

# Passion for Pixels

## Send Digital Signals to a Friend!

Did you ever think about how a photo from a satellite in space gets to earth? Remote sensing satellites take pictures and gather data that is transmitted to the ground as digital signals, or sets of numbers. Then computer software converts the numbers into color images.

### You'll Need (per small group)

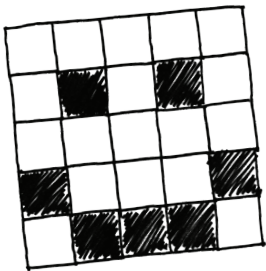
1 Hour

- pencils
- 2 pieces of grid paper
- optional: computer image to illustrate the concept of pixels

**1. Discuss digital images.** Explain that digital images are made up of hundreds of small squares called picture elements, or pixels. If you have a computer available, zoom in on an image to reveal the pixels. Each pixel in an image is represented by a number that identifies its color. In a digital signal, the pixel values are listed in order so that the computer knows where they are located in the image.



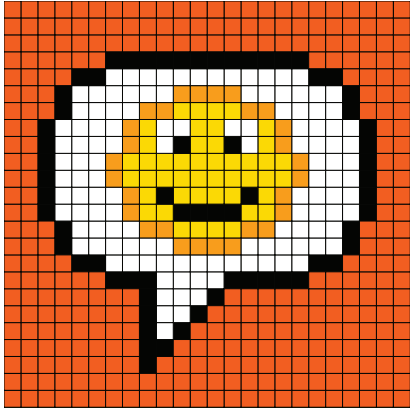
**POINTER:** The more pixels per inch the higher the resolution and the better the image quality. Printed materials usually require 300 dpi (dots per inch), while online images are 72 dpi.



**2. Deliver the challenge.** Divide your group into pairs<sup>5</sup> and hand out the supplies. Introduce the **SciGirls® Challenge**: “Transmit” an image digitally to your partner. Explain that they will create a black and white image on the grid paper, and then use a code of zeros and ones to transmit the image digitally, similar to the way satellites transfer images.

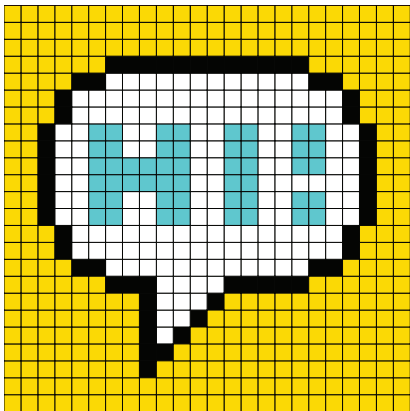
**3. Plan.** Ask each pair to select one person to be the sender and the other to be the receiver. (The roles will be reversed later.) Have pairs decide on the size of their grid<sup>2</sup> (e.g., 5 squares x 5 squares or 6 squares x 8 squares), then have each person draw an outline of the area on their paper. Next, have the sender draw a simple illustration on the grid by blacking out individual squares. (See the diagram on the left.) There should be no shaded or partially filled-in squares. And most important, the receiver should not see what the sender has drawn.

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**4. Transmit data.** Direct the sender to “send” their picture to the receiver by reading the picture, square by square, as a digital code: 0 for a white (unfilled) square, 1 for a black (filled) square. As the sender reads the code, the receiver colors in the squares on their own grid. Be sure to have the youth agree upon a convention for the order of transmission (e.g., left to right, top to bottom).

**5. Compare the images.** Then have youth switch roles and do the activity again.



**6. Analyze.** How accurate were their image transfers? How could they send more complex images, such as images with color? How could they speed up the process of transmitting information?<sup>2</sup>

