Synthetic Division of Polynomials

Recall the division algorithm: $\dfrac{P(x)}{d(x)} =$

There is a short cut for division, called Synthetic Division. However, it only works when your divisor is a linear factor in the form $x - k$.

Determine $\dfrac{P(x)}{d(x)}$. If $d(x)$ is not a factor express your answer using the division algorithm. If $d(x)$ is a factor, then rewrite $P(x)$ in completely factored form.

1. $P(x) = 2x^3 + 5x^2 - 7x - 12$
    & $d(x) = x + 3$

$$\begin{array}{c|cccc} & 2 & 5 & -7 & -12 \\ \hline -3 & & & & \end{array}$$

Since the remainder is ___, x + 3 _____ a factor.

2. $P(x) = x^3 + 4x^2 - 9x - 36$
    & $d(x) = x - 3$

3. $P(x) = x^4 - 5x^2 - 10x - 12$
    & $d(x) = x + 2$
    Remember to put in ____ for missing terms.