Name _____ Class _____ Date _____

5-4 Practice

Form G

Dividing Polynomials

Divide using long division. Check your answers.

1. $(x^2 - 13x - 48) \div (x + 3)$
2. $(2x^2 + x - 7) \div (x - 5)$
3. $(x^3 + 5x^2 - 3x - 1) \div (x - 1)$
4. $(3x^3 - x^2 - 7x + 6) \div (x + 2)$
5. $(x^2 - 3x + 1) \div (x - 4)$
6. $(x^3 - 4x^2 + 3x + 2) \div (x + 2)$

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

7. $x + 4$
8. $x - 3$
9. $x + 6$
10. $x + 2$

Divide using synthetic division.

11. $(x^3 - 8x^2 + 17x - 10) \div (x - 5)$
12. $(x^3 + 5x^2 - x - 9) \div (x + 2)$
13. $(-2x^3 + 15x^2 - 22x - 15) \div (x - 3)$
14. $(x^3 + 7x^2 + 15x + 9) \div (x + 1)$
15. $(x^3 + 2x^2 + 5x + 12) \div (x + 3)$
16. $(x^3 - 5x^2 - 7x + 25) \div (x - 5)$
17. $(x^4 - x^3 + x^2 - x + 1) \div (x - 1)$
18. $(2x^4 + 7x^3 - 11x^2 + 21x + 5) \div (x + 5)$
19. $(x^4 - 5x^3 + 5x^2 + 7x - 12) \div (x - 4)$
20. $(2x^4 + 23x^3 + 60x^2 - 125x - 500) \div (x + 4)$

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

21. $y = x^3 + 3x^2 - 13x - 15; (x + 5)$
22. $y = x^3 - 3x^2 - 10x + 24; (x - 2)$
23. $y = x^3 + x^2 - 10x + 8; (x - 1)$
24. $y = x^3 + 4x^2 - 9x - 36; (x + 3)$
25. The expression $V(x) = x^3 - 13x + 12$ represents the volume of a rectangular safe in cubic feet. The length of the safe is $x + 4$. What linear expressions with integer coefficients could represent the other dimensions of the safe? Assume that the height is greater than the width.

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

26. $P(x) = 3x^3 - 4x^2 - 5x + 1; a = 2$
27. $P(x) = x^3 + 7x^2 + 12x - 3; a = -5$
28. $P(x) = x^3 + 6x^2 + 10x + 3; a = -3$
29. $P(x) = 2x^4 - 9x^3 + 7x^2 - 5x + 11; a = 4$

Name _____ Class _____ Date _____

5-4 Practice (continued) Form G

Dividing Polynomials

Divide.

30. $(6x^3 + 2x^2 - 11x + 12) \div (3x + 4)$

31. $(x^4 + 2x^3 + x - 3) \div (x - 1)$

32. $(2x^4 + 3x^3 - 4x^2 + x + 1) \div (2x - 1)$

33. $(x^5 - 1) \div (x - 1)$

34. $(x^4 - 3x^2 - 10) \div (x - 2)$

35. $\left(3x^3 - 2x^2 + 2x + 1\right) \div \left(x + \frac{1}{3}\right)$

36. The volume in cubic inches of a 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 with integer coefficients for the other dimensions. Assume that the width is greater than the height.

37. Writing What are the divisor, quotient, and remainder represented by the synthetic division below?

-5	1	0	-19	30
		-5	25	-30
	1	-5	6	0

38. Reasoning What does it mean if $P(-4)$ for the polynomial function $P(x) = x^3 + 11x^2 + 34x + 24$ equals zero?

39. Error Analysis Using synthetic division, you say that the quotient of $4x^3 - 3x^2 + 15$ divided by $x - 1$ is $4x^2 - 7x + 7$ R 8. Your friend says that the quotient is $4x^2 + x + 1$ R 16. Who is correct? What mistake was made?

40. What is $P(-2)$ for $P(x) = 3x^3 - 6x^2 + 2x - 12$?

41. The expression $x^3 + 16x^2 + 68x + 80$ represents the volume of a flower box in cubic inches. The expression $x + 4$ represents the depth of the box. Assume that the length is greater than the height and that linear expressions with integer coefficients represent both.

a. What are the other dimensions of the flower box?

b. If $x = 3$, what are the dimensions of the flower box?