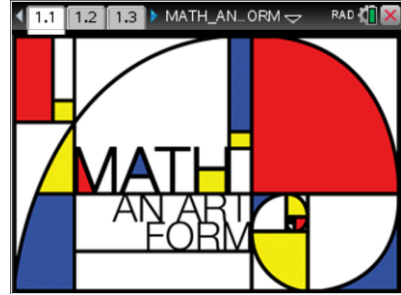# Math: An Artform

Student Activity

Name _____

Class _____

Art at the intersection of Light, Paint and Ratios

Open the TI-Nspire document *MATH_AN_ARTFORM.tns*

In this activity you will explore the primary and secondary colors of light and pigment. You will use your knowledge of colors, along with your skills with ratios, to determine how best to mix colors to "repair" a mural.
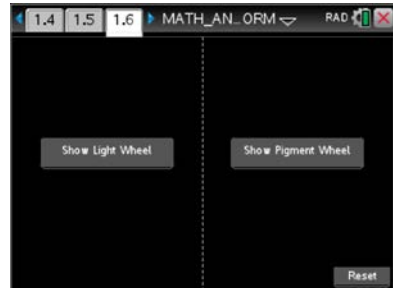
1. Read pages 1.2 to 1.5 and make notes as needed.
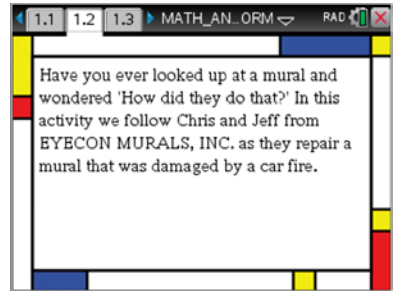
2. Navigate to page 1.6.
    *   Select the "buttons" to show the light and pigment color wheels.
    *   Be sure to pay attention to the combinations of colors for light and for pigment.
    *   Grab and drag the squares to see how pairs of colors mix.

    a. Based on the light wheel, what are the secondary colors of light?

    b. Based on the pigment wheel, what are the secondary colors of pigment?

    c. Describe how the colors of pigment and light are related.
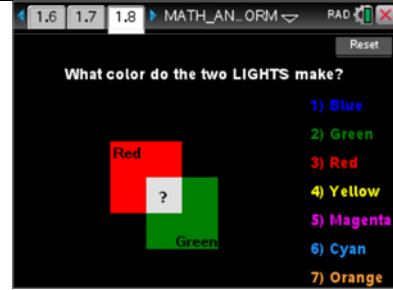
Name _____

Class _____

3. Read page 1.7 and then navigate to the color mixing quiz questions on page 1.8.
   - Answer three questions. (Your questions may differ from others around you.)
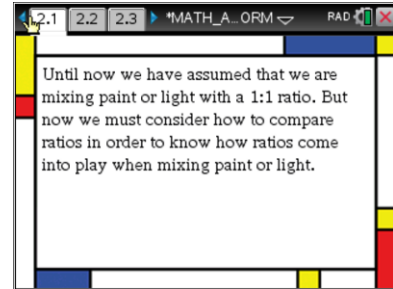   - Write the questions and your answers below.
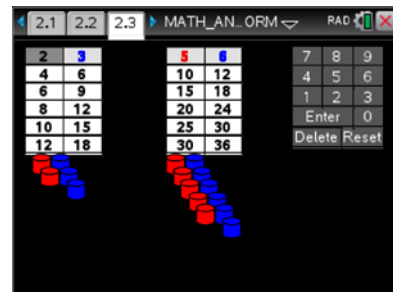
   a. Question 1:

   b. Question 2:

   c. Question 3:

4. Read pages 2.1 and 2.2

5. Move to page 2.3.
   - Use the up and down arrows to change levels in the table.
   - Use the left and right arrows to change between tables.
   - Observe what happens as you make changes on the page.

education.ti.com

6. Use the simulation on page 2.3 to answer the following questions.

    a. What are the ratios for the mixtures of paint?

    b. Use the up and down arrows to change the mixture on the left. Choose 3 mixtures and fill in the table below.

 | Red | Blue |
    |-----|------|
    | | |
    | | |
    | | |

    Which of the ratios above is "redder"?

    c. Change the number of cans of blue on the right mixture to be 12 by pressing the up or down arrow. Then determine how you can choose a row in the left hand mixture to determine which mixture is "redder." Explain your method and state which is redder.

    d. Explain at least one other method for determining which of two mixtures is redder.

7. Read page 2.4 and then navigate to the comparing ratios quiz questions on page 2.5. Answer the questions by selecting a mixture using the number keys or taping the mixture. Write the mixture s and your answers below.

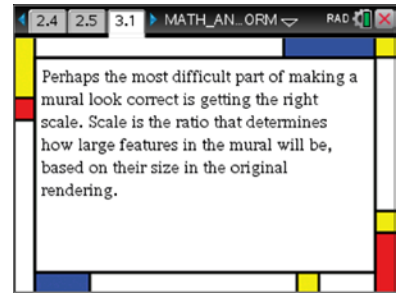   a. Question 1: Which mixture is "bluer"? Explain your answer.
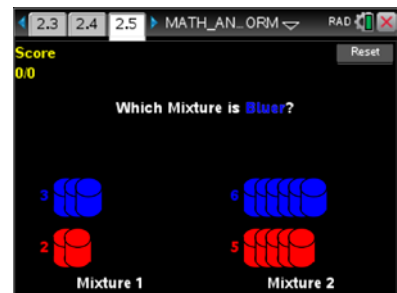
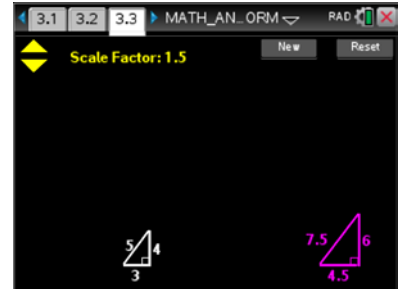   b. Question 2: Which mixture is "bluer"? Explain your answer.

    c. Question 3: Which mixture is "bluer"? Explain your answer.

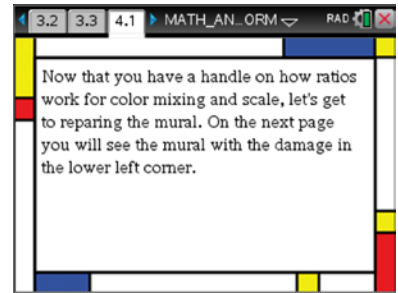8. Read pages 3.1 and 3.2 and make notes as needed.

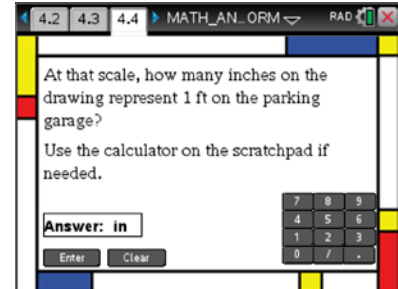9. On page 3.3, use the + and – keys to change the size the magenta figure.

    a. What is the value of the ratio of the length of the hypotenuse of the magenta triangle to the length of the hypotenuse of the white triangle?

    b. How are the lengths of the sides of the white triangle related to the lengths of the corresponding sides of the magenta triangle?

    c. What does the scale factor tell you? Verify your thinking by trying different scale factors.

    d. AB and A'B' are corresponding sides of two similar figures. If AB and A'B' have lengths 4 and 18, respectively, what is the scale factor that relates the two figures?

    e. If the scale factor 12 is applied to a triangle with side lengths 3, 4, and 5 units, what are the new lengths?

    f. Set the scale factor to 2. Suppose the units for length on the magenta triangle are feet and the units for length on the white triangle are inches. Write a ratio including units that shows the relationship between inches on the white triangle and feet on the magenta triangle.

10. Move to page 4.1 and read page 4.1 – 4.3 making notes if necessary.

> Now that you have a handle on how ratios work for color mixing and scale, let's get to reparing the mural. On the next page you will see the mural with the damage in the lower left corner.

11. On page 4.4 and answer the question below. If you need a calculator, use the scratchpad.

> At that scale, how many inches on the drawing represent 1 ft on the parking garage?
>
> Use the calculator on the scratchpad if needed.
>
> Answer: in

a. The mural is 120 feet tall and 160 feet wide. If the original reference rendering was drawn on a sheet of paper 22.5 inches by 30 inches, how many inches on the drawing represent 1 foot on the parking garage?

b. By what number could you multiply a 1 inch line on the drawing to figure out how long it would be on the mural?

12. Move to page 4.5 and answer the question below. Input your responses on the calculator.

The lower left corner of the parking garage is labeled (0, 0). On the rendering, the rectangular damaged area boundaries: Left boundary $\frac{3}{2}$ in, right boundary $\frac{21}{4}$ in, bottom boundary 0 in, top boundary 9 in. Use the scale computed in part 13 to give the boundaries of the damaged area in feet.

13. All the colors for fixing the damage are mixed except the orange for the background. If the original ratio of yellow to red was 5:3 and we need 64 ounces of orange paint, how many ounces of each are needed?