

2.3 Division: Long & Synthetic

Period _____

Use long division to divide. Show all your work. State if the factor is a root of the polynomial.

1) $(x^4 - 5x^3 - 6x^2 + 11x - 1) \div (x - 1)$

2)
$$\frac{8n^3 + 25n^2 + 8n + 7}{n + 3}$$

3) $(n^4 - 11n^3 + 22n^2 + 27n - 6) \div (n - 4)$

4) $(21r^4 + 65r^3 + 87r^2 + 69r + 24) \div (7r + 3)$

5)
$$\frac{x^3 + 9x^2 + 24x + 23}{x + 2}$$

6) $(8m^4 + 23m^3 + 70m^2 + 25m - 21) \div (8m + 7)$

Use synthetic division to divide. State if the factor is a root of the polynomial.

7) $(n^3 + 6n^2 - 35n - 29) \div (n - 4)$

8) $(a^4 + 3a^3 - 60a^2 - 76a + 50) \div (a - 7)$

9)
$$\frac{x^4 + 15x^3 + 55x^2 - 14x - 48}{x + 8}$$

10) $(3a^4 + 14a^3 + 15a^2 + 7a + 10) \div (a + 2)$

11) $(k^3 - 4k^2 - 61k - 6) \div (k + 6)$

12) $x^3 - 57x + 56 \div x - 7$

Divide using any method. State if the given binomial is a factor of the given polynomial. If it is, write the polynomial as a product of two factors.

13) $(x^3 + 6x^2 + 3x - 10) \div (x + 2)$

14) $(2r^3 - 22r^2 + 30r + 45) \div (r - 9)$

15) $(k^3 + 5k^2 - 4k + 67) \div (k + 7)$

16) $(v^3 - 12v^2 + 10v + 20) \div (v - 2)$

17) A polynomial $P(x)$ is divided by a binomial $x - a$. The remainder is 0. What conclusion can you draw? Explain.

18) Challenge: If the polynomial $f(x) = x^3 - 4x^2 - 9x + 36$ expresses the volume, in cubic inches, of a box, and the width is $x + 3$ inches, what are the dimensions of the box?