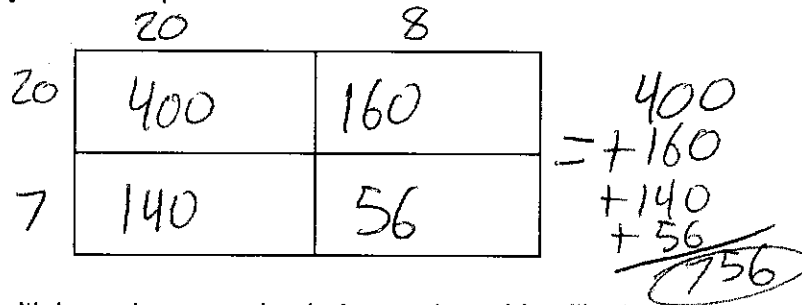
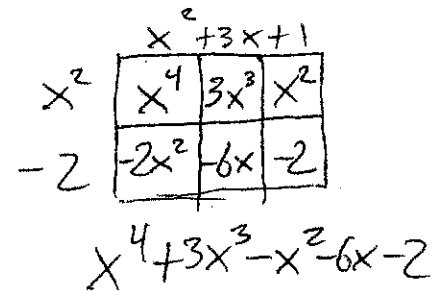
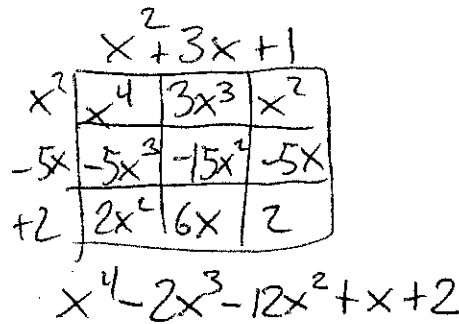
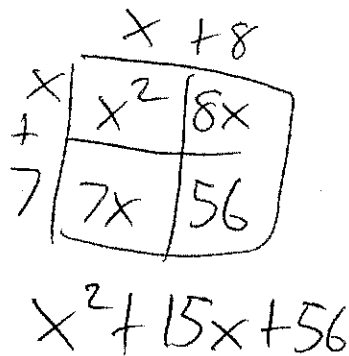


1. Show that  $28 \cdot 27 = (20+8)(20+7)$  using an area model. What do the numbers you placed inside the four rectangular regions you drew represent?

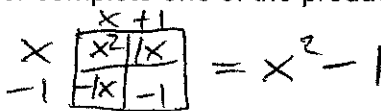


2. Use an area model to multiply each expression below and combine like terms.
- a.  $(x+8)(x+7)$       b.  $(x^2+3x+1)(x^2-5x+2)$       c.  $(x^2+3x+1)(x^2-2)$

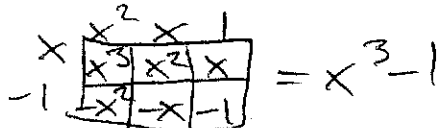


3. Have each of your team member complete one of the products below using an area model.

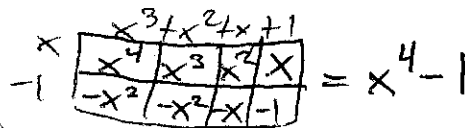
a.  $(x-1)(x+1)$



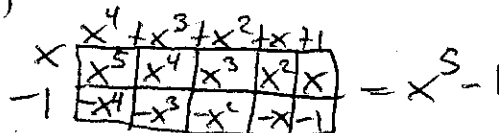
b.  $(x-1)(x^2+x+1)$



c.  $(x-1)(x^3+x^2+x+1)$



d.  $(x-1)(x^4+x^3+x^2+x+1)$



4. Based on your answer to #3, without using an area model, what is  $(x-1)(x^{20}+x^{19}+\dots+x^2+x+1) = ?$

$x^{21} - 1$

5. Generalize the pattern that emerges by writing down an identity for

$(x-1)(x^n+x^{n-1}+x^{n-2}+\dots+x^2+x+1)$

$x^{n+1} - 1$

6. Multiply  $(x - y)(x^3 + x^2y + xy^2 + y^3)$  using an area model. Combine like terms and simplify your answer.

$$\begin{array}{r}
 x^3 + x^2y + xy^2 + y^3 \\
 \begin{array}{|c|c|c|c|}
 \hline
 x & x^4 & x^3y & x^2y^2 & xy^3 \\
 \hline
 -y & -x^3y & -x^2y^2 & -xy^3 & -y^4 \\
 \hline
 \end{array}
 \end{array} = x^4 - y^4$$

7. Multiply  $(x^2 - y^2)(x^2 + y^2)$  using an area model and combine like terms.

$$\begin{array}{r}
 x^2 + y^2 \\
 \begin{array}{|c|c|}
 \hline
 x^2 & x^4 & x^2y^2 \\
 \hline
 -y^2 & -x^2y^2 & -y^4 \\
 \hline
 \end{array}
 \end{array} = x^4 - y^4$$

8. Multiply  $(x^5 - y^5)(x^5 + y^5)$  using an area model and combine like terms.

$$\begin{array}{r}
 x^5 + y^5 \\
 \begin{array}{|c|c|}
 \hline
 x^5 & x^{10} & x^5y^5 \\
 \hline
 -y^5 & -x^5y^5 & -y^{10} \\
 \hline
 \end{array}
 \end{array} = x^{10} - y^{10}$$

9. Generalize the pattern that emerges to write down an identity for  $(x^n - y^n)(x^n + y^n)$ .

$$x^{2n} - y^{2n}$$