



# ALGEBRA 4

Day 47



# Bell Work

In the standard  $(x,y)$  coordinate plane below, 3 of the vertices of a rectangle are shown. Which of the following is the 4th vertex of the rectangle?

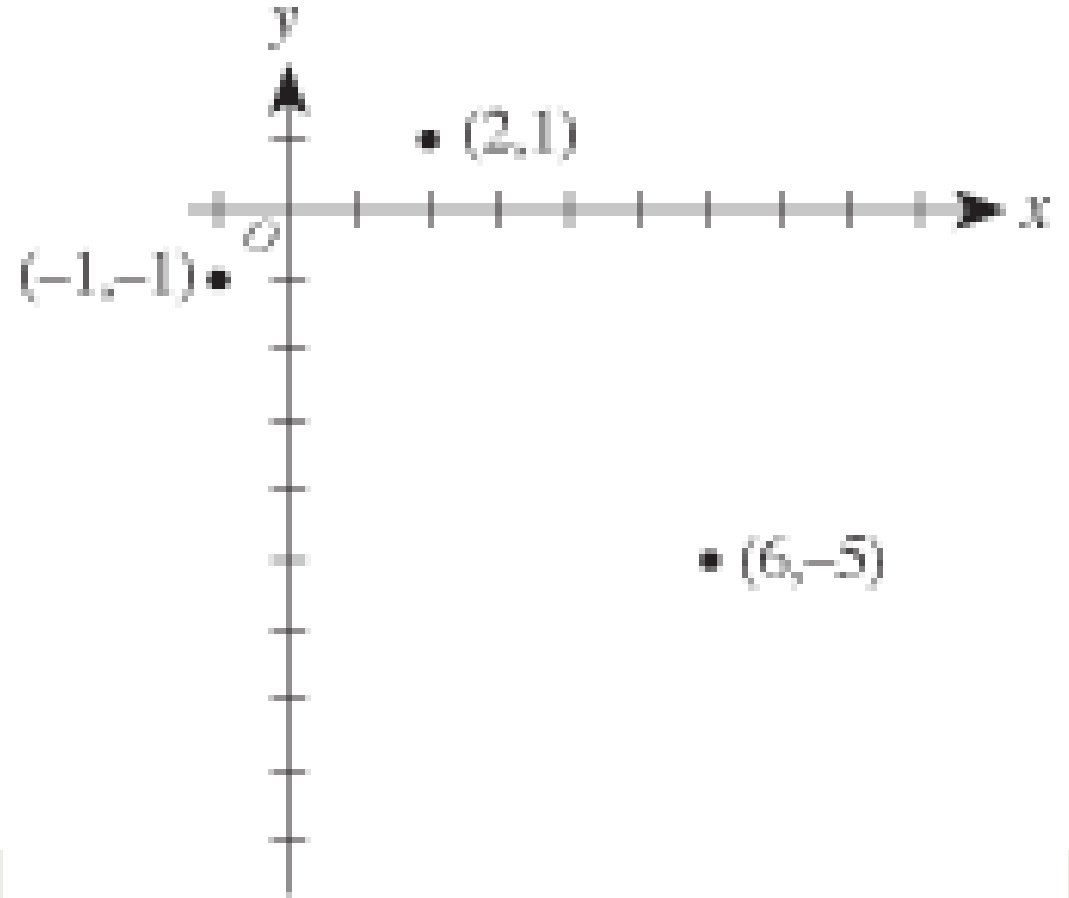
F.  $(3,-7)$

G.  $(4,-8)$

H.  $(5,-1)$

I.  $(8,-3)$

J.  $(9,-3)$



From Last Time (need time to work)

page 300 #1-9, 17, 25-31 (odd), 37, 51-52

# Quiz

- Half Sheet of Paper

## 5.4 Dividing Polynomials

Objectives:

- To Divide Polynomials Using Synthetic Division.
- To know that Long Division exists.

# To Divide Polynomials:

- Write polynomial in standard form
- Put 0's in for missing parts

*You have to remember 0's as place holders!!!!*

# Long Division

- Allows you to divide any polynomial by another polynomial
- The process is long, thus the name, and we have better options
- If you want to see it... I can show you another time! 😊

**Synthetic Division**: simplifies long-division by dividing by a linear expression  $x - a$

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**Steps to using Polynomial Synthetic Division:**

- Write the equation in standard form
- (put 0's in for exponents not represented)
- Multiply leading coefficient by the value of the variable
- Sum the next coefficient with the answer from Step 2
- Multiply the answer from Step 3 by the value of the variable
- Sum the next coefficient with the answer from Step 4
- Continue until each coefficient has been used



Example:

$f(x) = 2x^4 - 8x^2 + 5x - 7$  divided by  $x - 3$

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$$\begin{array}{r} 2x^4 + 0x^3 - 8x^2 + 5x - 7 \\ \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\ 2 \quad 0 \quad -8 \quad 5 \quad -7 \\ 3 \downarrow \quad \nearrow \quad \nearrow \quad \nearrow \quad \nearrow \\ \hline 2 \quad 6 \quad 10 \quad 35 \quad 98 \end{array}$$

$$2x^4 - 8x^2 + 5x - 7 = (2x^3 + 6x^2 + 10x + 35)(x - 3) + \mathbf{R: 98}$$

## Remainder Theorem;

If a polynomial  $f(x)$  is divided by  $x - k$ , then the remainder is  $r = f(k)$

Based on the last problem...

By the Remainder Theorem,  $f(3)$  is the remainder when you divide  $f(x)$  by  $x - 3$

$$f(3) = 98$$

Is  $(x+5)$  a factor of  $x^3 + 7x^2 - 38x - 240$ ?  
If yes, what are the other factors? If no,  
what is the remainder?

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- Since you get a remainder of 0 when doing synthetic division, then  $(x+5)$  is a factor
- The other factors are  $(x+8)$  and  $(x-6)$
- Therefore,  $x^3 + 7x^2 - 38x - 240 = (x+5)(x+8)(x-6)$

# For Next Time

Page 308 #1-7, 11-25 (odd), 29, 33-37  
(odd), 41

(Extra Practice #44-62)