

Practice 6-3

Dividing Polynomials

Determine whether each binomial is a factor of $x^3 + 3x^2 - 10x - 24$.

1. $x + 4$ 2. $x - 3$ 3. $x + 6$ 4. $x + 2$

Divide using synthetic division.

5. $(x^3 - 8x^2 + 17x - 10) \div (x - 5)$ 6. $(x^3 + 5x^2 - x - 9) \div (x + 2)$
 7. $(-2x^3 + 15x^2 - 22x - 15) \div (x - 3)$ 8. $(x^3 + 7x^2 + 15x + 9) \div (x + 1)$
 9. $(x^3 + 2x^2 + 5x + 12) \div (x + 3)$ 10. $(x^3 - 5x^2 - 7x + 25) \div (x - 5)$
 11. $(x^4 - x^3 + x^2 - x + 1) \div (x - 1)$ 12. $\left(x^4 + \frac{5}{3}x^3 - \frac{2}{3}x^2 + 6x - 2\right) \div \left(x - \frac{1}{3}\right)$
 13. $(x^4 - 5x^3 + 5x^2 + 7x - 12) \div (x - 4)$ 14. $(2x^4 + 23x^3 + 60x^2 - 125x - 500) \div (x + 4)$

Use synthetic division and the Remainder Theorem to find $P(a)$.

15. $P(x) = 3x^3 - 4x^2 - 5x + 1; a = 2$ 16. $P(x) = x^3 + 7x^2 + 12x - 3; a = -5$
 17. $P(x) = x^3 + 6x^2 + 10x + 3; a = -3$ 18. $P(x) = 2x^4 - 9x^3 + 7x^2 - 5x + 11; a = 4$

Divide using long division. Check your answers.

19. $(x^2 - 13x - 48) \div (x + 3)$ 20. $(2x^2 + x - 7) \div (x - 5)$
 21. $(x^3 + 5x^2 - 3x - 1) \div (x - 1)$ 22. $(3x^3 - x^2 - 7x + 6) \div (x + 2)$

Use synthetic division and the given factor to completely factor each polynomial function.

23. $y = x^3 + 3x^2 - 13x - 15; (x + 5)$ 24. $y = x^3 - 3x^2 - 10x + 24; (x - 2)$

Divide.

25. $(6x^3 + 2x^2 - 11x + 12) \div (3x + 4)$ 26. $(x^4 + 2x^3 + x - 3) \div (x - 1)$
 27. $(2x^4 + 3x^3 - 4x^2 + x + 1) \div (2x - 1)$ 28. $(x^5 - 1) \div (x - 1)$
 29. $(x^4 - 3x^2 - 10) \div (x - 2)$ 30. $(3x^3 - 2x^2 + 2x + 1) \div \left(x + \frac{1}{3}\right)$

31. A box is to be mailed. The volume in cubic inches of the box can be expressed as the product of its three dimensions:
 $V(x) = x^3 - 16x^2 + 79x - 120$. The length is $x - 8$. Find linear expressions for the other dimensions. Assume that the width is greater than the height.