

## Core Content

<b>Cluster Title: Use polynomial identities to solve problems.</b>
<b>Standard A.APR.4:</b> Prove polynomial identities and use them to describe numerical relationships. <i>For example, the polynomial identity <math>(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2</math> can be used to generate Pythagorean triples.</i>
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>Prove polynomial identities that expand or factor polynomials.</li> </ul>

## Supports for Teachers

<b>Critical Background Knowledge</b>	
<ul style="list-style-type: none"> <li>Properties of algebra</li> </ul>	
<b>Academic Vocabulary</b>	
polynomial identity	
<b>Suggested Instructional Strategies</b>	<b>Resources</b>
Prove that $(n^2 - 1)^2 + (2n)^2 = (n^2 + 1)^2$ and show how $(n^2 + 1)$ , $(n^2 - 1)$ , and $(2n)$ can be used to generate Pythagorean triples.	
<b>Sample Formative Assessment Tasks</b>	
<b>Skill-Based Task:</b>  Prove: $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$	<b>Problem Task:</b>  Write $y = x^4 - 16$ in various equivalent forms and relate each form to its graph.

## Core Content

<b>Cluster Title: Use polynomial identities to solve problems.</b>
<b>Standard A.APR.5:</b> Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of $x$ and $y$ for a positive integer $n$ , where $x$ and $y$ are any numbers, with coefficients determined for example by Pascal's Triangle.
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>Fluently expand binomials by hand, recognizing Pascal's Triangle as a tool of efficiency.</li> <li>Expand binomials of the form <math>(ax + by)^n</math> using Pascal's Triangle.</li> </ul>

## Supports for Teachers

<b>Critical Background Knowledge</b>	
<ul style="list-style-type: none"> <li>Pascal's Triangle</li> <li>Use of the distributive property to multiply polynomials</li> </ul>	
<b>Academic Vocabulary</b>	
Binomial Theorem, Pascal's Triangle	
<b>Suggested Instructional Strategies</b>	<b>Resources</b>
Find a pattern for the expansion of $(a + b)^n$ where $n = 0, 1, 2, 3, 4$ . Relate the resulting pattern to Pascal's Triangle and the Binomial Theorem.	
<b>Sample Formative Assessment Tasks</b>	
<b>Skill-Based Task:</b>  Expand $(x + 2)^5$ .	<b>Problem Task:</b>  Explain how using Pascal's Triangle can be used to expand $(x + y)^n$ .