

 **Key Concept** Rational Zero Theorem

Words If $P(x)$ is a polynomial function with integral coefficients, then every rational zero of $P(x) = 0$ is of the form $\frac{p}{q}$, a rational number in simplest form, where p is a factor of the constant term and q is a factor of the leading coefficient.

Example Let $f(x) = 6x^4 + 22x^3 + 11x^2 - 80x - 40$. If $\frac{4}{3}$ is a zero of $f(x)$, then 4 is a factor of -40 , and 3 is a factor of 6.

1. List all possible rational zeros of the following functions:

a. $f(x) = 4x^5 + x^4 - 2x^3 + 5x^2 + 8x + 16$

b. $f(x) = x^3 - 2x^2 + 5x + 12$

2. Find all the zeros of the following functions:

a. $h(x) = 9x^4 + 5x^2 - 4$

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b. $k(x) = 2x^4 - 5x^3 + 20x^2 - 45x + 18$

c. $f(x) = 3x^3 - 2x^2 - 8x + 5$

d. $f(x) = 8x^3 + 14x^2 + 11x + 3$

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e. $j(x) = 4x^4 - 12x^3 + 25x^2 - 14x - 15$

3. Find the remaining factors of the polynomial $f(x) = x^4 - 2x^3 - 17x^2 + 18x + 72$.
 $(x - 3)$ is a factor of the polynomial.