15y^4}\ \cancel{16y}\quad 5y^3 - 2y^2 + \frac{5}{3}y \\
\hline
3y-2 & 15y^4 - 16y^3 + 9y^2 - \frac{10}{3}y + 6 \\
 & \underset{-}{15y^4} \underset{+}{-} 10y^3 \\
\cline{2-2}
 & -6y^3 + 9y^2 \\
 & \underset{+}{-}6y^3 \underset{-}{+} 4y^2 \\
\cline{2-2}
 & 5y^2 - \frac{10}{3}y + 6 \\
 & 5y^2 - \frac{10}{3}y + 0 \\
\cline{2-2}
 & \textcircled{6}
\end{array}
$$

$\therefore \quad 15y^4 - 16y^3 + 9y^2 - \frac{10}{3}y + 6 = (3y-2)(5y^3 - 2y^2 + \frac{5}{3}y) + 6$

$= 15y^4 - 6y^3 + 5y^2 - 10y^3 + 4y^2 - \frac{10y}{3} + 6$

$= 15y^4 - 16y^3 + 9y^2 - \frac{10}{3}y + 6.$

$\therefore$ LHS = RHS.

(vi)

$2y+5$

$2y^2-y+1 \;\big)\; 4y^3+8y^2+8y+7$

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

$- \quad + \quad -$

$10y^2+6y+7$

$10y^2-5y+5$

$- \quad + \quad -$

$11y+2.$

$(2y^2-y+1)(2y+5)+11y+2 = 4y^3+10y^2-2y^2-5y$

$+2y+5+11y+2$

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

(vii)

$3y^2+2y+2$

$2y^3+1 \;\big)\; 6y^5+4y^4+4y^3+7y^2+27y+6$

$6y^5+0+0+3y^2$

$- \quad -$

$4y^4+4y^3+4y^2+27y+6$

$4y^4+0+0+2y$

$- \quad -$

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

$4y^3+0+0+2$

$- \quad -$

$4y^2+25y+4.$

$\therefore$ Quotient $= 4y^2+25y+4$; Divisor $= 2y^3+1.$

Remainder $= 4y^2+25y+4.$

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

$4y^2+25y+4$

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

Solution-22 :-

$$Q = 5y^3 + \frac{26}{3}y^2 + \frac{25}{9}y + \frac{80}{27}$$

$3y-2$) $15y^4 + 16y^3 + \frac{103}{y} - 9y^2 - 6$

can be written as

$$15y^4 + 16y^3 - 9y^2 + \frac{10}{3}y - 6$$

$$15y^4 \mp 10y^3$$

$$26y^3 - 9y^2$$

$$26y^3 - \frac{52}{3}y^2$$

$$- \quad +$$

$$\frac{25}{3}y^2 + \frac{10}{3}y$$

$$\frac{25y^2}{3} - \frac{50}{9}y$$

$$- \quad +$$

$$\frac{180}{9}y - 6.$$

$$\frac{180}{9}y - 6$$

$$+ \quad +$$

⓪.

∴ Quotient = $5y^3 + \frac{26}{3}y^2 + \frac{25}{9}y + \frac{80}{27}$.

coefficient of $y^3 = 5$

" $y^2 = \frac{26}{3}$

" $y = \frac{25}{9}$.

constant term $= \frac{80}{27}$.

23. (i)

$$\begin{array}{r|l} & \quad x-7 \\ \hline x+6 & x^2-x+42 \\ & \underset{-}{x^2}\underset{-}{+6x} \\ \cline{2-2} & \quad -7x-42 \\ & \quad \underset{+}{-7x}\ \underset{+}{-42} \\ \cline{2-2} & \qquad \textcircled{0}. \end{array}$$

Yes, $x+6$ is a factor of x^2-x-42.

(ii)

$$\begin{array}{r|l} & \quad x-3 \\ \hline 4x-1 & 4x^2-13x-12. \\ & \ 4x^2\underset{+}{-}x \\ \cline{2-2} & \qquad -12x-12 \\ & \qquad \underset{+}{-12x}\ \underset{-}{+3} \\ \cline{2-2} & \qquad\quad (-15). \end{array}$$

$4x-1$ is not a factor of $4x^2-13x-12$.

23. (iii)

$$2y^3+5y+\text{[illegible]}$$

$$2y-5\ \big)\ 4y^4-10y^3-10y^2+30y-15.$$

$$\underset{-}{4y^4}\ \underset{+}{-10y^3}$$

$$-10y^2+30y$$

$$10y^2-25y$$

$$5y-15$$

$2y-5$ is not a factor of $4y^4-10y^3-10y^2+30y-1$

(iv)

$$2y^3+5y^2+2y-7$$

$$3y^2+5\ \big)\ 6y^5+15y^4+16y^3+4y^2+10y-35$$

$$\underset{-}{6y^5}+\underset{-}{10y^4}+\underset{-}{10y^3}$$

$$15y^4+6y^3+4y^2$$

$$\underset{-}{15y^4}+\underset{-}{0}+\underset{-}{25y^2}$$

$$6y^3-21y^2+10y$$

$$\underset{-}{6y^3}+0+\underset{-}{10y}$$

$$-21y^2-35$$

$$\underset{+}{-21y^2}\ \underset{+}{-35}$$

⓪

∴ $3y^2+5$ is a factor of given polynamial.

ⓥ

$$
\begin{array}{r|l}
 & z^3 + 3z \\
\hline
z^2+3 & z^5 - 9z = z^5 + 0 + 0 + 0 - 9z + 0 \\
 & -z^5 + 0 \pm 3z^3 \\
\hline
 & -3\cancel{z^3} - 9\cancel{z} \\
 & \cancel{3z^3} + \cancel{9z} \\
\hline
 & (0)
\end{array}
$$

z^3+3 is a factor of polynamial $z^5 - 9z$.

ⓥⓘ

$$
\begin{array}{r|l}
 & 3x^3 + x^2 - 2x + 5 \\
\hline
2x^2 + x + 3 & 6x^5 - x^4 + 4x^3 - 5x^2 - x - 15. \\
 & 6x^5 \underset{+}{-} 3x^4 \underset{-}{+} 9x^3 \\
 & \underset{}{-} \\
\hline
 & 2x^4 - 5x^3 - 5x^2 \\
 & 2x^4 - x^3 + 3x^2 \\
 & - \quad + \quad - \\
\hline
 & -4x^3 - 8x^2 - x \\
 & -4x^3 + 2x^2 - 6x \\
 & + \quad - \quad + \\
\hline
 & -10x^2 + 5x - 15 \\
 & 10x^2 - 5x + 15 \\
\hline
 & (0)
\end{array}
$$

$2x^2 - x + 3$ is factor of given polynamial.

26.

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

$x-2$ added to $x^4+2x^3-2x^2+x-1$ Sothat the resulting Polynomial exactly divisible by x^2+2x-3.

24.

$$\begin{array}{r|l} & 4x^3 - 6x^2 + 9x + 10 \\ \hline x+2 & 4x^4 + 2x^3 - 3x^2 + 8x + 5a \\ & \underset{-}{4x^3} \underset{-}{+} 8x^3 \\ \cline{2-2} & \quad -6x^3 - 3x^2 \\ & \quad \underset{+}{-} 6x^3 \mp 12x^2 \\ \cline{2-2} & \qquad\quad 9x^2 + 8x \\ & \qquad\quad \underset{-}{9x^2} \underset{-}{+} 18x \\ \cline{2-2} & \qquad\qquad\quad -10x + 5a \\ & \qquad\qquad\quad 10x \pm 20 \\ \cline{2-2} & \qquad\qquad\qquad 5a + 20 \end{array}$$

~~$-10x + 5a$~~

$5a + 20 = 0$

$a = \frac{-20}{5}$

$\boxed{a = -4.}$