Use mouth-watering art to master math concepts

Paint, pastels, and colorful collages in the mathematics classroom? Absolutely!

The visual arts, which include drawing, painting, and sculpture, present an ideal and unique forum through which children can express their ideas, thoughts, and emotions. When you consider some of the elements of art, namely, *line*, *shape* (two dimensional), *form* (three dimensional), and *space* (perspective), it's hard to deny the obvious connections between mathematics and the visual arts, given the similarity in vocabulary.

Early educational researchers such as John Dewey (1934) argued that thinking in art improves thinking in other disciplines. Decades later, research still indicates that what students learn in the arts may help them master other subjects, such as reading, mathematics, and social studies (Deasy 2002). In fact, several independent studies show that increased years of enrollment in arts courses are positively correlated with higher SAT verbal and mathematics scores (Ruppert 2006).

Despite the sad fact that the arts provide many opportunities for students to demonstrate their skills and talents and develop self-confidence through the creation of authentic artifacts, K-12 education budget cuts have forced schools and districts to limit or even eliminate arts instruction.

This educational gap can be narrowed in part by including art instruction in after-school and early education programs. It's up to you.

Are you interested in capitalizing on the benefits of arts instruction and providing children with opportunities to explore the arts? More specifically, would you like to energize your *mathematics* teaching by seamlessly integrating the visual arts into exciting hands-on lessons?

Put on your math goggles (Ward 2012) and experience how young children can engage in rich mathematical investigations using the artwork of the 20th-century American painter **Wayne Thiebaud**.

Candy, cakes, and math

It's hard not to be captivated by the delectable subjects featured in the artwork of Thiebaud (pronounced *tee-bo*), who possesses an undeniable affinity and talent for capturing the geometry inherent
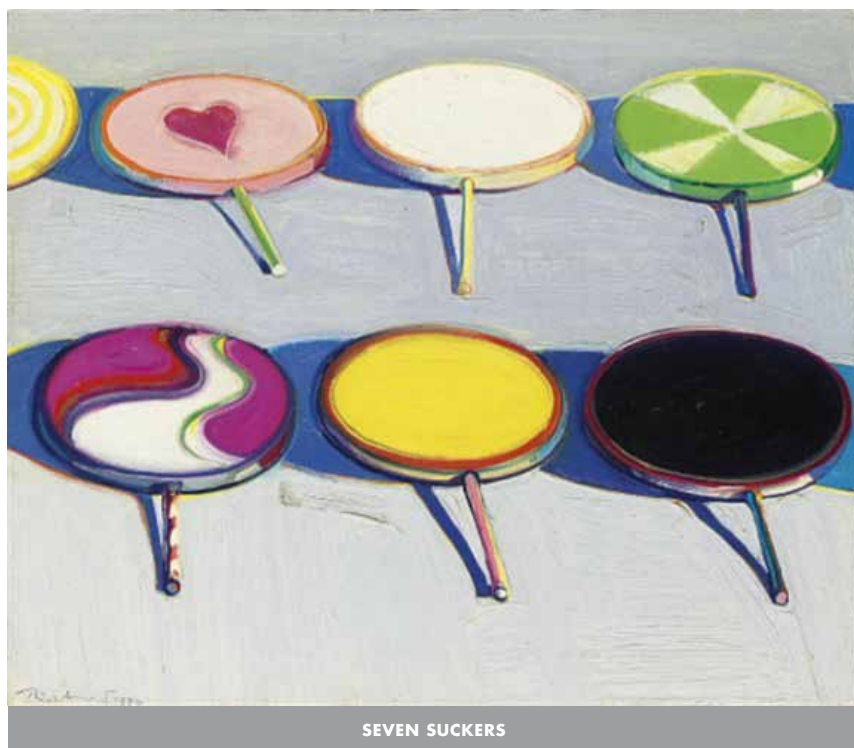
SEVEN SUCKERS

in food. Thiebaud's colorful re-creations of pastries, candies, and cafeteria-style foods are unquestionably a geometer's playground: His cakes are real-life examples of cylinders, his gumballs are spheres, and his cafeteria-style sandwiches are triangular and rectangular forms.

In my experience teaching an integrated mathematics-visual arts program, I have found that Tiebaud's art lends itself easily to the exploration of a variety of mathematical concepts. His art appeals to children and adults alike.

Seven Suckers (1970), for example, is a whimsical depiction of rainbow-colored stick candies that can be used to introduce and explore circles in the pre-kindergarten and kindergarten classroom. (See an image at www.artnet.com/artists/wayne-thiebaud/seven-suckers-rPMZeqZ8ZUiby-w5HVurOiQ2.). *Three Machines* (1963), as another example, depicts gumball machines, allowing children to explore fundamentals of


CAKES

probability. (See www.artnet.com/magazine/news/newthismonth/walrobinson2-1-16.asp.)

Let's look through our math goggles and see how young children have used Thiebaud's art as a lens to learning mathematics.

I spy a circle!

One key component of early childhood mathematics programs is to provide opportunities for children to recognize, name, build, draw, compare, and sort two- and three-dimensional shapes. It's also critical that children describe attributes of shapes as well as recognize geometric shapes and structures in their environment (NCTM 2000).

A class of prekindergarten children recently learned about Thiebaud's life and artwork and then created their own stick candy in the spirit of the artist. Using our classroom whiteboard and Internet connection, children viewed several images—for example: *Cakes* (1963) (www.nga.gov/content/ngaweb/Collection/art-object-page.72040.html), *Three Machines* (1963), and *Pies, Pies, Pies* (1961) (www.crockerartmuseum.org/digital-crocker/item/pies-
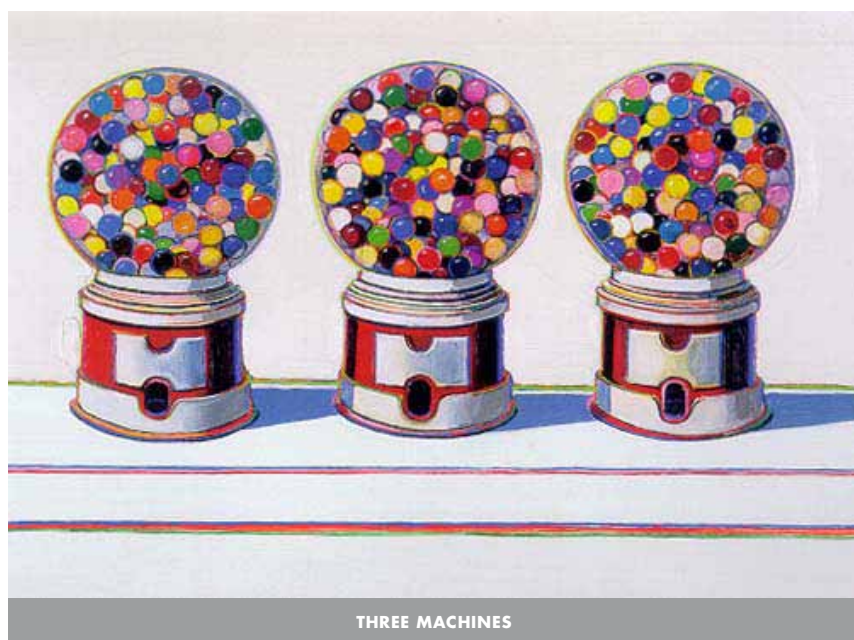
THREE MACHINES

pies-pies-1961).

As the children viewed selected works, they articulated what they liked about the artwork and even giggled at the notion of painting pies and hot dogs. (See *Five Hot Dogs* [1961] at www.artnet.com/ Magazine/reviews/wong/ wong7-9-2.asp.) The class erupted in cheers upon viewing *Seven Suckers* (1970) and hearing they were going to create their own Thiebaud-inspired candy.

After distributing one circle (measuring 4 inches in diameter and cut in advance from white cardstock) to each child, I encouraged the class to describe the attributes of the shape they were holding. They described their circles as "curved on the sides," "round all over," and "not pointy like a triangle." Then they put on their math goggles and played I Spy, identifying circles in the classroom such as a clock, a button on a classmate's shirt, and even a mosquito bite!

Using the circles and simple supplies such as crayons and markers, the children embarked on the creation of their suckers. After coloring, they taped craft sticks

FIVE HOT DOGS

onto the backs of their circles, transforming them into suckers.

I ended the activity by reading the book, *What Is Round?* by Rebecca Dotlich (1999), as a means to provide an increased awareness of real-world examples of circles. I encouraged the children to keep their math goggles on and to be on the lookout for more circles in the classroom, on the playground, and at home.

What's the chance...?

As early as pre-K, it's critical that teachers provide opportunities for young children to reason abstractly and quantitatively and discuss events as *likely* or *unlikely* (NCTM 2000). The most effective way to engage children in such investigations is by relating the mathematics to their experiences. For example, by placing colored blocks in a bag and sampling with replacement, children can create a tally chart and then predict how many blocks of each color they believe are hidden from view. In their own experience, most children by ages 4 and 5 have seen gumball machines or placed coins in them, resulting in the surprise of which random color gumball might exit the machine.

Capitalizing on children's past experiences, I used Thiebaud's *Three Machines* as the focal point for an integrated math-art activity designed to give them opportunities to make predictions based on what is most likely. After children

PIES, PIES, PIES

viewed and discussed the painting and made predictions about which color gumball might exit the machine if a coin were dropped in, I gave each child an image of a gumball machine. The children put on their artists' thinking caps and adorned their own gumball machines using a variety of colors.

I challenged children to count and record the total number of gumballs in their machines and predict which color would most likely come out if someone were to put in 25 cents. I encouraged the children to verbally justify their reasoning after making their predictions to further tap in to their mathematical thinking.

At the end of the activity, I read a few excepts from the book, *Probably Pistachio* by Stuart Murphy (2001), as a way to deepen the children's understandings of other probability terms such as *possible*, *probable*, and *fair chance*.

Pick up your paintbrush...and teach math!

Although learning about and experiencing the arts is increasingly recognized as an essential part of achieving success in learning and in life, the study of the arts is quietly disappearing from our schools (Ruppert 2006).

Don't deny your children opportunities to succeed. Instead, let the visual arts provide a fertile playground in which children can revel in the study of a variety of mathematical concepts. Simply find a piece of art that resonates with you, and then put on your math goggles to develop a mathematical lesson that centers on that piece of art. The lesson will ignite your children's creativity, capture their imaginations, and showcase mathematics in a new and engaging way.

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