

Synthetic Division Steps:

1. Check the dividend for any missing terms. Insert a zero as a place holder if any terms (even the constant) are missing.
2. Set the divisor equal to zero and solve for your special number. Put the special number in a home, crook, box, etc.
3. Next to the special number list out the coefficients from the dividend including any zero placeholders.
4. Bring down the first coefficient.
5. Multiply by the special number and place under the next coefficient.
6. Add together and write the answer under the line.
7. Repeat steps 5 and 6 until remainder is found.
8. Divide the numbers below the line by the coefficient of the divisor.
9. The quotient drops a degree, so if the dividend started with x^5 the quotient will start with x^4
10. Check to see if the remainder can be reduced. All three numbers in the remainder must be divisible by the same number.

$(8x^4 - 4x^2 + x + 4) \div (2x + 1)$ *divide in the end by this #*

$2x + 1 = 0$
 $2x = -1$
 $x = -\frac{1}{2}$

$-\frac{1}{2} \mid 8 \quad 0 \quad -4 \quad 1 \quad 4$
 $\downarrow -4 \quad 2 \quad 1 \quad -1$

 $8 \quad -4 \quad -2 \quad 2 \mid 3$
 $\frac{8}{2} \quad \frac{-4}{2} \quad \frac{-2}{2} \quad \frac{2}{2}$

** divide each quotient coefficient by 2*

$\boxed{4x^3 - 2x^2 - x + 1 + \frac{3}{2x+1}}$

*A video going over synthetic division as well as the worked out examples/notes can be found on the website.