

The Remainder Theorem

Evaluate each function at the given value.

1) $f(x) = -x^3 + 6x - 7$ at $x = 2$

$$\begin{array}{r} 2 | -1 \\ -2 \\ \hline -1 \end{array}$$

2) $f(x) = x^3 + x^2 - 5x - 6$ at $x = 2$

$$\begin{array}{r} 2 | 1 \\ 2 \\ \hline 1 \end{array}$$

3) $f(a) = a^3 + 3a^2 + 2a + 8$ at $a = -3$

$$\begin{array}{r} -3 | 1 \\ -3 \\ \hline 1 \end{array}$$

4) $f(a) = a^3 + 5a^2 + 10a + 12$ at $a = -2$

$$\begin{array}{r} -2 | 1 \\ -2 \\ \hline 1 \end{array}$$

5) $f(a) = a^4 + 3a^3 - 17a^2 + 2a - 7$ at $a = 3$

$$\begin{array}{r} 3 | 1 \\ 3 \\ \hline 1 \end{array}$$

6) $f(x) = x^3 - 47x^2 - 16x^2 + 8x + 52$ at $x = 7$

$$\begin{array}{r} 7 | 1 \\ 7 \\ \hline 1 \end{array}$$

State if the given binomial is a factor of the given polynomial.

7) $(k^2 - k^2 - k - 2) \div (k - 2)$

$$\begin{array}{r} 2 | 1 \\ 2 \\ \hline 1 \end{array}$$

8) $(b^4 - 8b^3 - b^2 + 62b - 34) \div (b - 7)$

$$\begin{array}{r} 7 | 1 \\ 7 \\ \hline 1 \end{array}$$

9) $(n^4 + 9n^3 + 14n^2 + 50n + 9) \div (n + 8)$

$$\begin{array}{r} -8 | 1 \\ -8 \\ \hline 1 \end{array}$$

10) $(p^4 + 6p^3 + 11p^2 + 29p - 13) \div (p + 5)$

$$\begin{array}{r} -5 | 1 \\ -5 \\ \hline 1 \end{array}$$

11) $(p^4 - 8p^3 + 10p^2 + 2p + 4) \div (p - 2)$

$$\begin{array}{r} 2 | 1 \\ 2 \\ \hline 1 \end{array}$$

12) $(n^5 - 25n^3 - 7n^2 - 37n - 18) \div (n + 5)$

$$\begin{array}{r} -5 | 1 \\ -5 \\ \hline 1 \end{array}$$

13) $(x^4 + 6x^3 - 3x^2 - 22x - 29) \div (x + 6)$

$$\begin{array}{r} -6 | 1 \\ -6 \\ \hline 1 \end{array}$$

14) $(n^4 + 10n^3 + 21n^2 + 6n - 8) \div (n + 2)$

$$\begin{array}{r} -2 | 1 \\ -2 \\ \hline 1 \end{array}$$

Math 3 Worksheet

Dividing Polynomials (Synthetic Division)

Divide (two ways: a) Long division and b) Synthetic division

1) $(n^3 + n^2 - 11n + 18) \div (n - 1)$

$$\begin{array}{r} n^2 + 2n - 9 \\ n^2 + 2n - 9 \\ \hline 0 \end{array}$$

2) $(m^3 + 6m^2 + 9m - 5) \div (m + 1)$

$$\begin{array}{r} m^2 + 5m + 4 \\ m^2 + 5m + 4 \\ \hline -5 \end{array}$$

3) $(x^3 - 6x^2 - 6x + 9) \div (x + 1)$

$$\begin{array}{r} x^2 - 7x + 1 \\ x^2 - 7x + 1 \\ \hline 0 \end{array}$$

4) $(5n^3 - 9n^2 - 13n - 6) \div (n - 2)$

$$\begin{array}{r} 5n^2 + 7n + 1 \\ 5n^2 + 7n + 1 \\ \hline -6 \end{array}$$

5) $(3r^3 + 34r^2 + 89r + 75) \div (r + 8)$

$$\begin{array}{r} 3r^2 + 10r + 9 \\ 3r^2 + 10r + 9 \\ \hline 0 \end{array}$$

6) $(6b^3 + 28b^2 + 25b - 21) \div (b + 3)$

$$\begin{array}{r} 6b^2 + 10b - 5 \\ 6b^2 + 10b - 5 \\ \hline 0 \end{array}$$

7) $(8r^3 - 55r^2 + 44r - 12) \div (r - 6)$

$$\begin{array}{r} 8r^2 + 23r - 6 \\ 8r^2 - 48r + 168 \\ \hline -25r^2 + 172r - 180 \\ -25r^2 + 150r - 150 \\ \hline 22r - 130 \\ 22r - 132 \\ \hline 2 \end{array}$$

8) $(n^3 - 9n - 3) \div (n + 3)$

$$\begin{array}{r} n^2 + 3n + 6 \\ n^2 + 3n + 6 \\ \hline -3 \end{array}$$

9) $(b^3 + 7b^2 - 2) \div (b + 7)$

$$\begin{array}{r} b^2 + 0b - 2 \\ b^2 + 7b + 49 \\ \hline -7b - 51 \\ -7b - 49 \\ \hline -2 \end{array}$$

10) $(2r^3 + 28r^2 + 86r + 60) \div (r + 10)$

$$\begin{array}{r} 2r^2 + 8r + 6 \\ 2r^2 + 20r + 200 \\ \hline -12r - 140 \\ -12r - 120 \\ \hline -20 \end{array}$$

11) $(m^3 - 2m^2 - 11m - 6) \div (m + 2)$

$$\begin{array}{r} m^2 - 4m - 11 \\ m^2 + 2m + 4 \\ \hline -6m - 15 \\ -6m - 12 \\ \hline -3 \end{array}$$

12) $(r^3 - 10r^2 + 15r + 20) \div (r - 3)$

$$\begin{array}{r} r^2 + 7r + 2 \\ r^2 - 3r + 9 \\ \hline -17r + 11 \\ -17r + 51 \\ \hline 40 \end{array}$$

13) $(k^3 - 6k^2 - 6k + 9) \div (k - 1)$

$$\begin{array}{r} k^2 - 5k - 1 \\ k^2 - k + 1 \\ \hline -4k + 0 \\ -4k + 4 \\ \hline 0 \end{array}$$

14) $(2r^3 + 6r^2 + 2r - 21) \div (r - 3)$

$$\begin{array}{r} 2r^2 + 12r + 34 \\ 2r^2 - 6r + 18 \\ \hline 18r - 39 \\ 18r - 54 \\ \hline 15 \end{array}$$

15) $(n^3 - 6n^2 - 6n + 9) \div (n - 1)$

$$\begin{array}{r} n^2 - 5n - 1 \\ n^2 - n + 1 \\ \hline -4n + 0 \\ -4n + 4 \\ \hline 0 \end{array}$$

16) $(n^3 - 3n^2 + 0n - 3) \div (n - 3)$

$$\begin{array}{r} n^2 + 0n + 3 \\ n^2 - 3n + 9 \\ \hline 3n - 3 \\ 3n - 9 \\ \hline 6 \end{array}$$

17) $(3n^3 + 34n^2 + 89n + 75) \div (n - 8)$

$$\begin{array}{r} 3n^2 + 50n + 17 \\ 3n^2 - 24n + 192 \\ \hline 74n - 175 \\ 74n - 592 \\ \hline 417 \end{array}$$

18) $(2r^3 + 28r^2 + 86r + 60) \div (r + 10)$

$$\begin{array}{r} 2r^2 + 48r + 66 \\ 2r^2 + 20r + 200 \\ \hline 28r - 134 \\ 28r + 280 \\ \hline -414 \end{array}$$

19) $(-5n^3 + 44n^2 - 12n + 4) \div (n + 8)$

$$\begin{array}{r} -5n^2 + 48n - 64 \\ -5n^2 - 40n - 40 \\ \hline 88n - 104 \\ 88n + 704 \\ \hline -808 \end{array}$$

20) $(3n^3 + 15n^2 - 21n - 18) \div (n - 3)$

$$\begin{array}{r} 3n^2 + 24n + 60 \\ 3n^2 - 9n + 9 \\ \hline 33n - 9 \\ 33n - 99 \\ \hline 90 \end{array}$$

21) $(n^3 - 7n^2 + 0n - 2) \div (n - 7)$

$$\begin{array}{r} n^2 + 0n - 2 \\ n^2 - 7n + 49 \\ \hline 7n - 51 \\ 7n - 49 \\ \hline -2 \end{array}$$

22) $(-2n^3 - 3n^2 - 8n - 6) \div (n - 4)$

$$\begin{array}{r} -2n^2 + 5n + 10 \\ -2n^2 + 8n - 8 \\ \hline -3n + 18 \\ -3n + 12 \\ \hline 6 \end{array}$$