

Rational Root Theorem:

$$y = x^2 + 5x + 6$$

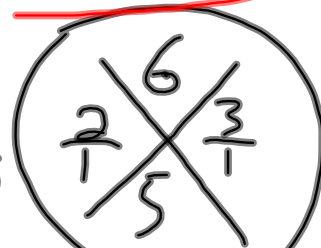
$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

same thing

Find the Roots

Find the Zeros

5	6
2	1.6
5	2.3



$$2x^3 - x^2 + 2x + 5 = 0$$

$$(x+2)(x+3)$$

(-1)  $2(-1)^3 - (-1)^2 + 2(-1) + 5 = 0$

$$-2 - 1 - 2 + 5 =$$

$$-5 + 5 = 0$$

Rational Root Theorem:

$$(21)x^2 + 29x + (10) = 0$$

Factors 21  
 $\pm 1, \pm 21, \pm 3, \pm 7$

Factor 10  
 1, 10, 2, 5

$\frac{\text{Constant Factors}}{\text{Leading Factors}} = \text{possible Roots.}$

$$\begin{array}{ccccccc} \left(\frac{\pm 1}{\pm 1}\right) & \frac{1}{21}, \frac{1}{3}, \frac{1}{7} & \left(\frac{10}{1}\right) & \frac{10}{21}, \frac{10}{3}, \frac{10}{7} & \left(\frac{2}{1}\right), \frac{2}{21} & \left(\frac{2}{3}\right), \frac{2}{7} & \left(\frac{5}{1}\right), \frac{5}{21}, \frac{5}{3}, \frac{5}{7} \\ \downarrow & & & & \downarrow & & \downarrow \\ 60 & & & & 15 & & 11, 180 \end{array}$$

$$21\left(-\frac{2}{3}\right)^2 + 29\left(-\frac{2}{3}\right) + 10$$

$$7 \cdot \frac{21(-2)^2}{3 \cdot 3} + 29\left(-\frac{2}{3}\right) + 10$$

$$\frac{7 \cdot 4}{3} + \frac{-58}{3} + 10$$

$$\frac{28}{3} - \frac{58}{3} + 10$$

$$\underline{-30} + 10 = 0$$



Step 1) Factor the constant Term AND  
Factor the leading coefficient

2) The possible roots are

$$\frac{\text{The constant Factors}}{\text{The leading coefficient Factors}}$$

3) Test each possible Root in  
the original Equation.

Note: We want it to be equal to Zero.

4) Factor original polynomial  
by dividing.

5) See if the new polynomial  
will factor more.

$$\frac{15x^3 - 32x^2 + 3x + 2}{1, 15, 3, 5} = 0$$

$$\left(\frac{1}{1}\right), \frac{1}{15}, \frac{1}{3}, \frac{1}{5}, \left(\frac{2}{1}\right), \frac{2}{15}, \frac{2}{3}, \frac{2}{5}$$

$$15 \cdot 1 - 32 \cdot 1 + 3 \cdot 1 + 2$$

$$15 - 32 + 3 + 2 = -12$$

$$15(8) - 32(4) + 3(2) + 2 \quad x=2 \leftarrow \text{factors}$$

$$120 - 128 + 6 + 2 \quad \cdot 2 \quad x-2=0$$

$$120 - 120 = 0 \quad (x-2)$$

$$0=0$$

$$15x^2 - 2x - 1$$

$$x-2 \overline{) 15x^3 - 32x^2 + 3x + 2}$$

$$15x^3 + 30x^2$$

$$-2x^2 + 3x + 2$$

$$-2x^2 + 4x$$

$$-x + 2$$

$$-x + 2$$

$$(x-2)(15x^2 - 2x - 1)$$

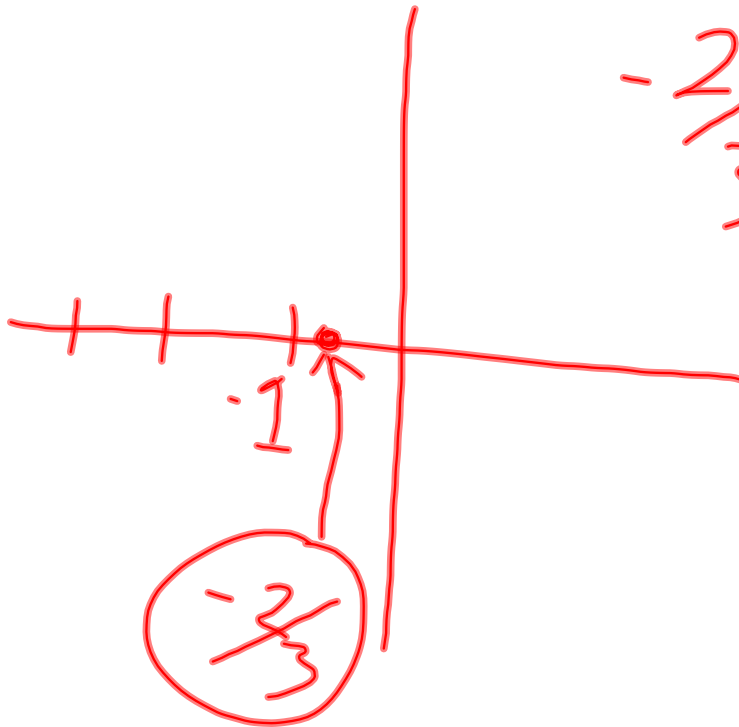
$$\frac{-15}{3} \cdot \frac{-5}{15} = \frac{1}{5}$$

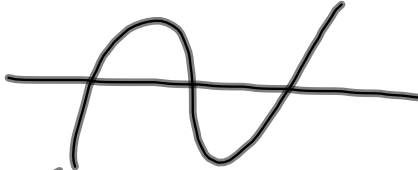
$$(x-2)(3x-1)(5x+1)$$

$$21x^2 + 29x + 10$$

Root  
Zero

$$-\frac{2}{3}$$



$$\begin{array}{r} \phantom{x-1} \overline{) x^3 - x^2 + 6x - 6} \\ x^2 + 6 \phantom{- 6} \\ \hline \end{array}$$


$$(x-1)(x^2+6)$$
