



Division of Algebraic Expressions Ex 8.4 Q21

Answer :

(i)

$$\begin{array}{r}
 2x + 3 \\
 7x - 4 \overline{) 14x^2 + 13x - 15} \\
 \underline{14x^2 - 8x} \\
 21x - 15 \\
 \underline{21x - 12} \\
 -3
 \end{array}$$

Quotient = $2x + 3$

Remainder = -3

Divisor = $7x - 4$

$$\begin{aligned}
 \text{Divisor} \times \text{Quotient} + \text{Remainder} &= (7x - 4)(2x + 3) - 3 \\
 &= 14x^2 + 21x - 8x - 12 - 3 \\
 &= 14x^2 + 13x - 15 \\
 &= \text{Dividend}
 \end{aligned}$$

Thus,

Divisor \times Quotient + Remainder = Dividend

Hence verified.

(ii)

$$\begin{array}{r}
 5z^2 + \frac{10}{3}z + 11 \\
 3z - 6 \overline{) 15z^3 - 20z^2 + 13z - 12} \\
 \underline{15z^3 - 30z^2} \\
 10z^2 + 13z - 12 \\
 \underline{10z^2 - 20z} \\
 33z - 12 \\
 \underline{33z - 66} \\
 54
 \end{array}$$

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

Remainder = 54

Divisor = $3z - 6$

$$\begin{aligned}
 \text{Divisor} \times \text{Quotient} + \text{Remainder} &= (3z - 6)\left(5z^2 + \frac{10}{3}z + 11\right) + 54 \\
 &= 15z^3 + 10z^2 + 33z - 30z^2 - 20z - 66 + 54 \\
 &= 15z^3 - 20z^2 + 13z - 12 \\
 &= \text{Dividend}
 \end{aligned}$$

Thus,

Divisor \times Quotient + Remainder = Dividend

Hence verified.

(iii)

$$\begin{array}{r} 3y^3 - 5y - \frac{3}{2} \\ 2y^2 - 6 \overline{) 6y^5 - 28y^3 + 3y^2 + 30y - 9} \\ \underline{6y^5 - 18y^3} \\ 10y^3 + 3y^2 + 30y - 9 \\ \underline{10y^3 + 30y} \\ 3y^2 - 9 \\ \underline{3y^2 - 9} \\ 0 \end{array}$$

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

$$\text{Remainder} = 0$$

$$\text{Divisor} = 2y^2 - 6$$

$$\text{Divisor} \times \text{Quotient} + \text{Remainder} =$$

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

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

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

$$= \text{Dividend}$$

Thus, Divisor \times Quotient + Remainder = Dividend

Hence verified.

(iv)

$$\begin{array}{r} -4x^3 + 2x^2 - 8x + 30 \\ 3x + 7 \overline{) -12x^4 - 22x^3 - 10x^2 + 34x - 75} \\ \underline{-12x^4 - 28x^3} \\ 6x^3 - 10x^2 + 34x - 75 \\ \underline{6x^3 + 14x^2} \\ -24x^2 + 34x - 75 \\ \underline{-24x^2 - 56x} \\ 90x - 75 \\ \underline{90x + 210} \\ -285 \end{array}$$

$$\text{Quotient} = -4x^3 + 2x^2 - 8x + 30$$

$$\text{Remainder} = -285$$

$$\text{Divisor} = 3x + 7$$

$$\text{Divisor} \times \text{Quotient} + \text{Remainder} = (3x + 7)(-4x^3 + 2x^2 - 8x + 30) - 285$$

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

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

$$= \text{Dividend}$$

Thus,

Divisor \times Quotient + Remainder = Dividend

Hence verified.

(v)

$$\begin{array}{r} 5y^3 - 2y^2 - \frac{5}{3}y \\ 3y - 2 \overline{) 15y^4 - 16y^3 + 9y^2 - \frac{10}{3}y + 6} \\ \underline{15y^4 - 10y^3} \phantom{+ 9y^2 - \frac{10}{3}y + 6} \\ -6y^3 + 9y^2 - \frac{10}{3}y + 6 \\ \underline{6y^3 + 4y^2} \phantom{- \frac{10}{3}y + 6} \\ -2y^2 - \frac{10}{3}y + 6 \\ \underline{5y^2 - \frac{10}{3}y} \\ -\frac{10}{3}y + 6 \\ \underline{-\frac{10}{3}y + 6} \\ 0 \end{array}$$

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

$$\text{Remainder} = 6$$

$$\text{Divisor} = 3y - 2$$

$$\begin{aligned}
 \text{Divisor} \times \text{Quotient} + \text{Remainder} &= (3y - 2) \left(5y^3 - 2y^2 + \frac{5}{3}y \right) + 6 \\
 &= 15y^4 - 6y^3 + 5y^2 - 10y^3 + 4y^2 - \frac{10}{3}y + 6 \\
 &= 15y^4 - 16y^3 + 9y^2 - \frac{10}{3}y + 6 \\
 &= \text{Dividend}
 \end{aligned}$$

Thus,

$$\text{Divisor} \times \text{Quotient} + \text{Remainder} = \text{Dividend}$$

Hence verified.

(vi)

$$\begin{array}{r}
 2y + 5 \\
 2y^2 - y + 1 \overline{) 4y^3 + 8y^2 + 8y + 7} \\
 \underline{4y^3 - 2y^2 + 2y} \\
 10y^2 + 6y + 7 \\
 \underline{10y^2 - 5y + 5} \\
 11y + 2
 \end{array}$$

$$\text{Quotient} = 2y + 5$$

$$\text{Remainder} = 11y + 2$$

$$\text{Divisor} = 2y^2 - y + 1$$

$$\begin{aligned}
 \text{Divisor} \times \text{Quotient} + \text{Remainder} &= (2y^2 - y + 1)(2y + 5) + 11y + 2 \\
 &= 4y^3 + 10y^2 - 2y^2 - 5y + 2y + 5 + 11y + 2 \\
 &= 4y^3 + 8y^2 + 8y + 7 \\
 &= \text{Dividend}
 \end{aligned}$$

Thus,

$$\text{Divisor} \times \text{Quotient} + \text{Remainder} = \text{Dividend}$$

Hence verified.

(vii)

$$\begin{array}{r}
 3y^2 + 2y + 2 \\
 2y^3 + 1 \overline{) 6y^5 + 4y^4 + 4y^3 + 7y^2 + 27y + 6} \\
 \underline{6y^5} \\
 4y^4 + 4y^3 + 4y^2 + 27y + 6 \\
 \underline{4y^4} \\
 4y^3 + 4y^2 + 25y + 6 \\
 \underline{4y^3} \\
 4y^2 + 25y + 4
 \end{array}$$

$$\text{Quotient} = 3y^2 + 2y + 2$$

$$\text{Remainder} = 4y^2 + 25y + 4$$

$$\text{Divisor} = 2y^3 + 1$$

$$\begin{aligned}\text{Divisor} \times \text{Quotient} + \text{Remainder} &= (2y^3 + 1)(3y^2 + 2y + 2) + 4y^2 + 25y + 4 \\ &= 6y^5 + 4y^4 + 4y^3 + 3y^2 + 2y + 2 + 4y^2 + 25y + 4 \\ &= 6y^5 + 4y^4 + 4y^3 + 7y^2 + 27y + 6 \\ &= \text{Dividend}\end{aligned}$$

Thus,

$$\text{Divisor} \times \text{Quotient} + \text{Remainder} = \text{Dividend}$$

Hence verified.

***** END *****