Comparing multiplying and factoring methods

MULTIPLY OR FACTOR EACH COLUMN. CAN YOU SEE ANY PATTERNS BETWEEN THE TWO OPERATIONS?

 Multiply this column factor this column

|  |  |
| --- | --- |
|  4(3A –5B + 6C) |  12A-20B+24C |
|   |   $X^{2}-35X-28$ |
|   |  $20Y^{4}$-$24Y^{3}$ |
|   |  12 $X^{6}$-$21X^{5}-24X^{4}$ |
|   |  $-28T^{4}-16T^{3}+16T^{2}-4T$ |
|   |  $6X^{3}Y^{8}-12X^{5}Y^{8}$-$3X^{2}Y^{5}$ |
|  7(3A +5B-4C) |   |
|  $3(3X^{3}-4X^{2}-10$) |   |
|  $ 2T^{2}(T^{3}-4)$ |   |
|  $5Y^{2}(Y^{5}-4Y^{2}-3)$ |   |
|  $4X(2X^{3}-X^{2}+3X-1)$ |   |
|  $6X^{2}Y^{2}(Y^{2}-6X^{2}+1)$ |   |
|   |  $24B^{6}-32B^{5}-12B^{4}+8B^{3}$ |
|   |  $-20S^{4}T^{3}-15S^{4}T^{4}-20S^{3}T^{4}$ |
|  $7X(2X^{2}+X-3)$ |   |
|  $8XY(X^{3}Y^{6}-2X^{2}-3Y)$ |   |
|   |  21A+35B-49C+56E+28F |
|   |  $6Y^{10}-9Y^{9}-15Y^{8}$+9$Y^{7}-21Y^{6}-18Y^{5}$ |
|  $8A(2A^{6}-3A^{5}-5A^{4}+A^{3}-4A^{2}$ |   |
|  $9(2X^{4}+9X^{3}-3X^{2}-4X-5)$ |   |

Use the smallest exponent on any variable to factor the common variable.

You must factor completely!!!

If there is a variable left in every term after you think you are finished then you have not factored completely.

# Multiplying conjugates or factoring difference of squares

Complete the table. Use separate paper if you need to. What patterns do you see?

 Multiply this column factor this column

|  |  |
| --- | --- |
|   (x + 3)(x – 3) |  $x^{2}-9$ |
|  (y + 2)(Y – 2) |  $y^{2}-4$ |
|  (a – 6)(a + 6) |  $a^{2}-36$ |
|  (z – 10)(z + 10) |  $z^{2}-100$ |
|  (2x – 5)(2x + 5) |  $4x^{2}-25$ |
|  (3T +8)(3T – 8) |  $9T^{2}-64$ |
|  (T + 4)(T – 4) |   |
|  (x + 2)(x – 2) |   |
|  (p – 5)(p + 5) |   |
|  (y – 9)(y + 9) |   |
|  (5c + 1)(5c – 1) |   |
|  (6d – 5)(6d + 5) |   |
|  (4m +n)(4m – n) |  $16m^{2}-n^{2}$ |
|  (7w –10y)(7w + 10y) |  $49w^{2}-100y^{2}$ |
|  (10x - 9y)(10x + 9y) |   |
|  (4m + 7n)(4m – 7n) |   |
|   (4y – 3)(4y + 3) |  $16y^{2}$-9 |
|  (5a + 6)(5a – 6) |  $25a^{2}-36$ |
|  (5a + 4b)(5a – 4b) |   |
|  (6t + 3)(6t – 3) |   |

Multiplying- Subtract the square of the second term in the parenthesis from the square of the first term

Factoring- Use the square root of each term in the expression and add and subtract each in separate parenthesis

## MULTIPLYING BINOMIALS AND FACTORING TRINOMIALS

Complete the table. Use separate paper if you need to. What patterns do you see?

 Multiply this column factor this column

|  |  |
| --- | --- |
|  (x + 4)(x + 5) |  $X^{2}+9X+20$ |
|  (Y + 1)(Y + 3) |  $Y^{2}$+4Y+3 |
|  (T + 5)(T – 2)  |  $T^{2}+3T-10$ |
|  (X – 4)(X – 5) |  $X^{2}-9X+20$ |
|  (Y – 8)(Y + 3) |  $Y^{2}-5Y-24$ |
|  (X – 7)(X – 8) |  $X^{2}-15X+56$  |
|  (x + 4)(x + 3) |   |
|  (y + 5)(y + 3) |   |
|  (z – 8)(z + 2) |   |
|  (p – 7)(p + 5) |   |
|  (x – 7)(x – 3) |   |
|  (p + 5)(p -2) |   |
|  (p + 2q)(p + 5q) |  $P^{2}$+7pq +10$q^{2}$ |
|  (X – 3Y)(X – 5Y) |  $X^{2}-8XY+15Y^{2}$ |
|  (x + 5y)(x + 2y) |   |
|  (T – 4S)(T + 3S) |   |

Multiplying- Add the two numbers in the parenthesis to get the middle term of the answer and multiply the two numbers to get the end term of the foil multiplication.

Factoring- Find two numbers that are factors of the end term that add up to the middle term and multiply to get the end term of the original problem

### PRODUCT AND SUM PRACTICE

This activity will help you review the previous worksheet and prepare for using the grouping method to factor complex trinomials.

#### Find two numbers that multiply to give the product shown and add or subtract to give the sum shown

Hint: factor the product to look for numbers that add or subtract to give the sum, Use the space in the box to calculate your answers

|  |  |  |
| --- | --- | --- |
| Product = 369\*4Sum = 13 | Product = 3612\*3Sum = 15 | Product = 3618\*2Sum = 20 |
| Product = 1515\*1Sum = 16 | Product = 155\*3Sum = 8 | Product = -15-5\*3Sum = -2 |
| Product = -155\*-3Sum = 2 | Product = -60-30\*2Sum = -28 | Product = -6012\*-5Sum = 7 |
| Product = -60-20\*3Sum = -17 | Product = -60-10\*6Sum = -4 | Product = -6010\*-6Sum = 4 |
| Product = -6060\*-1**Sum = 59** | Product = 6060\*1**Sum = 61** | Product = 6030\*2Sum = 32  |

### SQUARING AND FACTORING BINOMIALS

 Multiply this column factor this column

|  |  |
| --- | --- |
|   |  $x^{2}+8x+16$ |
|   |  $y^{2}+2y+1$ |
|   |  $4p^{2}-12p+9$ |
|   |  $25T^{2}-60T+36$ |
|   |  $49W^{2}+56W+16$  |
|   |  $M^{2}-12M+36$ |
|  $(X+5)^{2}$ |   |
|  ( $y-3)^{2}$  |   |
|  $(z-7)^{2}$ |   |
|  $(p-1)^{2}$ |   |
|  $(4x+5)^{2}$ |   |
|  $(5w-9)^{2}$ |   |
|   |  $100T^{2}+140TW+49W^{2}$ |
|   |  $9x^{2}-24xy+16y^{2}$ |
|  $(x+6y)^{2}$ |   |
|  $(3a+5b)^{2}$ |   |

To multiply mentally square the first term to get the first term in the answer, double the product of the first and second term in the parenthesis to get the middle term in the answer, square the second term in the parenthesis to get the end term in the answer.

To factor when the coefficient is = 1 take half the middle term and place it in the parenthesis which is then squared. For this to work half the middle term squared must equal the end term.

For a not equal to 1, take the square root of the end terms and if they add up to the middle term when multiplied and doubled these are your factors to be placed in a parenthesis which is squared.

### COMPLEX TRINOMIALS

 Multiply this column factor this column

|  |  |
| --- | --- |
|  (4X – 1)(X + 2) |  $4X^{2}+7X-2$ |
|  (3A + 2)(2A – 5) |  $6A^{2}-11A-2$ |
|  (2P – 3)(p + 1) |  $2P^{2}-P-3$ |
|  (5T – 6)(2T - 7) |  $10T^{2}-47T$+42 |
|  (7W + 4)(W – 8) |  $7W^{2}$-52W-32 |
|   (M – 6)(4M – 3) |  $4M^{2}-27M+18$ |
|  (3X -4)(X + 1) |   |
|  (2Y -3)(3Y + 1) |   |
|  (5T – 3)(2T + 3) |   |
|  (4X – 3)(3X – 5) |   |
|  (2Y + 5)(Y + 1) |   |
|  (3Z + 4)(Z + 2) |   |
|  (10t + w)(2t –3w) |  $20T^{2}-28TW-3W^{2}$ |
|  (3x – y)(5x + 4y) |  $15X^{2}-7XY-4Y^{2}$ |
|  (a + 5b)(a – b) |   |
|  (5x + 1)(x – 2) |   |

Trial and error method: pick numbers that create the first term of the quadratic and the last term and then check to see if the middle term works out correctly when you FOIL the answer