MATH 12 **FACTORING - EXAMPLES**

FACTOR THE FOLLOWING EXPRESSIONS, AND WRITE YOUR ANSWERS WITHOUT NEGATIVE EXPONENTS:

A) $(x^2+7)^{-1/3} - 32(x^2+7)^{-4/3}$

$= (x^2+7)^{-4/3}\left[\dfrac{(x^2+7)^{-1/3}}{(x^2+7)^{-4/3}} - \dfrac{32(x^2+7)^{-4/3}}{(x^2+7)^{-4/3}}\right]$ (FACTOR OUT x^2+7 RAISED TO THE LOWER EXPONENT.)

$= (x^2+7)^{-4/3}\left[(x^2+7)^1 - 32\right]$ (IN THE FIRST TERM, SUBTRACT EXPONENTS.)

$= (x^2+7)^{-4/3}\left[x^2 - 25\right] = \boxed{\dfrac{(x-5)(x+5)}{(x^2+7)^{4/3}}}$ (FACTOR AS THE DIFFERENCE OF 2 SQUARES.)

B) $(x^3+5)^{-1/2} - 13(x^3+5)^{-3/2}$

$= (x^3+5)^{-3/2}\left[\dfrac{(x^3+5)^{-1/2}}{(x^3+5)^{-3/2}} - \dfrac{13(x^3+5)^{-3/2}}{(x^3+5)^{-3/2}}\right]$ (FACTOR OUT x^3+5 RAISED TO THE LOWER EXPONENT.)

$= (x^3+5)^{-3/2}\left[(x^3+5)^1 - 13\right]$ (IN THE FIRST TERM, SUBTRACT EXPONENTS.)

$= (x^3+5)^{-3/2}\left[x^3 - 8\right]$

$= (x^3+5)^{-3/2}(x-2)(x^2+2x+4) = \boxed{\dfrac{(x-2)(x^2+2x+4)}{(x^3+5)^{3/2}}}$ (FACTOR AS THE DIFFERENCE OF 2 CUBES.)

C) $2x(x+4)^{1/2} + x^2 \cdot \frac{1}{2}(x+4)^{-1/2}$

$= \frac{1}{2}x(x+4)^{-1/2}\left[\dfrac{2x(x+4)^{1/2}}{\frac{1}{2}x(x+4)^{-1/2}} + \dfrac{x^2\cdot\frac{1}{2}(x+4)^{-1/2}}{\frac{1}{2}x(x+4)^{-1/2}}\right]$ (FACTOR OUT x RAISED TO THE LOWER EXPONENT, $(x+4)$ RAISED TO THE LOWER EXPONENT, AND $\frac{1}{2}$.)

$= \frac{1}{2}x(x+4)^{-1/2}\left[4(x+4)^1 + x\right]$ (IN THE FIRST TERM, SUBTRACT EXPONENTS.)

$= \frac{1}{2}x(x+4)^{-1/2}\left[4x+16+x\right]$

$= \frac{1}{2}\cdot\frac{x}{1}\cdot\frac{1}{(x+4)^{1/2}}\cdot\frac{(5x+16)}{1} = \boxed{\dfrac{x(5x+16)}{2(x+4)^{1/2}}}$