

1.3 Division of Polynomials

PRACTICE

Directions: Perform the indicated operation.

1) $\frac{p^4 + 2p^3 - 6p^2 - p + 24}{p + 3}$
 $p + 3 = 0$
 $p = -3$

$$\begin{array}{r} -3 \overline{) 1 \ 2 \ -6 \ -1 \ 24} \\ \underline{1 \ 3 \ -9 \ -10} \\ 1 \ -1 \ -3 \ 8 \ 0 \end{array}$$

$$p^3 - p^2 - 3p + 8$$

2) $\frac{6m^3 - 15m^2 - 19m + 37}{m - 3}$
 $m - 3 = 0$
 $m = 3$

$$\begin{array}{r} 3 \overline{) 6 \ -15 \ -19 \ 37} \\ \underline{6 \ 18 \ 9 \ -30} \\ 6 \ 3 \ -10 \ 7 \end{array}$$

$$\begin{array}{l} 6m^2 + 3m - 10 \ R7 \\ \text{or} \\ 6m^2 + 3m - 10 + \frac{7}{m-3} \end{array}$$

3) $\frac{v^3 - 10v + 9}{v - 1}$
 $v - 1 = 0$
 $v = 1$

$$\begin{array}{r} 1 \overline{) 1 \ 0 \ -10 \ 9} \\ \underline{1 \ 1 \ -9} \\ 1 \ 1 \ -9 \ 0 \end{array}$$

$$v^2 + v - 9$$

4) $\frac{b^4 - 5b^3 - 10b + 51}{b - 5}$
 $b - 5 = 0$
 $b = 5$

$$\begin{array}{r} 5 \overline{) 1 \ -5 \ 0 \ -10 \ 51} \\ \underline{5 \ 0 \ 0 \ -50} \\ 1 \ 0 \ 0 \ -10 \ 1 \end{array}$$

$$\begin{array}{l} b^3 - 10 + \frac{1}{b-5} \\ \text{OR} \\ b^3 - 10 \ R1 \end{array}$$

Directions: Determine whether or not the given binomial is a factor of the polynomial. Show work and EXPLAIN why or why not.

5) Is $(v - 9)$ a factor of $(9v^4 - 81v^3 - 10v + 90)$?
 $v = 9$

$$\begin{array}{r} 9 \overline{) 9 \ -81 \ 0 \ -10 \ 90} \\ \underline{9 \ 81 \ 0 \ 0 \ -90} \\ 9 \ 0 \ 0 \ -10 \ 0 \end{array}$$

There is no remainder when you divide by $(v-9)$ so therefore it is a factor.

6) Is $(x + 1)$ a factor of $(6x^3 + 5x^2 - 9x - 4)$?
 $x = -1$

$$\begin{array}{r} -1 \overline{) 6 \ 5 \ -9 \ -4} \\ \underline{6 \ -6 \ 1 \ 8} \\ 6 \ -1 \ -8 \ 4 \end{array}$$

There is a remainder when you divide by $(x+1)$ which means it doesn't divide evenly and IS NOT a factor.

Directions: Given one factor, factor completely.

8) $(k + 4)$ is a factor of $(3k^3 - 5k^2 - 74k - 24)$

$k = -4$

$$\begin{array}{r}
 -4 \overline{) \begin{array}{cccc} 3 & -5 & -74 & -24 \\ & -12 & 68 & 24 \\ \hline 3 & -17 & -6 & 0 \end{array} \\
 \hline
 3x^2 - 17x - 6 \quad x - 18 \\
 + -17
 \end{array}$$

	x	-6
$3x$	$3x^2$	$-18x$
1	$1x$	-6

$(x - 6)(3x + 1)(x + 4)$

9) $(v - 1)$ is a factor of $(5v^3 - 18v^2 + 7v + 6)$

$v = 1$

$$\begin{array}{r}
 1 \overline{) \begin{array}{cccc} 5 & -18 & 7 & 6 \\ & 5 & -13 & -6 \\ \hline 5 & -13 & -6 & 0 \end{array} \\
 \hline
 5v^2 - 13v - 6 \quad x - 30 \\
 + -13
 \end{array}$$

	v	-3
$5v$	$5v^2$	$-15v$
2	$2v$	-6

$(v - 1)(5v + 2)(v - 3)$