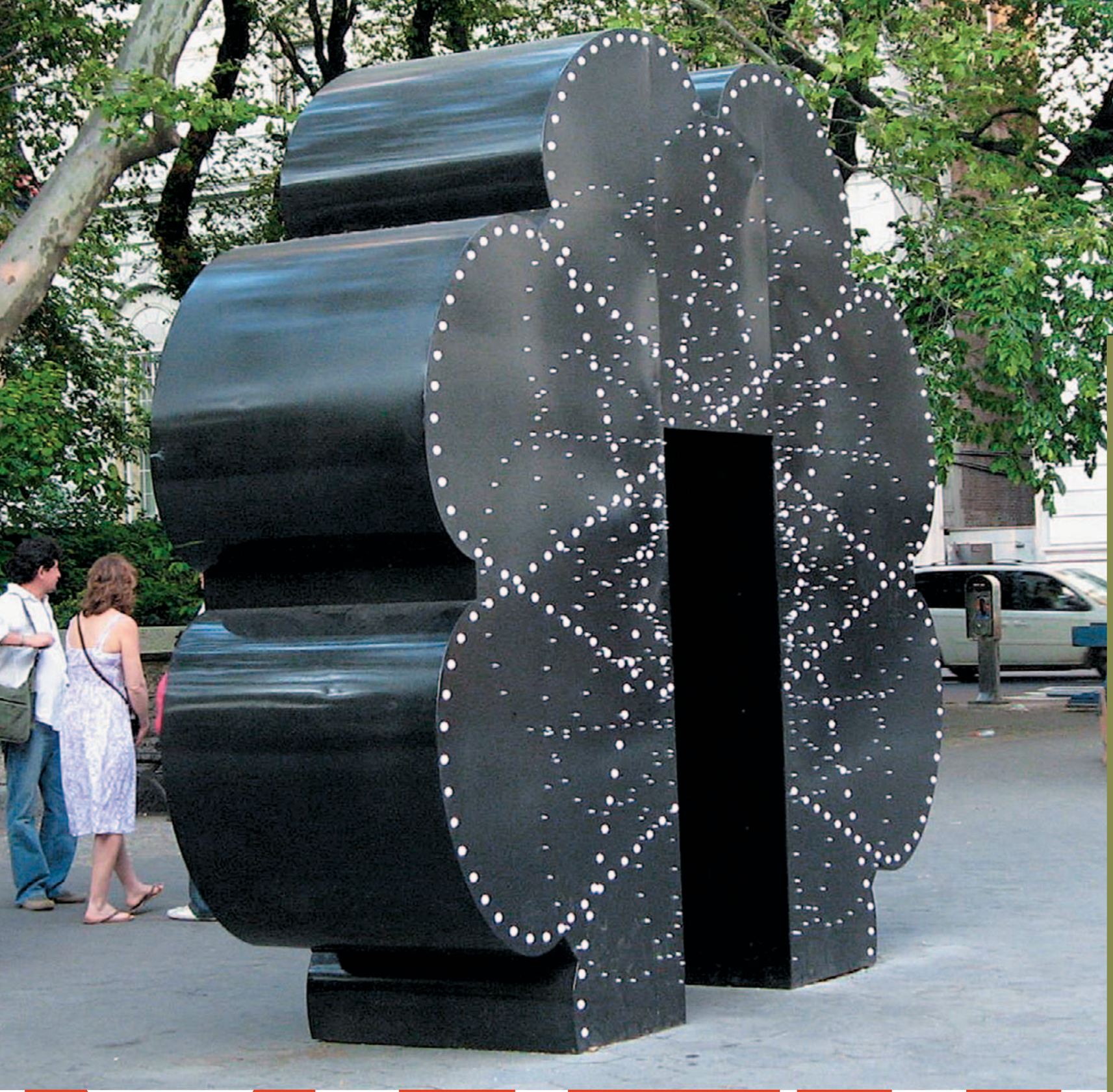


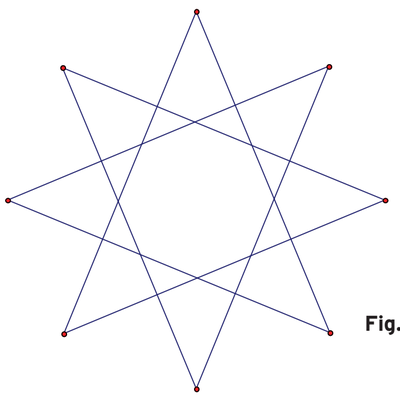


Fig. 1

STARRY NIGHT

At first glance, James Yamada's Our Starry Night, on view at the Doris C. Freedman Plaza in New York City from April to October 2008, is a black, 12-foot-tall sculpture with 1900 unlit colored LED lights on its two flat surfaces. As one passes through the sculpture's rectangular passageway, however, patterns of light appear. The explanation on the nearby Public Art Fund Project plaque read: "When visitors walk through the portal in the piece, they trigger a metal detector hidden inside the structure's casing. This activates the LED lights that perforate the exterior of the sculpture. Common everyday metal objects such as cell phones, keys, and belts will trigger the lights; the luminosity and the light patterns seen in the piece will correspond to the quantity of metal detected. Our Starry Night is literally activated by the public, reinforcing the notion that art—and particularly public art—is dependent on the people around it."

MATH meets ART

1 As someone passed through the sculpture, one of the patterns revealed was an 8-pointed star (Fig. 1, top right). Only seven points were visible, as the 8th point would be located where the passageway cuts through the sculpture (see the red star in the photo, right.) For the moment, **ASSUME** that the 8th point is visible and **SUPPOSE** that the artist decided to place 28 lights along each of the longest segments while placing only one light at each intersection of two segments. How many lights would he need?

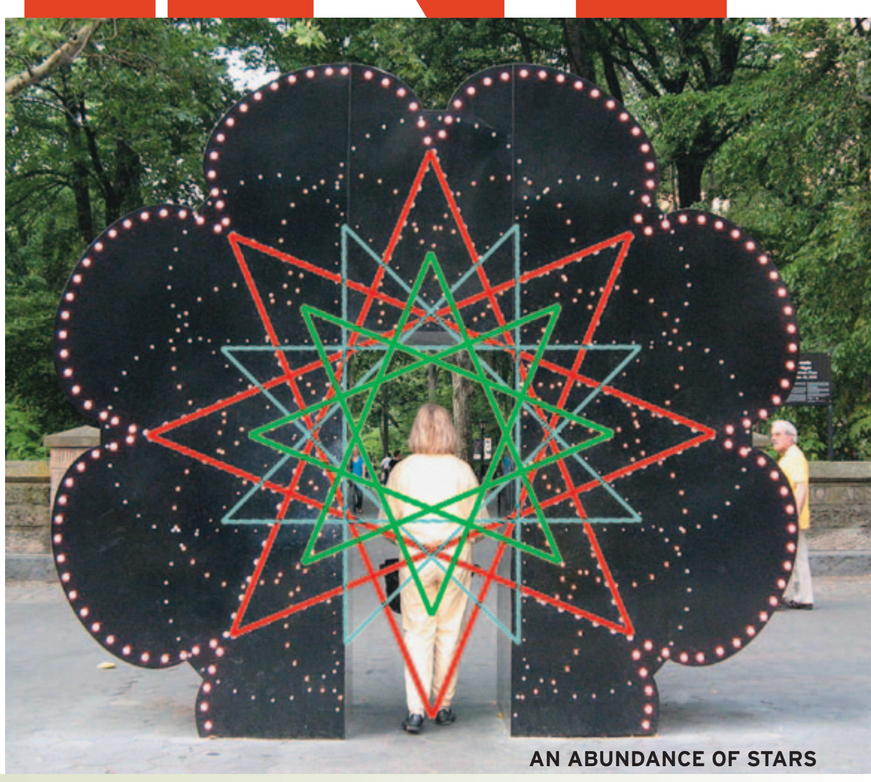
2 Consecutive vertices of the star are connected by arcs that appear to be elliptical. The two segments at each vertex are extended before the ellipse is formed. There are 17 lights along each of the elliptical paths that surround the sculpture and two additional lights along the extended segments. Each vertex is shared by two extended arcs. **HOW MANY** additional lights are needed for the exterior arcs that light up when the star lights up?

3 Depending on the amount of metal on the person walking through the passageway, two more stars with elliptical extensions in different colors might appear. Both are smaller than the original star (outlined in red in the photo, right). The larger of these two stars (outlined in light blue) has its vertices rotated by a 22.5° angle from the original, whereas the smaller one (outlined in green) does not.

(a) If the ratio of the dimensions of the three stars is 8:7:6, **HOW MANY** lights would each of the two smaller stars need?

(b) **HOW MANY** additional lights are needed for the other arcs?

4 One vertex of the largest star is not visible in the sculpture. **SUPPOSE** that the two lowest vertices are 20 in. above the ground and that the distance between them is 78 in. Would the missing vertex be above or below the ground if the sculpture were solid?



AN ABUNDANCE OF STARS

All photography by Ron Lancaster

M A T H I S A L L A R O U N D U S

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MATHEMATICAL lens
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