

Paint Your Way to STEM

Scientific evidence indicates that as early as 40,000 years ago humans were expressing themselves in paintings. Cave paintings were created using pigments derived from plants, animals and minerals. These natural substances were ground up and mixed with water or saliva.

Sometimes animal fats were mixed in to make the paint more durable. Read more about cave painting at https://en.wikipedia.org/wiki/Cave_painting. Many types of paints, as well as painting techniques, evolved over time and that history is fascinating. Water colors, tempera, and oil paints were invented long ago with acrylic paint recently added to artists' choices. Check out this website for some of the history and science involved in the art of painting and pigments: <http://www.webexhibits.org/pigments/>.

Artists of the Middle Ages were the first to use a type of tempera, with eggs in it, to create their works; Leonardo Da Vinci used this paint. Various minerals were ground up for color pigments, and egg yolk was mixed in to bind the pigment to the painting surface. Water could be used as the solvent, or base for the paint, and to dilute it. Egg tempera is easy to make, easy to use, durable when brushed on to various surfaces, and it is quick drying. Keep reading if you want to make some!

LET'S GET PAINTING



GATHER THESE SUPPLIES after covering your work area with newspaper or a plastic tablecloth.

- Paper - any kind. Try different papers.
- Paint brushes - simple, inexpensive brushes are fine.
- Plastic paint palette (or a mini-muffin tin) to mix the paint ingredients
- Stirrers (something like toothpicks, coffee stirrers or a spoon)

-Cup of water for cleaning your brush - The water will get dirty as it gets used.

-Cup of clean water for making the paint - If you have an eye dropper so that you can add drops of water, a few at a time, that would be great. If no dropper, use a small spoon. Keep this water clean.

-Egg yolk - You must separate the egg white from the yolk. Ask an adult for help if you've never done this. Put the yolk in a small bowl. Keep the egg white for an omelet, feed it to your dog, or throw it away. If you're keeping it, refrigerate it immediately.

-Spoon - to distribute the egg yolk when you start making the paint

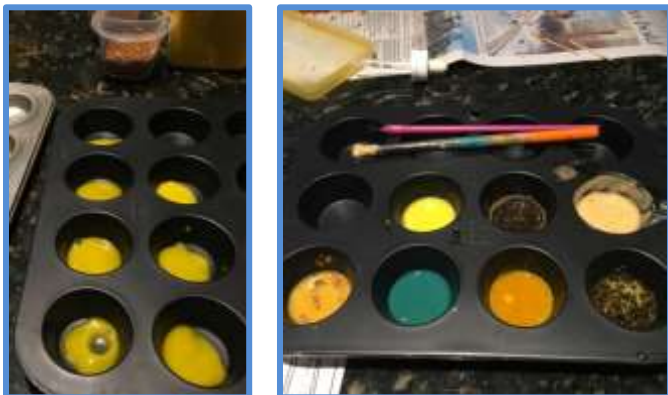
-Ingredients to try for pigments - The pigments work best when they are powdered. The spices turmeric, ground mustard, and paprika work. If you have others that are powdered, experiment to see what works for you. You can try to grind up items in a blender if your parents okay this.

Chalk works well, but it must be powdered. If you have sidewalk chalk, put it between newspapers and hit it with a hammer to crush it. Wear a dust mask (like for sanding) so you don't breathe in the chalk. Be careful where you are hammering!! Can you use the garage floor or a concrete floor in the basement? Don't hammer on the kitchen countertop!



TO MAKE THE EGG TEMPERA

- ◆ Using a spoon, separate the egg yolk into 4-8 portions and put each portion into its own well in your paint palette or muffin tin. Look at the picture on the left.



- ◆ Mix in about $\frac{1}{4}$ teaspoon of pigment and then add a few drops of clean water. Mix well with your paint brush or a stirrer. See the picture on the right.
- ◆ Adjust the amounts of the 3 ingredients as needed for a painting consistency you like, and to make more paint.
- ◆ Paint!

- ◆ Make other colors using different pigments.
- ◆ Keep your brush clean by swirling it in water.
- ◆ Egg tempera dries quickly so mix often.
- ◆ Hints: Use thin translucent strokes and build up layers of color for opacity. Hatch-like strokes are good.

YOU CAN MAKE WATER COLORS, TOO

Try colored liquids such as coffee or fresh fruit juice (for example, squish a raspberry).

MORE TO TRY

- ◆ Paint with some **store-bought tempera** for comparison. How is it the same as the egg tempera? How different? Research the composition of the commercial type.
- ◆ Do you have acrylic paint at home? If so, try some. Which paint type do you like best? Research the composition of acrylic paint. What are its advantages over tempera?
- ◆ How about other commercial paints—for example, what's the composition of house paint? How does "interior" paint differ from "exterior" paint?



RESOURCES

The Society of Egg Tempera Painters: <http://www.eggtempera.com/>

Lessons in tempera painting: <http://www.incredibleart.org/files/tempera.htm>

A Chemistry Lab Book: *Art in Chemistry: Chemistry in Art*, Greenberg & Patterson, Teacher Ideas Press, (1998)