Name _____ Class _____ Date _____

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.