Division of Algebraic Expressions Ex 8.4 Q21

Answer :

(i)

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

Quotient = $2x + 3$

Remainder = -3

Divisor = $7x - 4$

Divisor $\times$ Quotient + Remainder = $(7x - 4)(2x + 3) - 3$

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

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

= Dividend

Thus,

Divisor $\times$ Quotient + Remainder = Dividend

Hence verified.

(ii)

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

Quotient $= 5z^2 + \frac{10}{3}z + 11$

Remainder $= 54$

Divisor $= 3z - 6$

Divisor $\times$ Quotient + Remainder $= (3z - 6)\left(5z^2 + \frac{10}{3}z + 11\right) + 54$

$= 15z^3 + 10z^2 + 33z - 30z^2 - 20z - 66 + 54$

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

= Dividend

Thus,

Divisor $\times$ Quotient + Remainder = Dividend

Hence verified.

(iii)

$$
\begin{array}{r}
3y^3 - 5y - \frac{3}{2} \\
2y^2 - 6 \overline{\smash{\big)}\, 6y^5 - 28y^3 + 3y^2 + 30y - 9} \\
\underset{-}{6y^5} \underset{+}{- 18y^3} \qquad\qquad\qquad\quad \\
\hline
10y^3 + 3y^2 + 30y - 9 \\
\underset{+}{10y^3} \qquad \underset{-}{+ 30y} \quad\; \\
\hline
3y^2 - 9 \\
\underset{-}{3y^2} \underset{+}{- 9} \\
\hline
0 \\
\hline
\end{array}
$$

Quotient = $3y^3 - 5y + \frac{3}{2}$

Remainder = 0

Divisor = $2y^2 - 6$

Divisor × Quotient + Remainder =

$$\left(2y^2 - 6\right)\left(3y^3 - 5y + \tfrac{3}{2}\right) + 0$$

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

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

= Dividend

Thus, Divisor × Quotient + Remainder = Dividend

Hence verified.

(iv)

$$
\begin{array}{r}
-4x^3 + 2x^2 - 8x + 30 \\
3x + 7 \overline{\smash{\big)}\, -12x^4 - 22x^3 - 10x^2 + 34x - 75} \\
\underset{-}{-12x^4} \underset{+}{- 28x^3} \qquad\qquad\qquad\quad \\
\hline
6x^3 - 10x^2 + 34x - 75 \\
\underset{-}{6x^3} \underset{-}{+ 14x^2} \qquad\qquad \\
\hline
-24x^2 + 34x - 75 \\
\underset{+}{-24x^2} \underset{+}{- 56x} \quad\; \\
\hline
90x - 75 \\
\underset{-}{90x} \underset{-}{+ 210} \\
\hline
-285 \\
\hline
\end{array}
$$

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

Remainder = -285

Divisor = $3x + 7$

Divisor × Quotient + Remainder = $(3x + 7)(-4x^3 + 2x^2 - 8x + 30) - 285$

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

$= -12x^4 - 22x^3 - 10x^2 + 34x - 75$

= Dividend

Thus,

Divisor × Quotient + Remainder = Dividend

Hence verified.

(v)

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

Quotient = $5y^3 - 2y^2 + \frac{5}{3}y$

Remainder = 6

Divisor = 3y − 2

Divisor × Quotient + Remainder = $(3y - 2)(5y^3 - 2y^2 + \frac{5}{3}y) + 6$

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

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

= Dividend

Thus,

Divisor × Quotient + Remainder = Dividend

Hence verified.

(vi)

$$
\begin{array}{r|l}
 & 2y + 5 \\
\hline
2y^2 - y + 1 & 4y^3 + 8y^2 + 8y + 7 \\
 & \underline{\overset{-}{4y^3} \overset{+}{-2y^2} \overset{-}{+2y}} \\
 & \qquad 10y^2 + 6y + 7 \\
 & \qquad \underline{\overset{-}{10y^2} \overset{+}{-5y} \overset{-}{+5}} \\
 & \qquad\qquad 11y + 2
\end{array}
$$

Quotient = $2y + 5$

Remainder = $11y + 2$

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

Divisor × Quotient + Remainder = $(2y^2 - y + 1)(2y + 5) + 11y + 2$

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

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

= Dividend

Thus,

Divisor × Quotient + Remainder = Dividend

Hence verified.

(vii)

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

Quotient = $3y^2 + 2y + 2$

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

Divisor = $2y^3 + 1$

Divisor $\times$ Quotient + Remainder = $(2y^3 + 1)(3y^2 + 2y + 2) + 4y^2 + 25y + 4$

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

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

= Dividend

Thus,

Divisor $\times$ Quotient + Remainder = Dividend

Hence verified.

*********** END **********