

LESSON #2: DIVIDING POLYNOMIALS (DAY 1)

Do Now : Use long division to find the quotient:

a.
$$\begin{array}{r} \boxed{37} \\ 5 \overline{)185} \\ \underline{15} \\ 35 \\ \underline{35} \\ 0 \end{array} \rightarrow \text{remainder}$$

b.
$$\begin{array}{r} \boxed{23} \\ 11 \overline{)253} \\ \underline{22} \\ 33 \\ \underline{33} \\ 0 \end{array} \rightarrow \text{remainder}$$

1)
$$\begin{array}{r} 2x^2 + 5x + 3 \\ x + 1 \overline{)2x^2 + 5x + 3} \\ \underline{-(2x^2 + 2x)} \\ 3x + 3 \\ \underline{-(3x + 3)} \\ 0 \end{array}$$

Annotations:
 - $x+1$ is circled and labeled "DIVISOR" with an arrow.
 - $2x^2 + 5x + 3$ is circled and labeled "dividend" with an arrow.
 - $2x + 3$ is circled and labeled "quotient" with an arrow.
 - $-(2x^2 + 2x)$ is circled and labeled "dividend" with an arrow.
 - $3x + 3$ and $-(3x + 3)$ are circled and labeled "dividend" with an arrow.
 - The final result $2x + 3$ is boxed.

2)
$$\begin{array}{r} 2x^2 + x - 10 \\ x - 2 \overline{)2x^2 + x - 10} \\ \underline{-(2x^2 + 4x)} \\ 5x - 10 \\ \underline{-(5x + 10)} \\ 0 \end{array}$$

Annotations:
 - $x-2$ is circled and labeled "DIVISOR" with an arrow.
 - $2x^2 + x - 10$ is circled and labeled "dividend" with an arrow.
 - $2x + 5$ is circled and labeled "quotient" with an arrow.
 - $-(2x^2 + 4x)$ is circled and labeled "dividend" with an arrow.
 - $5x - 10$ and $-(5x + 10)$ are circled and labeled "dividend" with an arrow.
 - The final result $2x + 5$ is boxed.

The method that we just used is called LONG DIVISION

DIVIDEND: NUMERATOR

DIVISOR: DENOMINATOR (FACTOR)

↳ when the remainder is zero

The answer to the division problem is called the Quotient

3) $(x^2 - 2x - 15) \div (x + 3)$

$$\begin{array}{r} x-5 \\ x+3 \overline{) x^2 - 2x - 15} \\ + (\cancel{x^2} \ominus 3x) \\ \hline -5x - 15 \\ + (+5x + 15) \\ \hline 0 \end{array}$$

$x-5$

4) $(2x^3 + x^2 - 16x + 15) \div (2x - 3)$

$$\begin{array}{r} x^2 + 2x - 5 \\ 2x-3 \overline{) 2x^3 + x^2 - 16x + 15} \\ + (\cancel{2x^3} + 3x^2) \downarrow \\ \hline + 4x^2 - 16x \\ + (\cancel{-4x^2} + 6x) \downarrow \\ \hline -10x + 15 \\ + (+10x \ominus 15) \\ \hline 0 \end{array}$$

$x^2 + 2x - 5$

PRACTICE:

5) $(x^2 + 6x + 9) \div (x + 3)$

$$\begin{array}{r} x+3 \\ x+3 \overline{) x^2 + 6x + 9} \\ + (\cancel{x^2} \ominus 3x) \downarrow \\ \hline 3x + 9 \\ + (\cancel{-3x} \ominus 9) \\ \hline 0 \end{array}$$

$x+3$

6) $\frac{x^3 + 2x^2 + 2x + 1}{x + 1}$

$$\begin{array}{r} x^2 + x + 1 \\ x+1 \overline{) x^3 + 2x^2 + 2x + 1} \\ + (\cancel{x^3} \ominus x^2) \downarrow \\ \hline x^2 + 2x \\ + (\cancel{-x^2} \ominus x) \downarrow \\ \hline x + 1 \\ + (\cancel{-x} \ominus 1) \\ \hline 0 \end{array}$$

$x^2 + x + 1$

7) $(7x^3 - 8x^2 - 13x + 2) \div (7x - 1)$

$$\begin{array}{r} x^2 - x - 2 \\ 7x-1 \overline{) 7x^3 - 8x^2 - 13x + 2} \\ + (\cancel{-7x^3} + x^2) \downarrow \\ \hline -7x^2 - 13x \\ + (\cancel{+7x^2} \ominus x) \downarrow \\ \hline -14x + 2 \\ + (+14x \ominus 2) \\ \hline 0 \end{array}$$

8) $\frac{2x^3 - 13x^2 - x + 3}{2x + 1}$

$$\begin{array}{r} x^2 - 2x + 1 \\ 2x+1 \overline{) 2x^3 - 13x^2 - x + 3} \\ + (\cancel{-2x^3} \ominus x^2) \downarrow \\ \hline -14x^2 - x \\ + (\cancel{+14x^2} + 7x) \downarrow \\ \hline 6x + 3 \\ + (\cancel{-6x} \ominus 3) \\ \hline 0 \end{array}$$