

Higher Order Polynomial Operations Worksheet

For Problems 1-5, use long division to find each quotient, $q(x)$, and remainder, $r(x)$.

1. $(x^2 - 2x - 15) \div (x - 5)$

2. $(x^3 + 5x^2 + 7x + 2) \div (x + 2)$

3. $(6x^3 + 7x^2 + 12x - 5) \div (3x - 1)$

4. $\frac{x^4 - 81}{x - 3}$

5. $\frac{18x^4 + 9x^3 + 3x^2}{3x^2 + 1}$

For Problems 6 – 11, divide using synthetic division.

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

7. $(5x^3 - 6x^2 + 3x + 11) \div (x - 2)$

8. $(x^2 - 5x - 5x^3 + x^4) \div (5 + x)$

9. $\frac{x^7 + x^5 - 10x^3 + 12}{x + 2}$

10. $\frac{x^4 - 256}{x - 4}$

11. $\frac{x^5 - 2x^4 - x^3 + 3x^2 - x + 1}{x - 2}$

For Problems 12 – 16, use synthetic division and the Remainder Theorem to find the indicated function value.

12. $f(x) = x^3 - 7x^2 + 5x - 6$; $f(3)$

13. $f(x) = 4x^3 + 5x^2 - 6x - 4$; $f(-2)$

14. $f(x) = 2x^4 - 5x^3 - x^2 + 3x + 2$; $f\left(-\frac{1}{2}\right)$

15. $f(x) = 6x^4 + 10x^3 + 5x^2 + x + 1$; $f\left(-\frac{2}{3}\right)$

16. Use synthetic division to divide $f(x) = x^3 - 4x^2 + x + 6$ by $x + 1$. Use the result to find all zeros of f .

17. Solve the equation $2x^3 - 5x^2 + x + 2 = 0$ given that 2 is a zero of $f(x) = 2x^3 - 5x^2 + x + 2$.

18. Solve the equation $12x^3 + 16x^2 - 5x - 3 = 0$ given that $-\frac{3}{2}$ is a zero (root).

Factor Completely

19. $8p^3 - q^3$

20. $3x^{12} + 48x^7 - 51x^2$

Solve Completely

21. $16x^4 - 2x = 0$

22. $10x^4 - 10 = 0$