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Date _____
Algebra II

Finding k in a Polynomial Equation

1. Consider the polynomial $p(x) = x^3 + kx^2 + x + 6$. Find a value of k so that $x+1$ is a factor of P.

$0 = (-1)^3 + k(-1)^2 + -1 + 6$
$0 = -1 + k(1) - 1 + 6$
$0 = -1 + k - 1 + 6$
$0 = k + 4$
$-4 \quad -4$
$-4 = k$

-1 is a zero
$(-1, 0)$

2. Consider the polynomial $p(x) = x^3 + kx - 30$. Find a value of k so that $x+3$ is a factor of P.

$0 = (-3)^3 + k(-3) - 30$
$0 = -27 - 3k - 30$
$0 = -3k - 57$
$+57 \quad +57$
$\frac{57}{-3} = \frac{-3k}{-3}$
$-19 = k$

-3 is a zero
$(-3, 0)$

3. Given $p(x) = 6x^3 + 31x^2 + kx - 12$, and $x+4$ is a factor, find the value of k.

$0 = 6(-4)^3 + 31(-4)^2 + k(-4) - 12$
$0 = -384 + 496 - 4k - 12$
$0 = -4k + 100$
$-100 \quad -100$
$\frac{-100}{-4} = \frac{-4k}{-4}$
$25 = k$

-4 is a zero
$(-4, 0)$

4. Given $z(x) = 6x^3 + bx^2 - 52x + 15$, and $x+5$ is a factor, find the value of b.

$0 = 6(-5)^3 + b(-5)^2 - 52(-5) + 15$
$0 = -750 + 25b + 260 + 15$
$0 = 25b - 475$
$+475 \quad +475$
$\frac{475}{25} = \frac{25b}{25}$
$19 = b$

-5 is a zero
$(-5, 0)$

5. Given $p(x) = x^3 + 5x^2 + kx - 24$, and $x+3$ is a factor, find the value of k.

-3 is a zero

$(-3, 0)$

$0 = (-3)^3 + 5(-3)^2 + k(-3) - 24$

$0 = -27 + 45 - 3k - 24$

$0 = -3k - 6$

$+6 \quad +6$

$\frac{6}{-3} = \frac{-3k}{-3}$

$-2 = k$

6. If $x-1$ is a factor of $x^3 - kx^2 + 2x$, what is the value of k?

1 is a zero

$(1, 0)$

$(1)^3 - k(1)^2 + 2(1) = 0$

$1 - k + 2 = 0$

$-k + 3 = 0$

$+k \quad +k$

$3 = k$

7. The polynomial function $g(x) = x^3 + ax^2 - 5x + 6$ has a factor of $(x-3)$. Determine the value of a.

3 is a zero

$(3, 0)$

$0 = (3)^3 + a(3)^2 - 5(3) + 6$

$0 = 27 + 9a - 15 + 6$

$-2 = a$

$0 = 9a + 18$

$-18 \quad -18$

$\frac{-18}{9} = \frac{9a}{9}$

8. Consider the polynomial $p(x) = x^3 + kx + 2$. Find a value of k so that $x-2$ is a factor of P.

2 is a zero

$(2, 0)$

$0 = (2)^3 + k(2) + 2$

$0 = 8 + 2k + 2$

$0 = 2k + 10$

$-10 \quad -10$

$\frac{-10}{2} = \frac{2k}{2}$

$-5 = k$