

Advanced Algebra

Unit 5: Polynomials and the Intro to the Derivative Assignment #3

Factor the given problems with the given root. Write your answer in the form $y=(x-a)(x-h)(x-b)$

1) $y=3x^3+28x^2+52x-48$ Given root -6

$$\begin{array}{r} 3x^2 + 10x - 8 \\ X+6 \overline{) 3x^3 + 28x^2 + 52x - 48} \\ \underline{-3x^3 + 18x^2} \\ 10x^2 + 52x \\ \underline{-10x^2 + 60x} \\ -8x - 48 \\ \underline{8x + 48} \\ 0 \end{array}$$

$$y = (x+6)(3x-2)(x+4)$$

2) $y=2x^3+7x^2-10x-24$ Given root 2

$$\begin{array}{r} 2x^2 + 11x + 12 \\ X-2 \overline{) 2x^3 + 7x^2 - 10x - 24} \\ \underline{-2x^3 + 4x^2} \\ 11x^2 - 10x \\ \underline{-11x^2 + 22x} \\ 12x - 24 \\ \underline{-12x + 24} \\ 0 \end{array}$$

$$y = (x-2)(2x+3)(x+4)$$

3) $y=3x^3+15x^2+6x-24$ Given root -2

$$\begin{array}{r} 3x^2 + 9x - 12 \\ X+2 \overline{) 3x^3 + 15x^2 + 6x - 24} \\ \underline{-3x^3 + 6x^2} \\ 9x^2 + 6x \\ \underline{-9x^2 + 18x} \\ -12x - 24 \\ \underline{+12x + 24} \\ 0 \end{array}$$

$$y = (x+2)(3x-3)(x+4)$$

4) $y=x^3-7x^2-20x+96$ Given root -4

$$\begin{array}{r} x^2 - 11x + 24 \\ X+4 \overline{) x^3 - 7x^2 - 20x + 96} \\ \underline{-x^3 + 4x^2} \\ -11x^2 - 20x \\ \underline{-11x^2 + 44x} \\ 24x + 96 \\ \underline{-24x - 96} \\ 0 \end{array}$$

(backside)

$$y = (x+4)(x-8)(x-3)$$

5) $y = 2x^3 + 16x^2 + 8x - 96$ Given root 2

$$\begin{array}{r}
 2x^2 + 20x + 48 \\
 x-2 \overline{) 2x^3 + 16x^2 + 8x - 96} \\
 \underline{-2x^3 + 4x^2} \\
 20x^2 + 8x \\
 \underline{-20x^2 + 40x} \\
 48x - 96 \\
 \underline{-48x + 96} \\
 0
 \end{array}$$

$(2x+6)(x+8)$

$$y = (x-2)(2x+6)(x+8)$$

6) $y = x^3 + 10x^2 + 8x - 64$ Given root -4

$$\begin{array}{r}
 x^2 + 6x - 16 \\
 x+4 \overline{) x^3 + 10x^2 + 8x - 64} \\
 \underline{-x^3 + 4x^2} \\
 6x^2 + 8x \\
 \underline{-6x^2 + 24x} \\
 -16x - 64 \\
 \underline{+16x + 64} \\
 0
 \end{array}$$

$$y = (x+4)(x+8)(x-2)$$

7) $2x^3 + 11x^2 - 12x - 36$ Given root at 2

$$\begin{array}{r}
 2x^2 + 15x + 18 \\
 x-2 \overline{) 2x^3 + 11x^2 - 12x - 36} \\
 \underline{-2x^3 + 4x^2} \\
 15x^2 - 12x \\
 \underline{-15x^2 + 30x} \\
 18x - 36 \\
 \underline{-18x + 36} \\
 0
 \end{array}$$

$(2x+3)(x+6)$

$$y = (2x+3)(x+6)(x-2)$$

8) $3x^3 - 84x - 144$ Given root at 6

Key Point: Any time you are doing division, you need to make sure your exponents are going down. So in this case you should put in $0x^2$

$$3x^3 + 0x^2 - 84x - 144$$

$$\begin{array}{r}
 3x^2 + 18x + 24 \\
 x-6 \overline{) 3x^3 + 0x^2 - 84x - 144} \\
 \underline{-3x^3 + 18x^2} \\
 18x^2 - 84x \\
 \underline{-18x^2 + 108x} \\
 24x - 144 \\
 \underline{-24x + 144} \\
 0
 \end{array}$$

$(3x+6)(x+4)$

$$y = (x-6)(3x+6)(x+4)$$

or

$$y = 3(x-6)(x+2)(x+4)$$