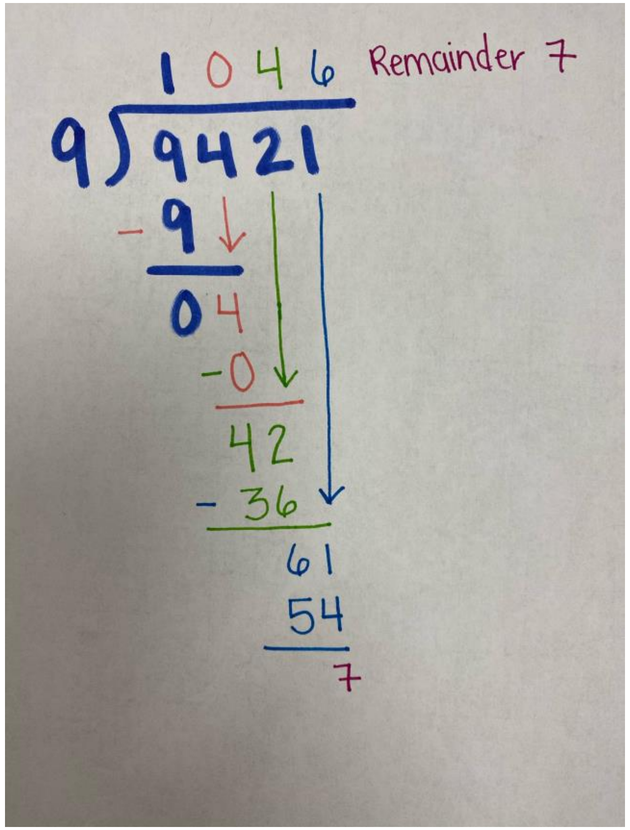
DIVIDING POLYNOMIALS

Using Long Division

Let's Review!

Divide the following using long division and explain the step-by-step process you used.

$$9\overline{)9421}$$



Let's Review!

Fill in the blank:

1. $x^2 \bullet$ __x__ $= x^3$

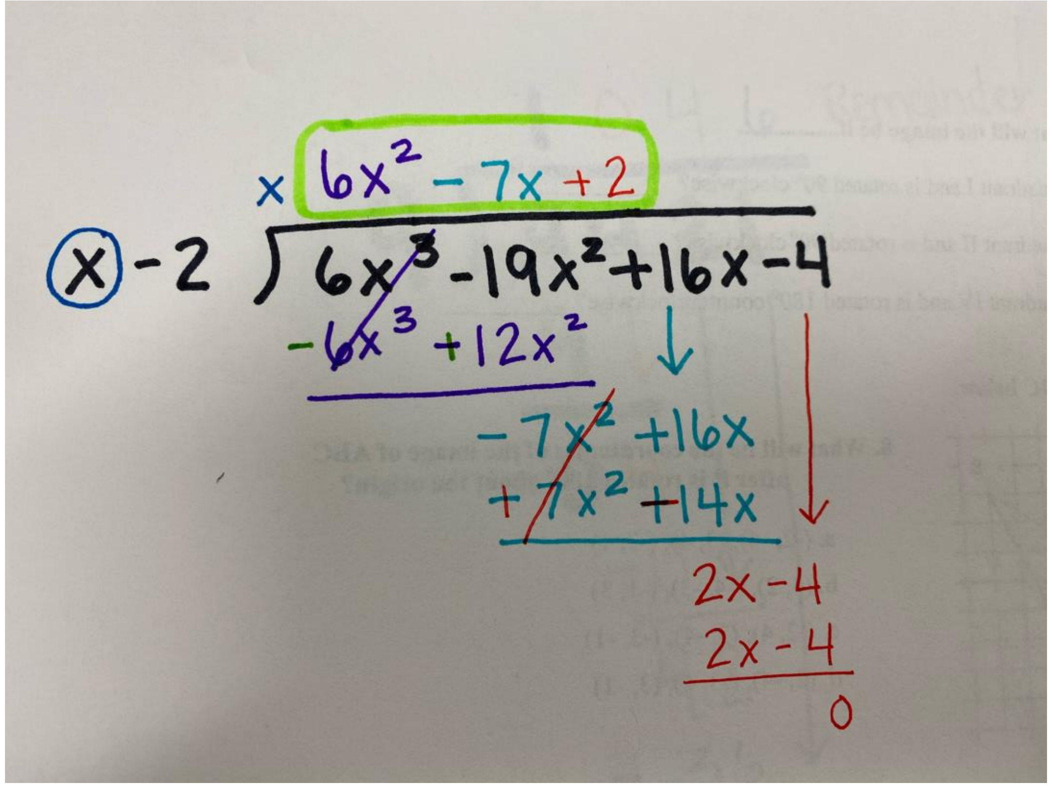
2. $a \bullet$ __a^3__ $= a^4$

3. $y^3 \bullet$ __y^2__ $= y^5$

4. $z \bullet$ __z^2__ $= z^3$

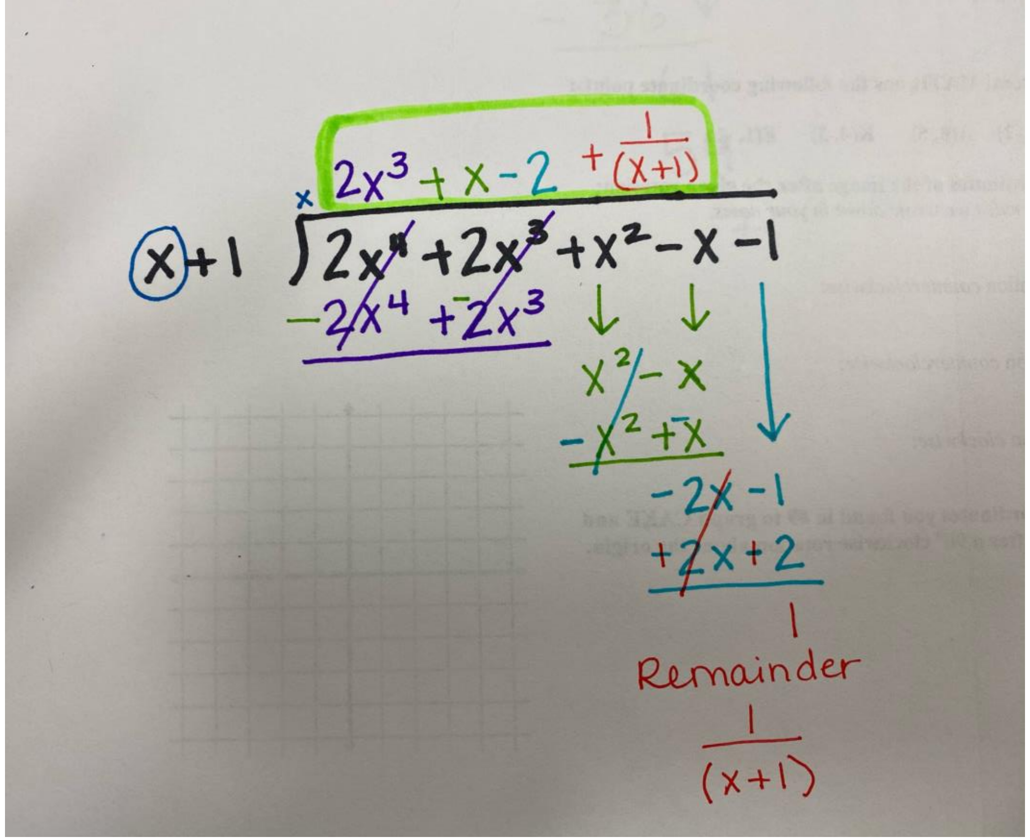
Example 1

Divide the following using long division: $x-2\overline{)6x^3-19x^2+16x-4}$



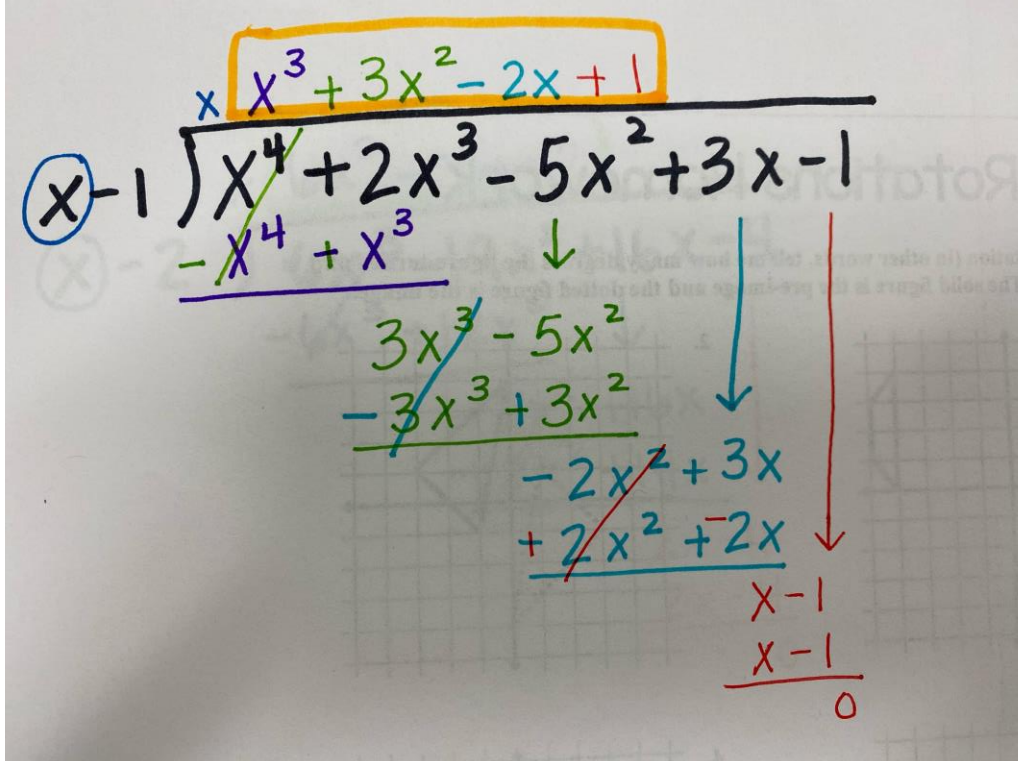
Example 2

Divide the following using long division: $\left(2x^4 + 2x^3 + x^2 - x - 1\right) \div \left(x + 1\right)$



On your own!

Divide the following using long division: $(x^4 + 2x^3 - 5x^2 + 3x - 1) \div (x - 1)$



DIVIDING POLYNOMIALS

Using Synthetic Division

Dividing Polynomials Using Synthetic Division

- **Synthetic Division** is a shortcut way to divide polynomials when the divisor is a binomial with a leading coefficient of 1. For example,

$$x - 5$$

- Note: Remember to write 0 for missing terms!

$$x^4 + x^2 – 3$$

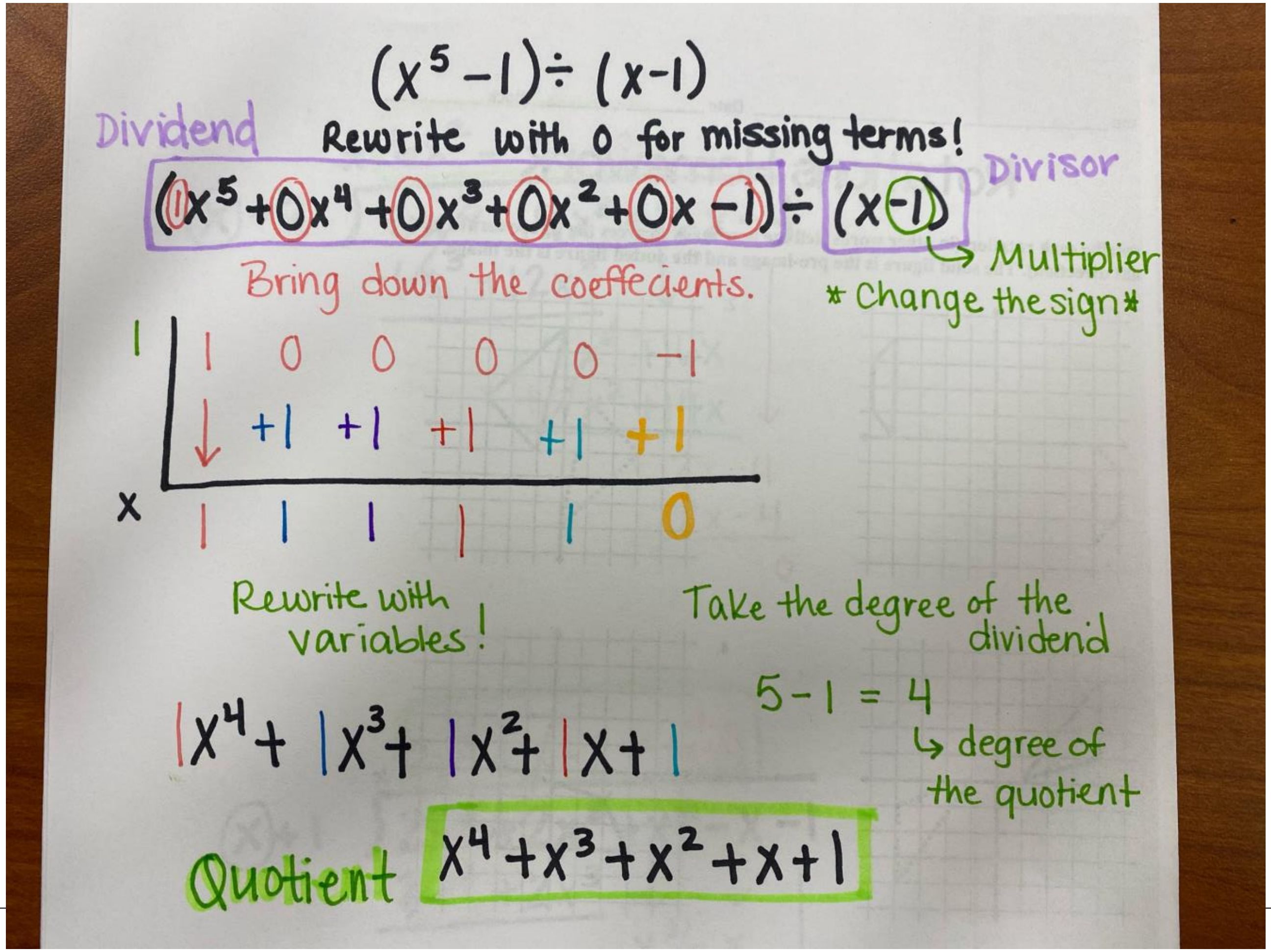
Dividing Polynomials Using Synthetic Division

Steps:

1. Write the multiplier, which is the opposite of the number in the divisor.
2. Draw ½ of a box next to the multiplier.
3. Write the coefficients and constant of the dividend next to the multiplier.
4. Bring down the 1st coefficient below the line.
5. Multiply whatever is below the line by the multiplier.
6. Add the numbers in the 1st and 2nd rows together.
7. Write your answer below the line.
8. Repeat.
9. The bottom row is your answer. Insert the variables, beginning with the x term that is one less than the degree of the dividend. The last number is your remainder.

Example 1

Divide the following using synthetic division: $(x^5 - 1) \div (x - 1)$



Example 2

Divide the following using synthetic division: $(2x^3 + 3x^2 - x + 1) \div (x + 2)$

$3-1=2$

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

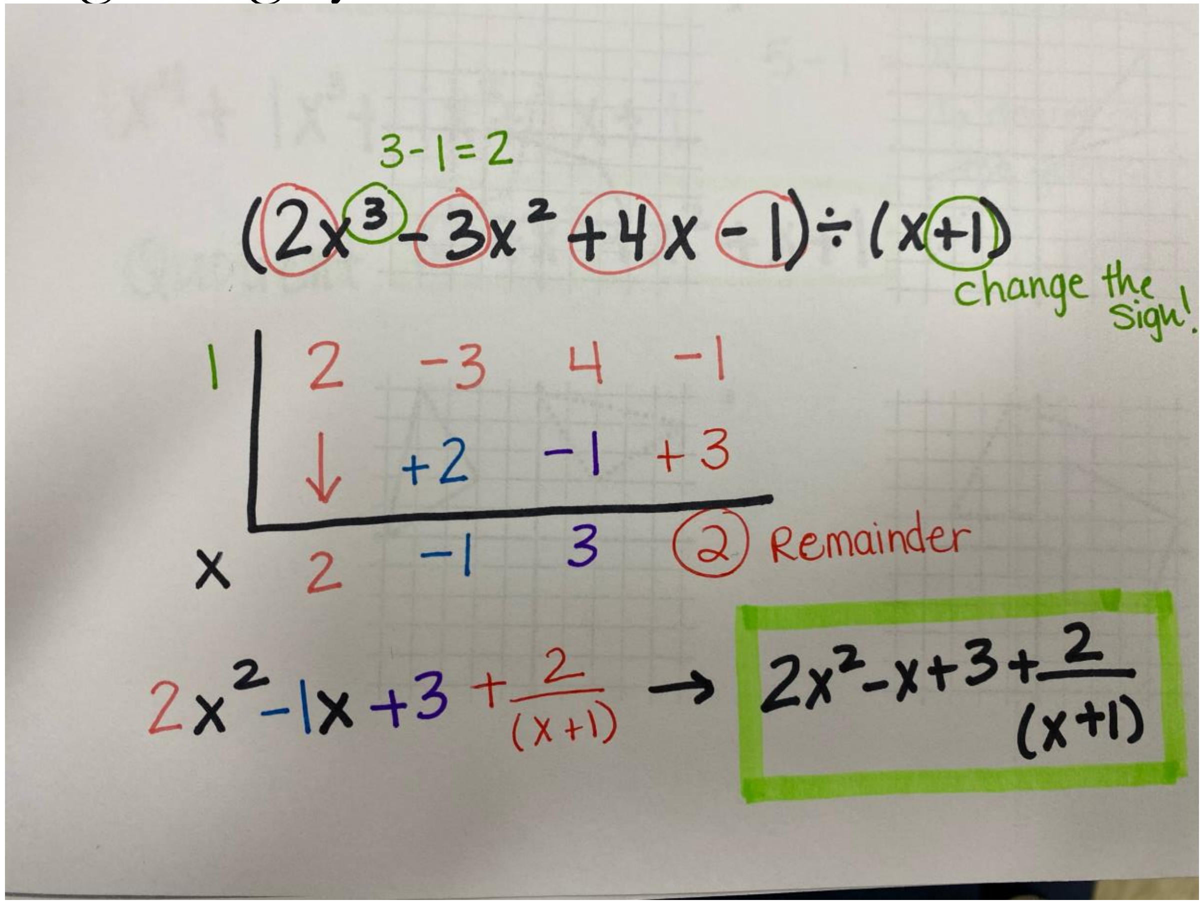
change the sign!

-2	2	3	-1	1	
	$\downarrow$	-4	$+2$	-2	
x	2	-1	1	-1	Remainder

$2x^2 - 1x + 1 - \frac{1}{(x+2)} \rightarrow \boxed{2x^2 - x + 1 - \frac{1}{(x+2)}}$

On your own!

Divide the following using synthetic division: $(2x^3 - 3x^2 + 4x - 1) \div (x + 1)$



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