

IMPROVING TEACHER QUALITY  
Arts and Science Integration

**Visual Art and Life Science**

**Grade 4**

Spring 2013

**ITQ ARTS AND SCIENCE INTEGRATION  
GRADE 3  
VISUAL ART AND LIFE SCIENCE**

**Concentration of Color  
Lesson #1**

- *FOSS Kit Grade 4, Life Science: Environments, Investigation 5*

**CONTENT STANDARDS**

**Visual Art**

**4.1** Describe how using the language of the visual arts helps to clarify personal responses to works of art.

**Life Science**

**I&E6c** Formulate and justify predictions based on cause-and-effect relationships.

**I&E6d** Conduct multiple trials to test a prediction and draw conclusions about the relationships between predictions and results.

**ESSENTIAL QUESTIONS** (*Questions students might ask about the topic*)

- What is intensity and how does it relate to color?
- How can I test my prediction about color, record data and analyze the results?
- How does using the language of visual art and the language of science help me to express my ideas about art and science more clearly?

**OBJECTIVES & STUDENT OUTCOMES** (*Students will be able to...*)

- Predict how many intensities of a single color he or she can create.
- Record color mixing data on a graph in a controlled manner.
- Analyze data from the graph and compare to prediction.
- Follow written procedures.

**ASSESSMENT** (*Various strategies to evaluate effectiveness of instruction and student learning*)

- **Feedback for Teacher**
  - Informal assessment of student skill by observation
  - Formal assessment: *Concentration of Color Worksheet*
- **Feedback for Student**
  - Informal verbal feedback from teacher
  - Direction and suggestions from individual conferences throughout work process

**WORDS TO KNOW**

**Visual Art Vocabulary**

- **Color:** The visual sensation dependent on the reflection or absorption of light from a given surface. The three characteristics of color are hue, value and intensity.
- **Hue:** Refers to the name of a color
- **Intensity:** Also called chroma or saturation. It refers to the brightness of a color (a color is in full intensity only when pure and unmixed). Color intensity can be changed by adding black, white, grey or an opposite color on the color wheel.
- **Monochromatic:** A color scheme involving the use of only one hue that can vary in value or intensity.

**Life Science Vocabulary**

- **Concentration:** The amount of a substance, such as salt, in an amount of another substance, such as water.
- **Justification:** Show or prove to be right or reasonable.
- **Prediction:** say or estimate that (a specified thing) will happen in the future or will be a consequence of something.

## MATERIALS

- Tempera paint, black, white, primary (red, blue, yellow) and/or secondary (orange, green, violet)
- Paint brushes, one per student
- 6" white paper or foam plate, one per student
- Container of water, one per student
- Concentration of Color Worksheet, one per student
- Paper towel, one per student
- Science Notebook, one per student

## RESOURCES

- *FOSS Kit Grade 4*, Life Science: Environments, Investigation 4
- *Portfolios Grade Four*, by Robyn Montana Turner, Barrett Kendall Publishing
  - Recording with Color: pages 24, 25
  - Value: Page 26, 27
  - Mixing tempera paint: page 134
- Internet
  - Tints and shades: <http://artlessonsforkids.me/2008/11/23/tints-and-shades/>
  - Tints and shades: <http://www.factmonster.com/ipka/A0882842.html>
  - Create a graph: <http://nces.ed.gov/nceskids/createagraph/>
  - Graphing Worksheets: <http://www.superteacherworksheets.com/graphing.html>
- Instructional Media Center (IMC)  
2442 Cardinal Lane, San Diego CA 92123  
To order instructional materials on line: <http://destiny.sandi.net>

## PREPARATION *(To be completed prior to the lesson)*

- Complete this lesson before *FOSS Kit Grade 4*, Life Science: Environments: Investigation 4
- Copy the "Concentration of Color" worksheet onto 8.5" x 11" construction paper

## WARM UP *(Engage students, access prior learning, review, hook or activity to focus the student for learning)*

- Display a monochromatic work of art. Suggestion: *The Tragedy* by Pablo Picasso  
<http://www.nga.gov/feature/picasso/technique.shtm>
- Instruct students to visually examine the work of art for 1 minute silently.
- Ask:
  - *What do you see?* [this is an open ended question, so the answers will vary]
  - *Lets talk about the elements of art. What lines to you see?*
  - *What shapes?*
  - *What colors?*
- Say:
  - *This type of color scheme is called **monochromatic**. **Monochromatic** means one color. What would the root word be?* [chroma, which means color]
  - *The prefix is "mono" which means "one".*

## MODELING *(Presentation of new material, demonstration of the process, direct instruction)*

- Distribute a **Concentration** of Color Worksheet and a pencil to each student.
- Distribute one paper plate, one paper towel, water in a container, and one paintbrush to each student.
- Place at least a tablespoon of a primary (red yellow or blue) or secondary paint (orange, green or violet), a teaspoon of black and a teaspoon of white tempera paint on each plate (palette).
- Say:
  - *Put your name and the date on the **Concentration** of Color Worksheet.*
  - *Let's read the worksheet.*
  - *The title says "**concentration**" of color. What does **concentration** mean?* [The amount of a substance in an amount of another substance.]
  - *When we talk about color, we can talk about characteristics of color.*

- *The word “**hue**” simply means the name of the color. Red or blue or yellow are all called **hues**.*
- Write the word “**hue**” and its definition (name of a color) on a chart paper, white board or place it under the document camera.
  - Another characteristic of color is **intensity**. “**Intensity**” refers to the brightness or most **concentrated** color.
  - A pure color means that no other color has been added to it, therefore the concentration is the highest. The paints on your palette are all at their highest **intensity** or most **concentrated** right now because they are not mixed.
- Write the word “**intensity**” and its definition (brightness or concentration of a color) on a chart paper, white board or place it under a document camera.
- Say:
  - *Think of the **monochromatic** work of art we just examined and discussed.*
- Remind students of the title and artist of the monochromatic work you chose to use. (*The Tragedy* by Pablo Picasso).
- Say:
  - *Remember how many **intensities** of the color (blue) the artist (Pablo Picasso) used.*
  - *Now, think of the tempera paint you have in front of you in your workspace.*
  - *Make a **prediction** of how many **intensities** of color you think you can make with the tempera paint you have been given.*
  - *Go ahead and make your **prediction** by thinking of how many **intensities** you think you can make with the paint you have.*
- Give students time to write in their predictions on the worksheet.
- Say:
  - *Let’s read the next section: “**Justification** (Explain why you made this **prediction**)”.*
  - *What does justification mean? [show or prove to be right or reasonable]*
  - *Write an explanation of why you chose that number in the area provided.*
- Give students time to write their explanations.

**GUIDED PRACTICE** (*Application of knowledge, problem solving, corrective feedback*)

- Say:
  - *Turn your worksheet paper over.*
  - *You will now have 15 minutes to test your prediction.*
  - *Record as many different **intensities** and mixtures of your color as you can.*
  - *Also think about what you already know about mixing paint.*
  - *Consider what happens when you mix white into a color.*
  - *Consider what happens when you mix black into a color.*
  - *Remember to place the pure color somewhere on your paper.*
  - *Before you begin, think about how you will organize your mixtures of color so that you can prove or disprove your prediction.*
  - *Take one minute to plan before you begin. Your planning time begins now...*
- After one minute passes, say:
  - *You now have 15 minutes to prove or disprove your prediction.*
  - *Remember to place the pure, most intense color somewhere on your paper first.*
  - *Once your paint is gone, you will not get any more. At that time, your experiment is complete.*
- When 15 minutes has elapsed, direct students to place their work in a drying area.
- Instruct students in appropriate clean up procedures.

**DEBRIEF & REFLECT** (*Identify problems encountered, ask and answer questions, discuss solutions and learning that took place. Did students meet outcomes?*)

- Science Notebook Prompt: Explain how you tested your prediction using the vocabulary of art and science. How many colors did you make? How close was this to your prediction?

**EXTENSION** (*Expectations created by the teacher that encourage students to participate in further research, make connections, and apply understanding and skills previously learned to personal experiences.*)

- Read FOSS Kit Grade 4 Science Resources: Summary: Range of Tolerance, page 163-164.

**Attention:** Print this worksheet on 8.5 x 11 white construction paper

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Concentration of Color Worksheet

- Think of the monochromatic work of art we examined at the beginning of class. Remember how many intensities of the color the artist used.
- Now think of the paint materials you have in front of you in your workspace.

How many intensities of color do you think you can create using these materials? Prediction: \_\_\_\_\_

Justification: (Explain why you made this prediction)

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On the other side of this worksheet **create as many different intensities of your color as possible.**

Conclusion: (Explain your results)

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*Tragedy* by Pablo Picasso  
<http://www.nga.gov/feature/picasso/technique.shtm>  
National Gallery of Art, Washington D.C.

**ITQ ARTS AND SCIENCE INTEGRATION  
GRADE 4  
VISUAL ART AND LIFE SCIENCE**

**Changing the Concentration of Color: Shades  
Lesson # 2**

- *FOSS Kit Grade 4, Life Science: Environments, Investigation 4 & 5*

**CONTENT STANDARDS**

**Visual Art**

**5.3** Construct diagrams, maps, graphs, timelines, and illustrations to communicate ideas or tell a story about an historical event.

**Life Science**

**I&E6c** Formulate and justify predictions based on cause-and-effect relationships.

**I&E6d** Conduct multiple trials to test a prediction and draw conclusions about relationships between predictions and results.

**I&E6e** Construct and interpret graphs from measurements.

**ESSENTIAL QUESTIONS** (*Questions students might ask about the topic*)

- What happens when black is mixed with a pure color?
- How many shades can I create with black paint and a pure color?
- How can I recreate the exact colors I made during Lesson 1?

**OBJECTIVES & STUDENT OUTCOMES** (*Students will be able to...*)

- Create a graph that demonstrates how a color is affected by the addition of black to a pure color in measured amounts.
- Demonstrate accuracy when measuring volume.
- Thoroughly mix paint, apply it methodically and appropriately to a graph.
- Follow a set of written instructions.

**ASSESSMENT** (*Various strategies to evaluate effectiveness of instruction and student learning*)

- **Feedback for Teacher**
  - Informal assessment of student skill by observation
  - Formal Assessment: *Concentration of Color Worksheet* and *Shade and Tint Graph*
- **Feedback for Student**
  - Informal verbal feedback from teacher
  - Direction and suggestions from individual conferences throughout work process

**WORDS TO KNOW**

**Visual Art Vocabulary**

- **Intensity:** Also called chroma or saturation. It refers to the brightness of a color (a color is in full intensity only when it is pure and unmixed). Color intensity can be changed by adding black, white, grey or an opposite color on the color wheel.
- **Shade:** Color with black added to it.

**Life Science Vocabulary**

- **Concentration:** the amount of a substance, such as salt (or black), in an amount of another substance, such as water (pure color).
- **Conclusion:** a judgment or decision reached by reasoning
- **Data:** facts and statistics collected together for reference or analysis

## MATERIALS

- *Concentration of Color Worksheet* from Lesson 1, one per student
- 6" white paper or foam plate to be used as a palette
- Tempera paint, primary (red, yellow, blue), secondary (orange, green, violet) and black
- Minispoon from *FOSS Kit Grade 4, Life Science: Environments*, one per student
- Craft sticks, two per student
- Medium sized paintbrush, one per student
- *Shade and Tint Graph* from Lesson 1, one per student
- Pencil, one per student
- Paper towel, one per student
- Science notebook, one per student

## RESOURCES

- *FOSS Kit Grade 4, Life Science: Environments, Investigation 4 and 5*
- *Portfolios Grade Four*, by Robyn Montana Turner, Barrett Kendall Publishing
  - Recording with Color: pages 24, 25, 26, 27
  - Painting and Mixing Colors: page 134
- Internet
  - Tints and Shade Through Van Gogh: <http://www.kidzone.ws/plans/view.asp?i=2203>
  - The Getty Museum: Art and Science of Impressionist Color: [http://www.getty.edu/education/teachers/classroom\\_resources/curricula/impressionism/lesson01.html](http://www.getty.edu/education/teachers/classroom_resources/curricula/impressionism/lesson01.html)
  - Art Lesson Plan: Monochrome and Me [http://eiu.edu/adulted/ArtConference\\_Bianchi.pdf](http://eiu.edu/adulted/ArtConference_Bianchi.pdf)
- Instructional Media Center (IMC)  
2442 Cardinal Lane, San Diego CA 92123  
To order instructional materials on line: <http://destiny.sandi.net>

## PREPARATION *(To be completed prior to the lesson)*

- This lesson must be presented after Visual Art/Life Science Grade 4, Lessons #1.
- Copy *Shade and Tint Graph* worksheet onto 8.5" x 11" white construction paper, one per student
- This lesson may be used before, in conjunction with, or after the presentation of FOSS Grade 4, Life Science: Environments, Investigations 4 & 5

## WARM UP *(Engage students, access prior learning, review, hook or activity to focus the student for learning)*

- Distribute the **Concentration of Color Worksheet** created in Lesson 1 and a pencil to each student.
- Say:
  - *Who can tell the class what the word "intensity" means?* [refers to the brightness of a color; a color is in full intensity when it is pure and unmixed with any other color]
  - *Lets take a minute for each of us to look at the **Concentration of Color Worksheet** we created in the last lesson.*
  - *Look at the number of **intensities** you predicted and then read what you wrote as an explanation of your prediction.*
- Give student a minute or two to read their worksheets.
- Say:
  - *Now, turn the worksheet over and count how many **intensities** of color you actually created.*
  - *Turn the worksheet back to the front and notice at the bottom where it says: Conclusion: (Explain your results)".*
  - *Write the number of **intensities** you actually created and how that compares to your prediction.*
  - *Then write about why the prediction and results are the same or different.*
- Give students a few minutes to complete this task.
- Ask:
  - *Raise your hand if you created 3 or more **intensities** color.*
  - *Keep your hand up if you created 4 or more **intensities** of color.*



- Continue this process until you have the student with the highest number of intensities.
- *Ask that student:*
  - *How did you make so many different **intensities**?*
- Instruct students to place the worksheet inside their science notebook for reference.

**MODELING** (*Presentation of new material, demonstration of the process, direct instruction*)

- Distribute a *Shade and Tint Graph*, a minispoon, two craft sticks, a 6" white paper or foam plate to be used as a palette, a paper towel and a medium sized paintbrush to each student.
- **Do not add water to paint at any time in this experiment/art project. The water will change the intensity of the paint and skew results.**
- Place one tablespoon of pure color and one tablespoon of black paint on opposite sides of each student's **palette**.
- Instruct students to write their name on the *Shade and Tint Graph*.
- *Say:*
  - *This graph has been constructed to help us extend our experiment with color in a scientific way.*
  - *Notice how the graph is split into two sections, top and bottom.*
  - *The top section will be used for the **shades** we create and the bottom will be used for tints.*
  - *Today we are going to complete the top half of the graph.*
  - *Put your finger on the section of the graph that says "**Shade** = Pure Color + Black".*
- Check the class to make sure everyone is in the correct place.
- *Say:*
  - *All of the long, thin rectangles to the right of this box will be where we record our color **data** or all the shades we create.*
  - *Now, move your finger down to the small box below that says "Number (sign) of minispoons of black".*
  - *What do you think the numbers in the boxes to the right mean?* [the number of minispoons of black paint that has been added to the pure color]
  - *Find the small box that says "0" and place your finger on it.*
  - *Now move your finger to the rectangle above it.*
  - *What do you think we should paint into this box?* [pure color or the highest intensity, unmixed color]
- Check the class again for correct placement of the pure color.
- Demonstrate how and instruct students to load their paintbrush with the pure color and carefully paint the rectangle in the "**Shade**" half of the graph and above "0".
- Reinforce the concept that it is in the "0" section because no black has been added.
- Demonstrate how and instruct students to measure one minispoon of black paint into the pure color paint and mix.
  - Scoop black paint into the minispoon.
  - Level excess black paint off the spoon and onto the black paint on the palette using a craft stick.
  - Use the craft stick to drop the black paint left in the minispoon into the pure color paint on the palette.
  - Place the minispoon and the first craft stick on the palette near the black paint and away from the colored paint.
  - Use the second craft stick to carefully and thoroughly mix the black paint into *all* of the pure color paint.
  - Place the second craft stick on the palette near the colored paint.
  - Use a paintbrush and the mixed paint to fill in the rectangle above the "1" in the "**Shade**" half of the graph.
  - Place paintbrush on the paper towel.
- *Say:*
  - *Each time we complete a section of the graph, we will repeat this process.*
  - *We will measure and level each new minispoon of black paint, thoroughly mix it into the color and record the result on the graph.*
  - *Remember that one craft stick will be used for measuring and will only have black paint on it. The*

*other craft stick will be used for mixing and will have the colored paint on it.*

- *Let's do one more together before you work on your own.*
- Demonstrate the scooping, leveling, mixing and painting process as a class.
- *Ask:*
  - *The next section says "2"...Does that mean we add two minispoons of paint? [NO, one scoop is already mixed into the color and the addition of one minispoon will equal two]*
- Place the *Shade and Tint Graph Procedure* graphic (at the end of this lesson) under a document camera.
- Read the *Shade and Tint Graph Procedure* graphic out loud.
- Make sure all students know they can refer to the procedure sheet for guidance when they are working independently.
- Instruct students to write the numbers 4 and 5 in the next two small boxes.

#### **GUIDED PRACTICE** (*Application of knowledge, problem solving, corrective feedback*)

- Remember: do not add water to paint at any time in this experiment/art project. The water will change the intensity of the paint and skew results.
- *Say:*
  - *In the next few minutes, follow the procedure we just completed for sections numbered 3,4 and 5.*
  - *Add one minispoon each time remembering what you have already added to the color.*
  - *Look up at the written procedure if you need some guidance.*
  - *Raise your hand if you have a question or need some help and I will come to you.*
  - *Any questions?*
- Direct students to begin when you are satisfied that they all know what to do.
- Circulate around the room, monitor student progress and provide assistance as needed.
- Ask students to stop when they have completed sections 3, 4 and 5.
- *Say:*
  - *What is happening to the pure color? [it is getting progressively darker]*
  - *Can we call it a pure color now? [as soon as we added black it became a shade, no longer a pure color]*
  - *So the **concentration** of color or **intensity** has changed. The color becomes less and less pure each time we add black.*
- If the **intensity** has changed only a little you may consider allowing the students to place two minispoons in each of the remaining sections. Just make sure the numbers of minispoons coincide with the experiment for accurate data. The adjoining sections would be 7-9-11-13-15.
- Allow students time to complete their color **intensity** experiment and record the additional data on the upper half of the graph.
- *Ask:*
  - *Where is the highest **concentration** of color on your graph? [pure color, above "0"]*
  - *Where is the highest **intensity** of color on your graph? [pure color, above "0"]*
- Place **Shade and Tint Graphs** in a safe place to dry.
- Instruct students to use appropriate clean up procedures.

#### **DEBRIEF & REFLECT** (*Identify problems encountered, ask and answer questions, discuss solutions and learning that took place. Did students meet outcomes?*)

- *Ask:*
  - *What was the difference between today's lesson on the **Shades and Tints Graph** and the **Concentration of color Worksheet** we did during the last lesson?*
- Science Notebook Prompt: Why is accurate measurement important?

#### **EXTENSION** (*Expectations created by the teacher that encourage students to participate in further research, make connections, and apply understanding and skills previously learned to personal experiences.*)

- Use pure color and shades in a still life painting to show shading on objects to make them appear 3 dimensional.

- Examine famous works of art and identify ways in which artists use shades.
- Make lists of names we use to identify shades in our daily life (navy, maroon, burnt orange)

# Shade and Tint Graph Procedures

1. Scoop black paint into the minispoon.
2. Level excess black paint off the spoon and onto the black paint on the palette using a craft stick.
4. Use the craft stick to drop the black paint left in the minispoon into the pure color paint.
5. Place the minispoon and the first craft stick on the palette near the black and away from the colored paint.
6. Use the second craft stick to mix the measured black paint into *all* of the colored paint.
7. Place the second craft stick on the palette near the colored paint.
8. Use a paintbrush to place the mixed paint in the proper rectangle on the graph.

Name: \_\_\_\_\_

<b><u>Shade =</u></b> <b>Pure Color + Black</b>											
<b># of minispoons of black</b>	0	1	2	3							

<b><u>Tint =</u></b> <b>Pure Color + White</b>											
<b># of minispoons of white</b>	0	1	2	3							

Attention: Copy this graph onto 8.5" x 11" white construction paper before use.

**ITQ ARTS AND SCIENCE INTEGRATION  
GRADE 4  
VISUAL ART AND LIFE SCIENCE**

**Value Scale and Range of Tolerance  
Lesson # 3**

- *FOSS Kit Grade 4, Life Science: Environments, Investigation 4 & 5*

**CONTENT STANDARDS**

**Visual Art**

**5.3** Construct diagrams, maps, graphs, timelines, and illustrations to communicate ideas or tell a story about an historical event.

**Life Science**

**I&E6c** Formulate and justify predictions based on cause-and-effect relationships.

**I&E6d** Conduct multiple trials to test a prediction and draw conclusions about relationships between predictions and results.

**I&E6e** Construct and interpret graphs from measurements.

**ESSENTIAL QUESTIONS** (*Questions students might ask about the topic*)

- What happens when white is mixed with a pure color?
- Will white paint affect a color differently than black paint?
- How many tints can you create with white paint and a pure color?
- How can we recreate the exact tints and shades we created during Lesson 1?

**OBJECTIVES & STUDENT OUTCOMES** (*Students will be able to...*)

- Complete a graph that demonstrates how a color is affected by the addition of white to a pure color in measured amounts.
- Demonstrate accuracy when measuring volume.
- Thoroughly mix paint, apply it methodically and appropriately to a graph.
- Follow a set of written instructions.
- Compare the range of a value scale in visual art to the concept of range of tolerance in life science.

**ASSESSMENT** (*Various strategies to evaluate effectiveness of instruction and student learning*)

- **Feedback for Teacher**
  - Informal assessment of student skill by observation
  - Formal Assessment: *Shade and Tint Graph*
- **Feedback for Student**
  - Informal verbal feedback from teacher
  - Direction and suggestions from individual conferences throughout work process

**WORDS TO KNOW**

**Visual Art Vocabulary**

- **Intensity:** Also called chroma or saturation. It refers to the brightness of a color (a color is in full intensity only when it is pure and unmixed). Color intensity can be changed by adding black, white, grey or an opposite color on the color wheel.
- **Tint:** Color lightened with white added to it.
- **Value Scale:** Scale showing the range of values from black to white and light to dark.

**Life Science Vocabulary**

- **Concentration:** the amount of a substance, such as salt (or black), in an amount of another substance, such as water (pure color).

- **Data:** facts and statistics collected together for reference or analysis
- **Range:** An amount of variation or difference.
- **Range of Tolerance:** The varying conditions of one environmental factor in which an organism can survive.

### MATERIALS

- 6" white paper or foam plate to be used as a palette
- Tempera paint, primary (red, yellow, blue), secondary (orange, green, violet) and white
- Minispoon from *FOSS Kit Grade 4, Life Science: Environments*, one per student
- Craft sticks, two per student
- Medium sized paintbrush, one per student
- *Shade and Tint Graph* begun in Lesson 2, one per student
- Paper towel, one per student
- Pencil, one per student
- Value scale
- Science notebook, one per student

### RESOURCES

- *FOSS Kit Grade 4, Life Science: Environments*, Investigation 4 and 5
- *Portfolios Grade 4*, by Robyn Montana Turner, Barrett Kendall Publishing
  - Recording with Color: pages 24, 25, 26, 27
  - Painting and Mixing Colors: page 134
- Internet
  - Creating tints: <http://teachart.net/unit4/paint/tints.htm>
  - Tints and Shades in Tempera: <http://syrlynrainbowdragon.tripod.com/tints.html>
  - Tints and Shades Changing the Value of Color: <http://svam.org/education/09a.pdf>
- Instructional Media Center (IMC)  
2442 Cardinal Lane, San Diego CA 92123  
To order instructional materials on line: <http://destiny.sandi.net>

### PREPARATION *(To be completed prior to the lesson)*

- This lesson must be presented after Visual Art/Life Science Grade 4, Lessons #1 and #2.
- This lesson may be used before, in conjunction with, or after the presentation of FOSS Grade 4, Life Science: Environments, Investigations 4 & 5.

### WARM UP *(Engage students, access prior learning, review, hook or activity to focus the student for learning)*

- Divide students into pairs.
- Say:
  - *Discuss with your partner what we did to record our color **data** in the first half of the **Shades and Tints Graph** during the last lesson?*
- Guide students to remember each step in the proper order.

### MODELING *(Presentation of new material, demonstration of the process, direct instruction)*

- Distribute a *Shade and Tint Graph*, a minispoon, two craft sticks, a 6" white paper or foam plate to be used as a palette, a paper towel and a medium sized paintbrush to each student.
- Place one tablespoon of the same pure color each student used in Lesson #2 and one tablespoon of white tempera paint on opposite sides of the students' **palettes**.
- Demonstrate how and instruct students to load their paintbrush with the pure color and carefully paint the rectangle in the "**Tint**" or lower half of the graph above "0".
- Reinforce the concept that it is in the "0" section because no white paint has been added. This pure color or highest **intensity** should match the section above it in the "Shade" half of the graph.
- Demonstrate how and instruct students to measure one minispoon of white paint into the pure color paint and mix.
  - Scoop white paint into the minispoon.

- Level excess white paint off the spoon and onto the white paint on the **palette** using a craft stick.
- Use the craft stick to drop the white paint left in the minispoon into the pure color paint on the **palette**.
- Place the minispoon and the first craft stick on the **palette** near the white paint and away from the colored paint.
- Use the second craft stick to carefully and thoroughly mix the white paint into *all* of the pure color paint.
- Place the second craft stick on the **palette** near the colored paint.
- Use a paintbrush and the mixed paint to fill in the rectangle above the “1” in the “**Tint**” half of the graph.
- Place paintbrush on the paper towel.
- **Say:**
  - *Each time we complete a section of the graph, we will repeat this process, just like the last lesson.*
  - *Remember that one craft stick will only have white paint on it and will be used for measuring.*
  - *The other craft stick will have color on it and will be used only for mixing.*
  - *We will measure and level each new minispoon of white paint, thoroughly mix it into the color and record the result on the graph.*
  - *Before we continue, let’s make a class prediction about what will happen during this half of our color concentration experiment.*
- Assist students in creating a class prediction based on previous experience and write that prediction on chart paper or on the white board.
- Place the *Shade and Tint Graph Procedures* under the document camera.
- Review each step.

**GUIDED PRACTICE** (*Application of knowledge, problem solving, corrective feedback*)

- **Say:**
  - *In the next few minutes, follow the procedure for sections numbered 3,4 and 5.*
  - *Please write those numbers in the small box under the corresponding rectangle in the lower graph.*
  - *Add one minispoon each time remembering what you have already added white to the color.*
  - *Look up at the written procedure if you need some guidance.*
  - *Raise your hand if you have a question or need some help and I will come to you.*
  - *Any questions?*
- Direct students to begin when you are satisfied that they all know what to do.
- Circulate around the room, monitor student progress and provide assistance as needed.
- Ask students to stop when they have completed sections 3, 4 and 5.
- **Say:**
  - *What is happening to the pure color?* [it is getting progressively darker]
  - *Can we call it a pure color now?* [as soon as we added white it became a shade, no longer a pure color]
  - *So the **concentration** of color or **intensity** has changed.*
- Guide the students to add white in the same quantities as the upper graph. If students increased the black by two scoops at this point in the upper graph, then they should increase by two scoops of white in the lower graph.
- Make sure the numbers of minispoons coincide with the experiment for accurate recording of data.
- Allow students time to complete their color **intensity** experiment and record the additional data on the lower half of the graph.
- **Ask:**
  - *Where is the highest **concentration** of color on your graph?* [pure color, above “0”]
  - *Where is the highest **intensity** of color on your graph?* [pure color, above “0”]
- Place *Shade and Tint Graphs* in a safe place to dry.
- Instruct students to use appropriate clean up procedures.



**DEBRIEF & REFLECT** (*Identify problems encountered, ask and answer questions, discuss solutions and learning that took place. Did students meet outcomes?*)

- Place one of the completed *Shades and Tints Graph* or a complete value scale (see end of this lesson) under the document camera and project the image in an area easily seen by all students.
- Say:
  - *In art we create tools like a color wheel to remind us about color concepts.*
  - *This visual art tool is called a **value scale**.*
  - *A **value scale** shows the **range** of **tints** and shades from black to white.*
  - *How does this **value scale** compare with the **Tints and Shades Graph** we just completed?*
  - *In Life Science we studied the term **Range of Tolerance**.*
  - *Who can explain the meaning of the term **Range of Tolerance**? [The varying conditions of one environmental factor in which an organism can survive.]*
  - *I notice that we just used the word **range** when talking about the **value scale** and again when we talk about environments.*
  - *When you write in your science notebooks today, I want you to think about the **Range of Tolerance** and the salt we measured in Investigation 4 with the hatching of brine shrimp and in Investigation 5 with plants and compare it to the **Shades and Tints Graph** we just created.*
- Science Notebook Prompt: How is creating a **range** of color for a **value scale** the same as finding the **Range of Tolerance** in life science?

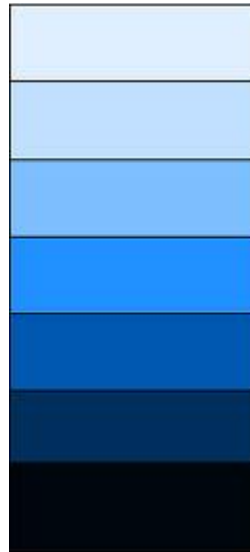
**EXTENSION** (*Expectations created by the teacher that encourage students to participate in further research, make connections, and apply understanding and skills previously learned to personal experiences.*)

- Continue the learning about tints and shades by presenting Grade 3 “Mixing Tints and Shades” [http://www.sandi.net/cms/lib/CA01001235/Centricity/Domain/176/lessons/visualart\\_3.pdf](http://www.sandi.net/cms/lib/CA01001235/Centricity/Domain/176/lessons/visualart_3.pdf)

# Shade and Tint Graph Procedures

1. Scoop white paint into the minispoon.
2. Level excess white paint off the spoon and onto the white paint on the palette using a craft stick.
4. Use the craft stick to drop the white paint left in the minispoon into the pure color paint.
5. Place the minispoon and the first craft stick on the palette near the white and away from the colored paint.
6. Use the second craft stick to mix the measured white paint into *all* of the colored paint.
7. Place the second craft stick on the palette near the colored paint.
8. Use a paintbrush to place the mixed paint in the proper rectangle on the graph.

Which section shows the highest intensity of blue?



<http://library.thinkquest.org/C005470F/technique/colortheory.html>