

4.4 Dividing Polynomials • Form A (All work on separate sheet of paper. Final answers on this WS for full credit.)

Examples 1

Simplify each expression.

1. $(4f^5 - 6f^4 + 12f^3 - 8f^2)(4f^2)^{-1}$

$$f^3 - \frac{3}{2}f^2 + 3f - 2$$

2. $(4a^2h^2 - 8a^3h + 3a^4) \div (2a^2)$

$$2h^2 - 4ah + \frac{3}{2}a^2$$

Examples 2 and 4

Simplify by using long division.

3. $(d^2 + 4d + 3)(d + 1)^{-1}$

$$d + 3$$

4. $(6y^2 + y - 2)(2y - 1)^{-1}$

$$3y + 2$$

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

$$2x + 1 - \frac{1}{x-3}$$

Examples 4 and 5

Simplify using synthetic division.

6. $(3t^4 + 4t^3 - 32t^2 - 5t - 20)(t + 4)^{-1}$

$$3t^3 - 8t^2 - 5$$

7. $\frac{2x^3 - x^2 - 18x + 32}{2x - 6}$

$$x^2 + \frac{5}{2}x - \frac{3}{2} + \frac{23}{2x-6}$$

8. $(3c^4 + 6c^3 - 2c + 4)(c + 2)^{-1}$

$$3c^2 - 2 + \frac{8}{c-2}$$

Mixed Exercises

Simplify.

9. $(a^3 - 6a^2 + 10a - 3) \div (a - 3)$

$$a^2 - 3a + 1$$

10. $(x^3 + 2x^2 - 34x + 9) \div (x + 7)$

$$x^2 - 5x + 1 + \frac{2}{x+7}$$

11. $(6x^3 + x^2 + x) \div (2x + 1)$

$$3x^2 - x + 1 - \frac{1}{2x+1}$$

12. $(x^4 - y^4) \div (x - y)$

$$x^3 + x^2y + xy^2 + y^3 \text{ or } (x^2 + y^2)(x + y)$$

13. $(a^3b^2 - a^2b + 2b)(-ab)^{-1}$

$$-a^2b + a - \frac{2}{a}$$

14. $\frac{p^3 + 2p^2 - 7p - 21}{p + 3}$

$$p^2 - p - 4 - \frac{9}{p+3}$$

15. **AVERAGES** Bena has a list of $n + 1$ numbers and she needs to find their average. Two of the numbers are n^3 and 2. Each of the other $n - 1$ numbers are all equal to 1. Find the average of these numbers.

$$n^2 - n + 2 - \frac{1}{n+1}$$

16. **REASONING** Rewrite $\frac{6x^4 - 2x^3 - 16x^2 + 24x + 2}{2x + 4}$ as $q(x) + \frac{r(x)}{d(x)}$ using long division. What does the remainder indicate in this problem?

$$3x^3 - 5x^2 + 2x + 8$$

17. **REGULARITY** Rewrite $\frac{x^5 + 2x^2 + x - 2}{2x + 3}$ as $q(x) + \frac{r(x)}{d(x)}$ using long division.

a. Identify $q(x)$, $r(x)$, and $d(x)$.b. How can you check your work using the expressions of $q(x)$, $g(x)$, and $r(x)$?

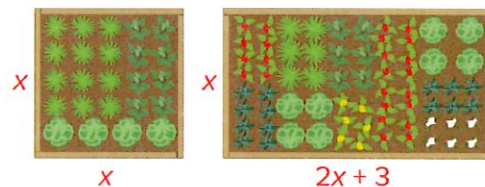
18. **USE A MODEL** Luciano has a square garden. A new garden will have the same width and a length that is 3 feet more than twice the width of the original garden.

a. Define a variable and label each side of the diagrams with an expression for its length.

$$200 + \frac{300}{x}$$

b. Write a ratio to represent the percent increase in the area of the garden. Use polynomial division to simplify the expression.

c. Use your expression from part b to determine the percent of increase in area if the original garden was a 12-foot square. Check your answer.



19. **PERSEVERE** If a polynomial is divided by a binomial and the remainder is 0, what does this tell you about the relationship between the binomial and the polynomial?

The binomial is a factor of the polynomial

20. **CREATE** Write a quotient of two polynomials for which the remainder is 3.

answers will vary.

21. **PERSEVERE** Mr. Collins has his class working with bases and polynomials. He wrote on the board that the number 1111 in base B has the value $B^3 + B^2 + B + 1$. The class was then given the following questions to answer.

- a. The number 11 in base B has the value $B + 1$. What is 1111 (in base B) divided by 11 (in base B)? *$B^2 + 1$*

- b. The number 111 in base B has the value $B^2 + B + 1$. What is 1111 (in base B) divided by 111 (in base B)?

$$B + \frac{1}{B^2 + B + 1}$$