

Warm-up

1. Describe the transformations that changed the function $f(x) = x^2$ to $g(x) = 7(x - 3)^2 - 2$
2. Create a quadratic equation with the roots $x = 2$ and $x = 1$.
3. The function $f(x) = x^2 + 18 - 8x$ has what type of roots? How do you know?



Objectives

Use Polynomial Long Division to divide one polynomial into another polynomial.

Use Synthetic Division to divide one polynomial into another polynomial.

Homework

Packet Page 40, 5-4 Dividing Polynomials: 12, 14 and 16

Packet Page 36, 5-4 Dividing Polynomials: 17-29 odd

Homework Review

Divide using polynomial long division.

1. $(3x^2 - 8x + 7) \div (x - 1)$

$3x - 5, R 2$

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

$x + 8, R 32$

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

$x^2 - 4x - 1$

7. $(2x^2 - 4x + 7) \div (x - 3)$

$2x + 2, R 13$

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

$x - 4, R -2$

2. $(x^3 + 5x^2 - 3x - 4) \div (x + 6)$

$x^2 - x + 3, R -22$

4. $(x^2 + 6x + 14) \div (x + 3)$

$x + 3, R 5$

6. $(2x^3 - 3x^2 - x - 2) \div (x - 2)$

$2x^2 + x + 1$

8. $(x^3 + 2x^2 - 20x + 4) \div (x + 7)$

$x^2 - 5x + 15, R -101$

10. $(2x^3 + 3x^2 + x + 6) \div (x + 3)$

$2x^2 - 3x + 10, R -24$

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Use polynomial division to divide $2x^5 + x^4 - 15x^3 - 2x + 10x - 24$ by $x^2 - x - 4$. What is the **quotient** and what is the **remainder**?

$$x^2 - x - 4 \overline{) 2x^5 + x^4 - 15x^3 - 2x + 10x - 24}$$



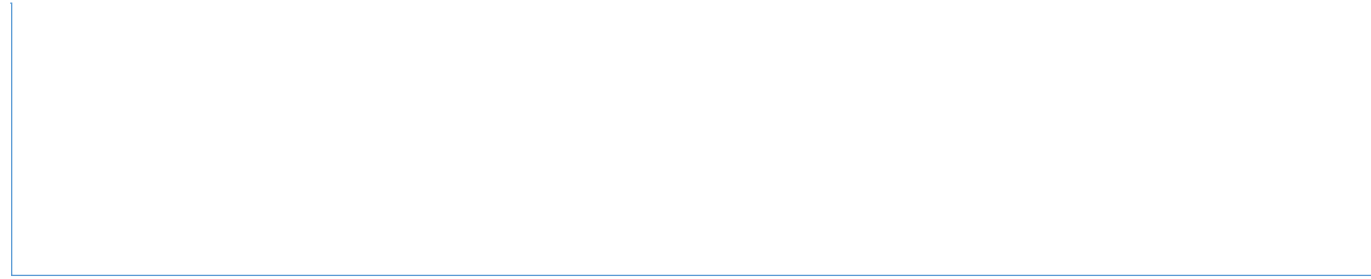
If you liked long division, you'll love SYNTHETIC division!

Synthetic division was first modeled in the early 1800s by the Italian mathematician, Paolo Ruffini. This process was created to more efficiently perform long division between polynomials. Synthetic division is a form of shorthand mathematics, which allows you to work solely with the coefficients without having to worry about the variables. You can find more information here: <http://www.purplemath.com/modules/synthdiv.htm>

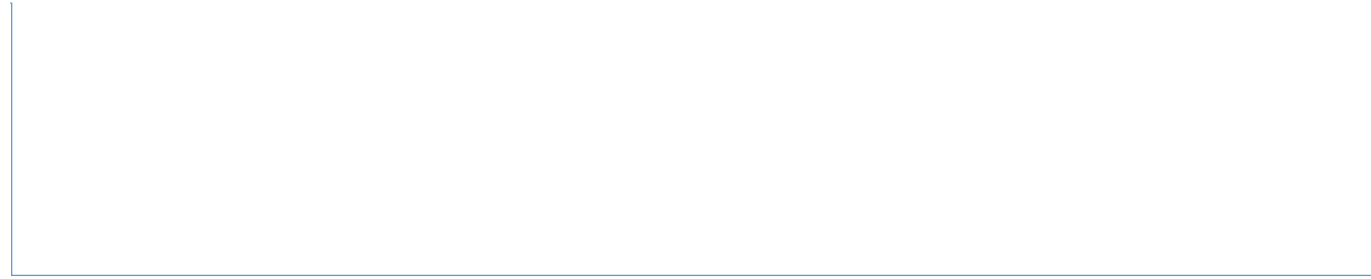
But...there's some fine print. *It only works when you divide by a linear factor.* (Degree of 1)

AND you divide by the zero!

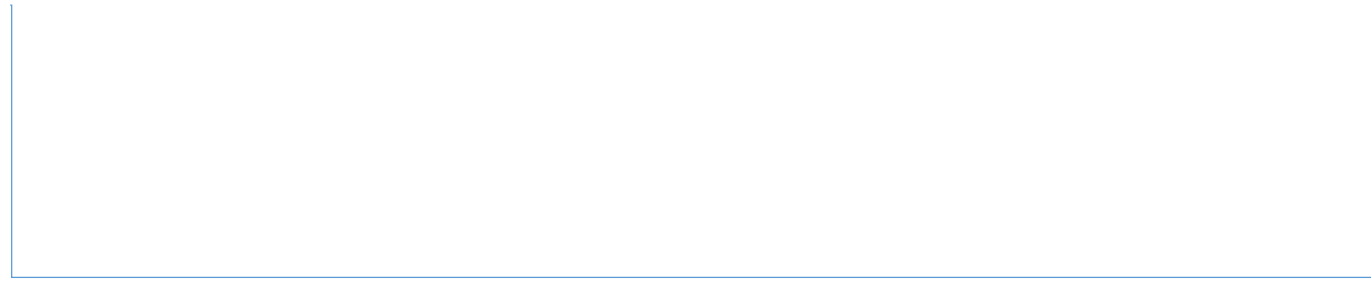
Use **synthetic** division to divide $x^3 + 13x^2 + 46x + 48$ by $x + 3$. What is the **quotient** and what is the **remainder**?



Use **synthetic** division to divide $x^3 + 3x^2 - 15$ by $x + 5$. What is the **quotient** and what is the **remainder**?

A large empty rectangular box with a thin blue border, intended for the student to write their answer to the problem.

Use **synthetic** division to divide $x^3 + x^2 - 10x + 8$ by $x - 1$. What is the **quotient** and what is the **remainder**?



Look at 5-4 Dividing Polynomials page 40.

Use synthetic division to find the quotient and remainder.

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



13. $(3x^4 + x^3 - 6x^2 - 9x + 12) \div (x + 1)$



To Turn in for a classwork grade:

Packet Page 35-36

5-4 Dividing Polynomials; 3, 23 and 25

You may work with a partner