Personal Polynomials

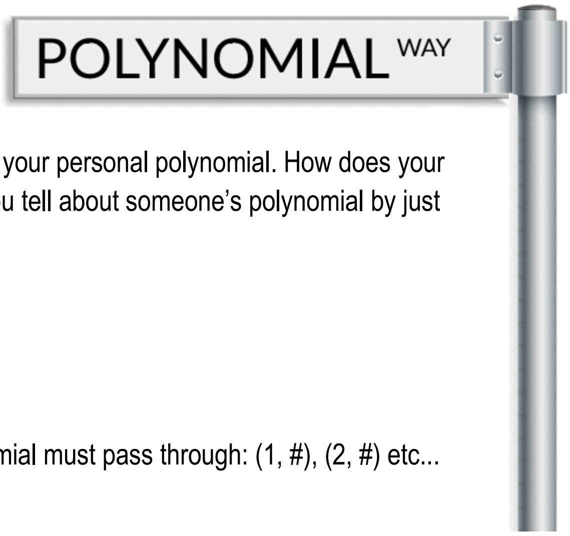
Teachers Teaching with Technology™
Professional Development from Texas Instruments

Student Activity

7 8 9 10 **11** 12

TI-Nspire™ | Activity | Student | 3 hours

Introduction



Not everyone has a street named after them, but everyone can have a polynomial. What does your polynomial look like? In this activity you will change your name into a set of points and determine the polynomial that passes through these points, your personal polynomial. How does your polynomial compare and interact with others? How much can you tell about someone's polynomial by just looking at their name?

Question: 1.

Write down your name as numbers from 1 to 26.

Question: 2.

Write down the coordinates for the points that your polynomial must pass through: (1, #), (2, #) etc...

Question: 3.

What is smallest degree polynomial that will pass through all of your points? What assumptions do you need to make?

Question: 4.

Define your polynomial as: $f(x) = ax^n + bx^{n-1} + cx^{n-2} + \ldots$ according to the degree of your polynomial. Using your points from Question 2, write down the simultaneous equations that need to be solved in order to determine the equation for your polynomial.

Question: 5.

Determine the solution to the simultaneous equations (Question 4) and hence write down the equation to your polynomial.

Question: 6.

Generate a table of values to show that your polynomial passes through the appropriate points.

Question: 7.

Use the bisection method to determine the x-intercepts of your polynomial.
[Consult with your teacher if your personal polynomial does not have any x axis intercepts.]

Exploring more Personal Polynomials

Question: 8.

Hannah noticed that her polynomial had a smaller degree than she first thought. Explain why this is so.

Question: 9.

Arora and Mayam both noticed that Elle and Hannah's polynomials had a smaller degree than expected, but their polynomials were 'as expected'. Explain why this is the case.

Question: 10.

Amy joins the conversation and states that her name is unique. It too has a lower than expected degree, but for a different reason. Explain. Can you find another name that also has this property?

Authors: Peter Fox

Question: 11.

Which of the following names would provide polynomials $p(x)$ such that $p(x) = 0$ has at least one solution:

i) Daisy ii) Peter iii) Brian iv) Emma v)John

Question: 12.

Bindi notices that her polynomial $p(x)$ has no solutions such that $p(x) = 0$. Find some other names that have no solutions to $p(x) = 0$. Explain how you searched and what criteria you used.

Question: 13.

According to their polynomials, where do Lilly and Lillian meet?

Question: 14.

Victor and his friend Victoria want to explore all the places where there polynomials meet. Without determining their equations:

i) Identify six points where their polynomials will intersect.

ii) Explain why their polynomials have seven points of intersection.

Question: 15.

Anna and Hannah claim to have very similar polynomials. Apply an appropriate transformation and compare the two polynomials.

Question: 16.

Are there any two names that share the same polynomial? Explain your reasoning.

Authors: Peter Fox