

A RECREATION OF
‘WATER LILIES’

BY OSCAR-CLAUDE MONET



2025 GOLD LEVEL PVCICS
MATHCLUB ART PROJECT

PAINTED BY

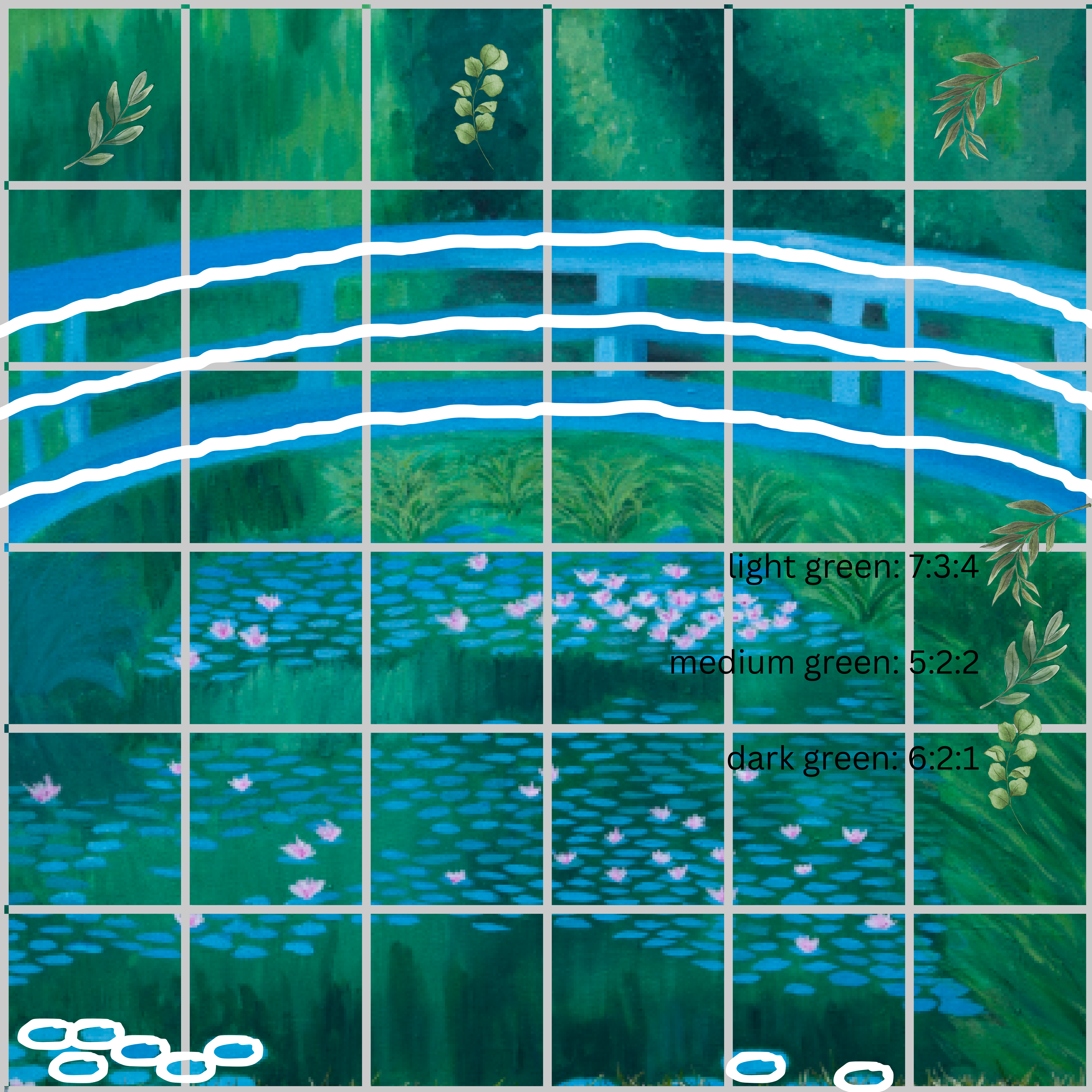
ASTRID KNYT, REGINA YOU, AND GRETA DIAMOND

PIONEER VALLEY CHINESE IMMERSION CHARTER
SCHOOL GOLD LEVEL MATHCOUNTS PROJECT

APRIL 2025







light green: 7:3:4

medium green: 5:2:2

dark green: 6:2:1

Monet's Water Lilies

2025 Gold Level PVCICS MathClub Art Project

Our project for the Gold Level Honour Roll is a mathematical recreation of Monet's 'Water Lilies'.

Monet's Water Lilies is a collection of over 250 paintings, with the main subject being water lilies (of course). Some paintings are larger than others, but for this project we chose one of the smaller, square paintings.

Our painting was done entirely with acrylic paints. The canvas is a 30" by 30" splined canvas from BLICK, and the paints are all branded Artists' Loft and were purchased at Michaels. The students who worked on this project were Astrid Knyt (8th grade), Regina You (7th grade), and Greta Diamond (6th grade).

The PVCICS math club has spent the last three weeks working on our Gold Level Project, and through the process of working on the project we have fostered teamwork, collaboration, and creativity that can only be achieved through hard work and determination. Last year, the math club entered a recreation of “The Great Wave off Kanagawa”, a woodblock print depicting a large wave near Mount Fuji. In this year’s entry for the gold level art project, we chose to recreate Claude Monet’s ‘Water Lilies,’ which is much more impressionist and significantly harder to paint. This ambitious goal absorbed much time, for both artistic and mathematical aspects. The painting is done with acrylic paints on a 30” by 30” splined canvas, and is meant to incorporate many mathematical concepts into the painting, such as coordinates, ratios, translation, congruence, quadratics, parabolas, and ellipses. The painting this year was meant to push us harder and strengthen our skills in mathematics and painting, and was chosen because we were stunned by the beauty in the bridge, the detail in the foliage, and by how ethereal the water lilies appeared.

For the first concept, the coordinate plane was incorporated as we used the grid method to sketch the outline for the painting, and used fractions to ensure the details were accurate, which were based upon a square grid of parallel lines five inches apart, vertically and horizontally. The use of a coordinate plane itself, in which the bottom left corner was (0,0) and the top right corner was (30,30), demonstrates our knowledge of its concept. We did not plot dots, but used the grid to determine where clumps of water lilies would be and where the bridge would be, as well as the highlights and shadows in the trees. This then allowed us to transition parts of Monet's paintings to relative and exact locations, preserving his unique perspective. This use of coordinates allowed us to create a true and proportionate recreation of Monet's Water Lilies, as well as assisting us to portray the other parts of the painting.

Continuing with the coordinate plane's theme of simple geometry, our next mathematical elements incorporated are translation and congruence. The arches of the bridge represent both of these, as they have the same curve and degree, and are simply relocated up or down, which is the definition of translation. We used fractions on the grid to draw the bridge and ensure that each arch was the same, and the arches of the bottom of the bridge and the handrails both aligned along the same curve. This single formula adds an element of elegance and gentleness as the focal point of this painting, and helps to guide a viewer's eyes downward to the water lilies themselves. In addition, on the bridge, there are vertical poles between the rail and base. These are all approximately the same length, and have just been moved between the arches in order to create and support a beautiful depiction of congruence between the arches of the bridge.

Our third math concept was color ratios. In the painting, we mixed the greens with approximate color ratios. Darker greens had a green:yellow:white ratio of 6:2:1, medium greens had 5:2:2, and light greens had a ratio of 7:3:4. The other greens were made without color ratios. This use of color ratios allowed for an adept display of shadows and depth, causing the painting to appear 3-dimensional, and more similar to its original counterpart. Furthermore, the color ratios are present in the water lilies and reflections in the water, with the water lilies fading by changing from blue:green:white ratios of 5:2:3 to 4:1:2. The reflections consist of similar color ratios to the green canopy into the water, but with an additional half part of blue and green, to provide a murky-water looking surface. Color values are not only a part of the depth of the painting and its view of the landscape, but also a crucial part of the painting itself, displaying how deeply math and art are intertwined.

Lastly, we decided to continue our custom of overachieving, and include quadratics, specifically the graphed parabolic form of a quadratic function, and ellipses. The curve of the bridge is parabolic, and its varying shading, despite the identical arches, contributes to the impressionism of the piece, as well as the entire painting's representation of a landscape. The arches of the bridge, consisting of both the handrails and base, all exist with an intentional identical vertex-form quadratic formula of $-0.01(x-15)^2+21$. We also decided to incorporate ellipses in the foreground lily pads. They are nearly congruent ellipses with areas of $\frac{5}{32}\pi$ sq in, as the equation for the area of an ellipse is $A=\pi ab$, and a is $\frac{1}{4}$ " and b is $\frac{5}{8}$ ". Because the lilies are all congruent, we measured a single lily for this equation. In addition, there are parabolic curves in some of the grass blades, although we did not mark them or include them due to them being so small.

This year, we have fewer mathematical concepts, in part because of the more impressionist painting style. A commendable effort was put into this project, and hope that you enjoy this project just as much as we do. We cherish the time we spent working together, as this year, like last year, one member of our group is graduating middle school. We hope that future students will see this painting on a classroom wall and recognise the mathematical concepts, but also that they will learn to appreciate the beauty of math, and how it is intertwined with art. We worked to recreate the same feeling of endlessness and elegance so admired in Monet's works, reminding us that everyone belongs somewhere. We hope to continue this legacy created through these art projects, whether we gain an award or not. But mostly, we hope to give thanks to our amazing math club teacher, who always supported us with words of encouragement, be that answering emails at outrageous speeds and times, even on the weekends, or simply telling us that we're doing amazing. Each year we plan on decorating her classroom walls with another painting, which is where this one will go as well.