

Long Division

This means \div by $3z-6$

#30. $(6z^6 + 3z^4 - 9z^2)(3z-6)^{-1} \Rightarrow \frac{6z^6 + 3z^4 - 9z^2}{3z-6}$

$$3z-6 \overline{) 6z^6 + 0z^5 + 3z^4 + 0z^3 - 9z^2 + 0z + 0} \quad \begin{matrix} 2z^5 + 4z^4 + 9z^3 + 18z^2 + 33z + 66 + \frac{396}{3z-6} \\ \hline \end{matrix}$$

$\frac{6z^6}{3z} = 2z^5$
 $2z^5(3z-6) = 6z^6 - 12z^5$
 $\frac{12z^5}{3z} = 4z^4$
 $4z^4(3z-6) = 12z^5 - 24z^4$

$12z^5 + 3z^4$
 $+ (-12z^5 + 24z^4)$

$27z^4 + 0z^3$
 $+ (-24z^4 + 54z^3)$

$54z^3 - 9z^2$
 $+ (54z^3 + 108z^2)$

$99z^2 + 0z$
 $+ (-99z^2 + 198z)$

$198z + 0$
 $+ (-198z + 396)$

396

$\frac{27z^4}{3z} = 9z^3$
 $9z^3(3z-6) = 27z^4 - 54z^3$

$\frac{54z^3}{3z} = 18z^2$

$18z^2(3z-6) = 54z^3 - 108z^2$

$\frac{99z^2}{108} = 33z$

$33z(3z-6) = 99z^2 - 198z$
 $\frac{198z}{3z} = 66$

$66(3z-6) = 198z - 396$

$\frac{396}{3z-6} = \frac{396}{3(z-2)} = \frac{132}{z-2}$

Final Answer:

$2z^5 + 4z^4 + 9z^3 + 18z^2 + 33z + 66 + \frac{132}{z-2}$