



Integrating the Arts

Mummies, Manuscripts & Madonnas

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Mathematics
STAINED GLASS DRAWING



Creating a stained glass panel takes great care and planning. You use drawing and artistic talents as well as your skills as a glasscutter. You need to imagine the effect that light will have on your final design. A stained glass artist must understand math, color, and the scientific properties of glass. The skills and tools that artists used to make the mid 13th-century Refectory Window with the Life of St. Vincent are much the same as the way stained glass panels are still made today.

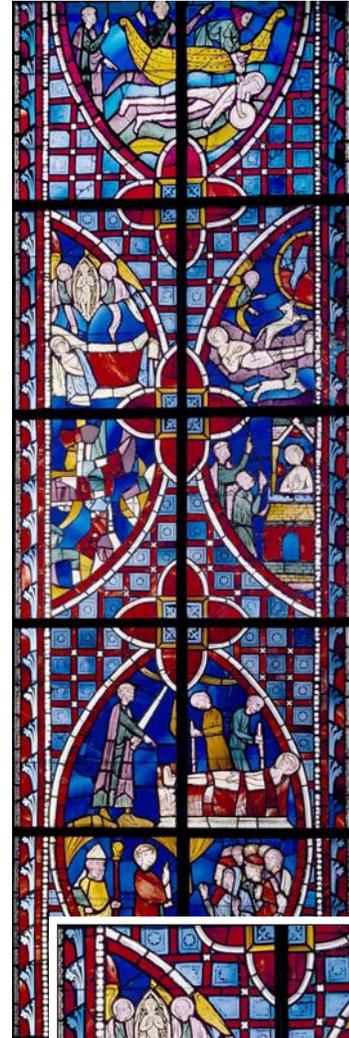
This activity guides you through the first steps in creating a stained glass window. You'll start with a photographic image, outline its primary components, enlarge the image to a desired size and then estimate how much glass you would need to create a finished panel.

After completing this assignment you will be able to:

1. Simplify a complex image by breaking it down into its core components.
2. Use the grid technique for enlarging or reducing the size of an image.
3. Calculate the amount of materials required.
4. Explore the connection between art and math in the creation of a work of stained glass.

MATERIALS CHECKLIST

- ✓ 3-5 sheets of 8.5 x 11 paper
- ✓ 1 sheet of 8.5 x 11 tracing paper
- ✓ pencil
- ✓ colored pencils or crayons
- ✓ ruler
- ✓ scissors
- ✓ print out of page 6



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The Refectory Window with the Life of St. Vincent, made in the mid-13th century contains 10 individual panels. Each panel is composed of dozens of pieces of colored glass. Each piece of glass was cut and placed in the planned design. The idea for this window most likely started as a series of drawings called cartoons.

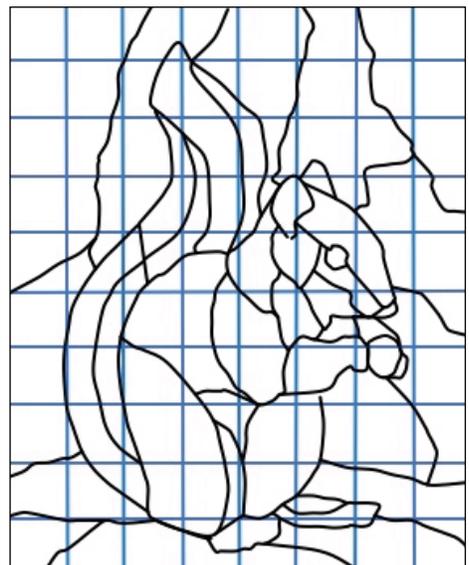
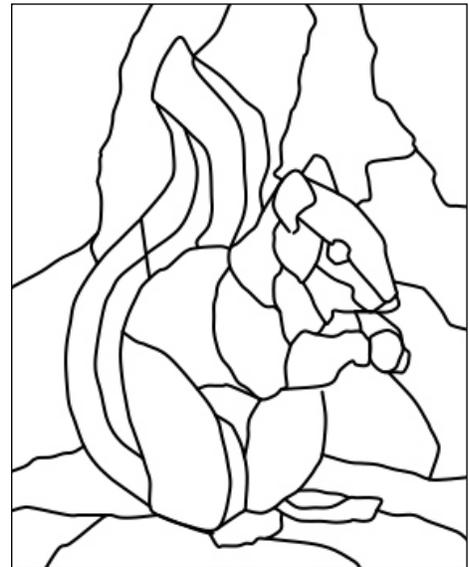
Now let's use your math skills to learn the process of creating a stained glass window. Look at the photograph of the squirrel. Compare the photograph to the stained glass design on the right. The photograph has been simplified based on color, brightness, subject, foreground and background. In creating a stained glass window we need to be sure that the pieces of glass are simplified and large enough to fit into the design.

1 Print out the page 6 which contains a line drawing of the squirrel.

2 You need to enlarge the printed 4" by 5" drawing to twice its current size. Use a pencil and ruler to draw a 1/2 inch grid over the top of the drawing.



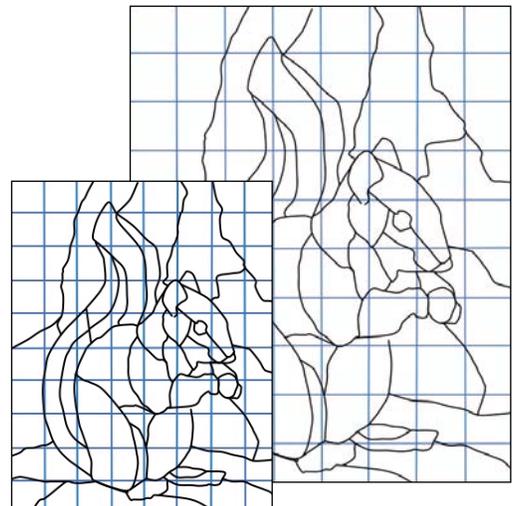
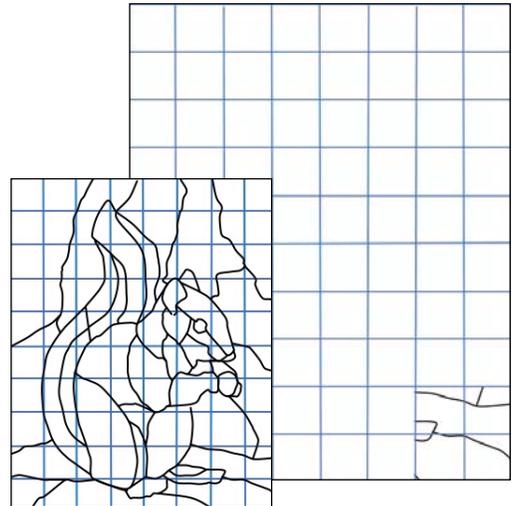
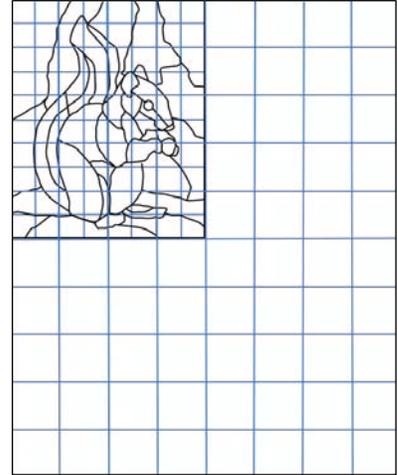
Photo by Suneko, Creative Commons



- 3 On a separate piece of paper use a pencil and ruler to draw a rectangle that is twice the size of your original drawing. Use the pencil and ruler to draw a 1 inch grid within the rectangle. The finished grid should be exactly twice the size of the one on the squirrel drawing. Use a copy machine to copy this grid or make several copies, and set them aside. You'll use them later in estimating how much glass you'll need to produce a glass panel of the design.

- 4 Lay the page containing the squirrel drawing next to the page containing the larger grid. Starting in the lower right (or any corner), copy your drawing square by square onto the larger grid. Hint: Try to forget about the picture itself. Just be as accurate as you can copying whatever is in each 1/2 inch square to each 1 inch square in the larger grid.

Continue until the entire drawing is enlarged onto the larger grid.



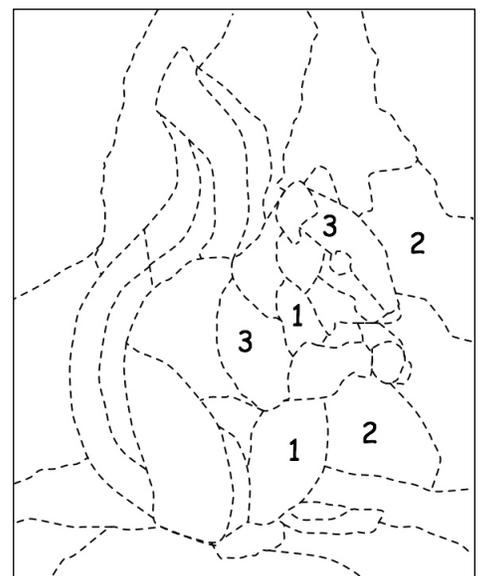
5 Now you want to make sure your new design has color. Use color pencils or crayons to color the 4" x 5" line drawing according to the colors of glass you'd like to use for a final panel. Next create a simple chart containing each color you used on the 4" x 5" line drawing. Number each shape in the larger drawing with the number corresponding to the color on your chart. It's like doing "paint by numbers."



GLASS COLOR CHART

- 1 = Light tan glass
- 2 = Medium green glass
- 3 = "
- 4 = "
- 5 = "
- 6 = "
- 7 = "
- 8 = "
- 9 = "
- 10 = "
- 11 = "

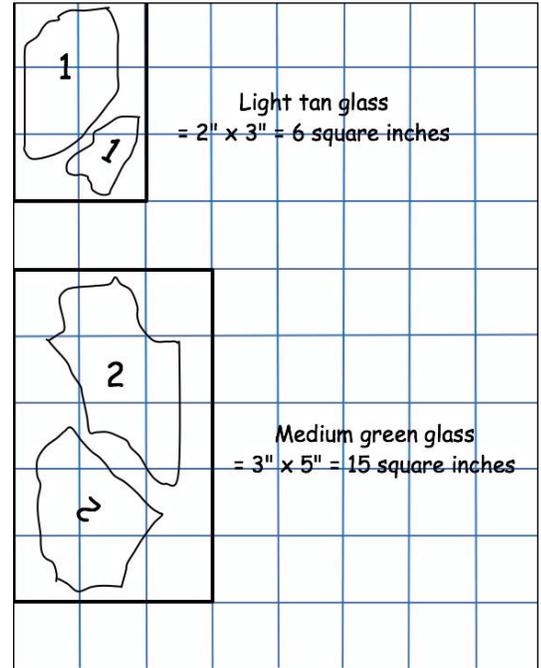
6 After each shape is numbered, use a pair of scissors to cut out each individual shape. Sort all of the shapes according to the number of their color.



7 Use the extra 1 inch square grids that you made in step three to estimate the amount of glass you'll need to make a stained glass panel. Glass is sold by the square inch, so you'll need to estimate the minimum amount you will need for each color in your design. Using a blank 1 inch grid as a reference, lay out all the elements of one color as closely as possible, trying to minimize the amount of waste. Once you have laid out one color, use the grid to calculate how many square inches of glass you will need for each color. Write the number of square inches of colored glass required on your color chart.

OPTIONAL

Art Activity: To simulate the final product, trace the patterns on colored construction paper. Cut them out and reassemble the squirrel according to the design. For an added effect, use puffy paint as the lead that holds the stained glass together in a real window.



GLASS COLOR CHART	
1 =	Light tan glass = 6 sq. inches
2 =	Medium green glass = 15 sq. inches
3 =	" "
4 =	" "
5 =	" "
6 =	" "
7 =	" "
8 =	" "
9 =	" "
10 =	" "
11 =	" "

