Synthetic Division

$$12 \div 3 = 4$$

12= dividend; 3=divisor; 4=quotient

$$x^2 - x + 4$$

Constant = 4S

$$(x^3 - 3x - 2) \div (x - 2) \text{ or } \frac{x^3 - 3x - 2}{x - 2}$$

<u>Step 1</u>: Set up using coefficients of the dividend

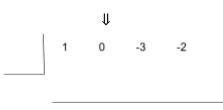
(Note: If the exponents do not go in decreasing order, add $0x^n$ to fill the space)

$$1x^{3} + 0x^{2} - 3x - 2$$

$$\downarrow \qquad \downarrow \qquad \downarrow$$

$$1 \qquad 0 \qquad -3 \qquad -2$$

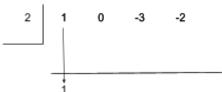
$$\downarrow \qquad \downarrow$$



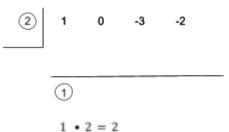
<u>Step 2</u>: Look at the divisor. Take the negative of the constant term



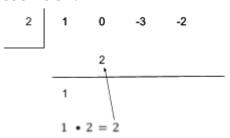
Step 3: Bring the first number down



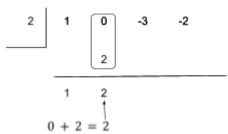
<u>Step 4</u>: Multiply the bottom number by the left number



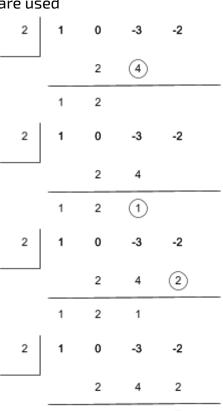
<u>Step 5</u>: Bring that number below the next coefficient



Step 6: Add the second number and the number below it



<u>Step 7</u>: Repeat steps 4-7 until all numbers are used

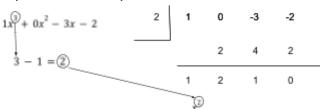


2

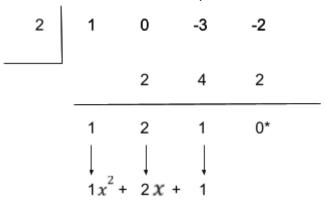
0

Synthetic Division

<u>Step 8</u>: Look at the degree(highest exponent) of the dividend, and subtract 1 from that number. This will be the highest exponent in the quotient.



<u>Step 9</u>: Bring the numbers down, which will be the numbers in the quotient



Solution:

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

*10. If the last number is not 0, then there is a remainder. After doing steps 1-9, put the last number over the divisor to solve for the remainder.

Examples:

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

3 | 1 | 2 | 1

3 | 15

1 | 5 | 16

$$1x^2 + 5x + \frac{16}{x-3}$$

#2.
$$(x^2 - 9x - 10) \div (x + 1)$$
-1 | 1 -9 -10

-1 | 10

-1 | 0

$$1x - 10$$