



NAME: _____ SCORE: _____



Objectives:

1. Perform long division

2. Perform synthetic division



TASKS



Complete the long division story.

Divide $3x^3 - 5x^2 + 10x - 3$ by $3x + 1$.	
I start with the long-division set-up:	$3x+1 \overline{) 3x^3 - 5x^2 + 10x - 3}$
Looking only at the leading terms, I divide $3x^3$ by $3x$ to get x^2 . This is what I put on top:	
I multiply this x^2 by the $3x + 1$ to get $3x^3 + 1x^2$, which I put underneath:	$\begin{array}{r} x^2 \\ 3x+1 \overline{) 3x^3 - 5x^2 + 10x - 3} \\ \underline{3x^3 + 1x^2} \\ -6x^2 \end{array}$
Then I change the signs, add down, and remember to carry down the "+10x - 3" from the original dividend, giving me a new bottom line of $-6x^2 + 10x - 3$:	$\begin{array}{r} x^2 \\ 3x+1 \overline{) 3x^3 - 5x^2 + 10x - 3} \\ \underline{3x^3 + 1x^2} \\ -6x^2 + 10x - 3 \end{array}$
Dividing the new leading term, $-6x^2$, by the divisor's leading term, $3x$, I get $-2x$, so I put this on top:	
Then I multiply $-2x$ by $3x + 1$ to get $-6x^2 - 2x$, which I put underneath. I change signs, add down, and remember to carry down the "-3" from the dividend:	
My new last line is " $12x - 3$ ". Dividing the new leading term of $12x$ by the divisor's leading term of $3x$, I get $+4$, which I put on top. I multiply 4 by $3x + 1$ to get $12x + 4$. I switch signs and add down. I end up with a remainder of -7 :	
Since the remainder in this case is -7 and since the divisor is $3x + 1$, then I'll turn the remainder into a fraction (the remainder divided by the original divisor), and add this fraction to the polynomial across the top of the division symbol. Then my answer is this:	



Check your work above using synthetic division. Complete the details below.

$$\begin{array}{r|rrrr} -\frac{1}{3} & 3 & -5 & 10 & -3 \\ \hline \end{array}$$

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$$\begin{array}{r|rrrr} -\frac{1}{3} & 3 & -5 & 10 & -3 \\ \hline & & 3 & -6 & \end{array}$$

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