Exit Ticket Sample Solutions

Multiply $(x-1)(x^3+4x^2+4x-1)$ and combine like terms. Explain how you reached your answer.

x	-1	
x^4	$-x^3$	x^3
$4x^3$	$-4x^2$	$4x^2$
$4x^2$	$-4x$	$4x$
$-x$	1	-1

x^4
$3x^3$
$0x^2$
$-5x$
1

$(x-1)(x^3+4x^2+4x-1) = x^4+3x^3-5x+1$

Tabular method:
Using the distributive property (Each-With-Each):

$(x-1)\left(x^3+4x^2+4x-1\right) = x^4+4x^3+4x^2-x-x^3-4x^2-4x+1 = x^4+3x^3-5x+1.$

Homework Problem Set Sample Solutions

1. **Complete the following statements by filling in the blanks.**

   A. $(a+b)(c+d+e) = ac+ad+ae+\_\_\_+\_\_\_+\_\_\_$ — bc, bd, be

   B. $(r-s)^2 = (\_\_\_\_)^2-(\_\_\_\_)rs+s^2$ — $r, 2$

   C. $(2x+3y)^2 = (2x)^2+2(2x)(3y)+(\_\_\_\_)^2$ — $3y$

   D. $(w-1)\left(1+w+w^2\right) = \_\_\_\_-1$ — w^3

   E. $a^2-16 = (a+\_\_\_\_)(a-\_\_\_\_)$ — $4, 4$

F. $(2x + 5y)(2x - 5y) =$ ____ $-$ ____ $\quad$ $4x^2, 25y^2$

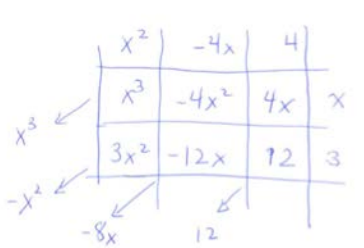
G. $(2^{21} - 1)(2^{21} + 1) =$ ____ $- \ 1$ $\quad$ 2^{42}

Think about the rules above and what you reviewed in Lesson 1 about exponents.

H. $[(x - y) - 3][(x - y) + 3] = (\_\_\_\_)^2 - 9$ $\quad$ $x - y$

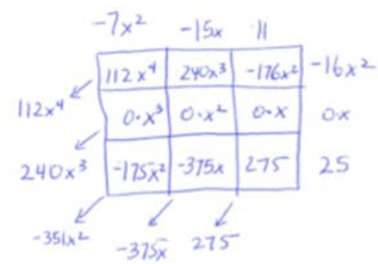
2. Use the tabular method to multiply and combine like terms. Sample student work:

A. $(x^2 - 4x + 4)(x + 3)$



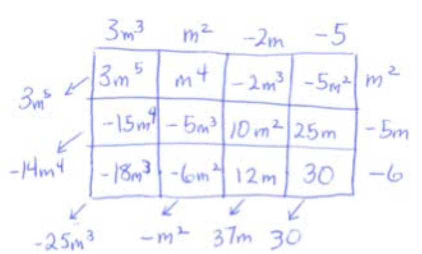
$(x^2 - 4x + 4)(x + 3) = x^3 - x^2 - 8x + 12$

B. $(11 - 15x - 7x^2)(25 - 16x^2)$



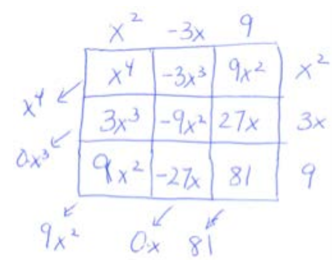
$(11 - 15x - 7x^2)(25 - 16x^2)$
$= 112x^4 + 240x^3 - 351x^2 - 375x + 275$

C. $(3m^3 + m^2 - 2m - 5)(m^2 - 5m - 6)$



$(3m^3 + m^2 - 2m - 5)(m^2 - 5m - 6)$
$= 3m^5 - 14m^4 - 25m^3 - m^2 + 37m + 30$

D. $(x^2 - 3x + 9)(x^2 + 3x + 9)$



$(x^2 - 3x + 9)(x^2 + 3x + 9) = x^4 + 9x^2 + 81$

3. Multiply and combine like terms to write as the sum or difference of monomials.

A. $2a(5+4a)$

$8a^2+10a$

B. $x^3(x+6)+9$

x^4+6x^3+9

C. $\frac{1}{8}(96z+24z^2)$

$12z+3z^2$

D. $2^{23}(2^{84}-2^{81})$

$2^{107}-2^{104}$

E. $(x-4)(x+5)$

x^2+x-20

F. $(10w-1)(10w+1)$

$100w^2-1$

G. $(3z^2-8)(3z^2+8)$

$9z^4-64$

H. $(-5w-3)w^2$

$-5w^3-3w^2$

I. $(m^3-2m+1)(m^2-m+2)$

$m^5-m^4+3m^2-5m+2$

J. $(2r+1)(2r^2+1)$

$4r^3+2r^2+2r+1$

K. $(t-1)(t+1)(t^2+1)$

t^4-1

L. $n(n+1)(n+2)$

n^3+3n^2+2n

M. $(x+2)(x+2)(x+2)$

$x^3+6x^2+12x+8$

N. $n(n+1)(n+2)(n+3)$

$n^4+6n^3+11n^2+6n$

4. Polynomial expressions can be thought of as a generalization of place value.

A. **Multiply 214×112 using the standard paper-and-pencil algorithm.**

```
    214
  × 112
    428
   214
 +214
 23,968
```

B. **Multiply $(2x^2+x+4)(x^2+x+2)$ using the tabular method and combine like terms.**

$2x^2$	x	4	
$2x^4$	x^3	$4x^2$	x^2
$2x^3$	x^2	$4x$	x
$4x^2$	$2x$	8	2

$2x^4$ $3x^3$ $9x^2$ $6x$ 8

$(2x^2+x+4)(x^2+x+2)=2x^4+3x^3+9x^2+6x+8$

C. **Substitute $x=10$ into your answer from Part B.**

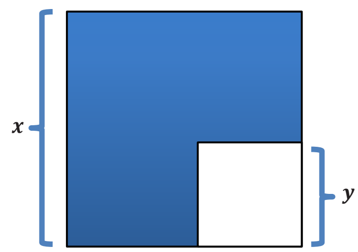
$23,968$

D. Is the answer to Part C equal to the answer from Part A? Compare the digits you computed in the algorithm to the coefficients of the entries you computed in the table. How do the place-value units of the digits compare to the powers of the variables in the entries?

Yes. The digits computed in the algorithm are the same as the coefficients computed in the table entries. The zero-degree term in the table corresponds to the ones unit, the first-degree terms in the table correspond to the tens unit, the second-degree terms in the table correspond to the hundreds unit, and so on.

Challenge Problem

5. In the diagram, the side of the larger square is $\boldsymbol{x}$ units, and the side of the smaller square is $\boldsymbol{y}$ units. The area of the shaded region is $(\boldsymbol{x}^2 - \boldsymbol{y}^2)$ square units. Show how the shaded area might be cut and rearranged to illustrate that the area is $(\boldsymbol{x}-\boldsymbol{y})(\boldsymbol{x}+\boldsymbol{y})$ square units.



Solution: