

The Palace of Celestial Purity, located within the Forbidden City in Dongcheng, China, is an architectural classic and has an impressive design inspired by the traditional Pagoda style. This style is characterized by its symmetrical roofs, a feature that is executed in the Palace of Celestial Purity, which was constructed in the early 15th century. To further explore the symmetrical design of the Pagoda-style roof, a quadratic function $f(x) = ax^2 + bx + c$, where $a \neq 0$ and b and c are real numbers, was used to demonstrate the roof's symmetry. In order to invert this quadratic function, $f(x) = f(-x)$ for all values of x , so that the function is symmetric along the y -axis. This involves horizontally inverting the function along the y -axis, which results in the equation remaining the same except for the sign of the constant term " c " becoming negative in a quadratic function and " a " becoming negative in a linear function. To demonstrate the symmetry of the roof along the y -axis, 2 quadratic functions and 3 linear functions were used on one side of the roof, which were then inverted to create a symmetric shape that should perfectly fit the roof. For example, the equation $f(x) = 0.25x^2 + 2.13x - 6.54$ was used to demonstrate the first slope of the roof. By inverting this function, the equation becomes $f(x) = 0.25x^2 - 2.13x + 6.54$, as demonstrated in the accompanying infographic. To confirm the symmetry of the roof, another function was created and compared with the inverted function. By matching the equation, it was concluded that the architecture behind the roof was accurately symmetrical. This demonstration effectively showcases the importance of mathematical principles in architecture, and how they can be used to create stunning and symmetrical designs that are visually appealing.