

# IGGY FINDS A HOME

**T**HE FOLLOWING “FOOD FOR THOUGHT FROM Jay’s Diner” problem appeared in the March–April 1998 issue of the journal:

Iggy needs a home. He is John’s pet iguana. Iggy is very active and needs plenty of room to roam. John has 60 feet of fencing that is flexible and will bend. With the available fencing, John wants to design an enclosure that will maximize Iggy’s living space. Can you help him?

Several teachers challenged their students with this problem. Arlene Cohen submitted several creative solutions from her seventh-grade class at Princeton Day School, Princeton, NJ 08540, one of which is shown in **figure 1**. Notice that Annie begins by drawing different shapes and finding the area of each shape. This strategy was a common approach to the problem, but Annie takes her guess-and-check method a step further when she reaches the insightful conclusion that as the number of sides increases, so does the area.

Barbara Haugen, Sacred Hearts School, Sun Prairie, WI 53590, submitted the work of Claire, her sixth-grade student (**fig. 2**). Claire provides a thorough explanation of her thinking in determining the radius of the circle.

Mary Ellen Gillis’s students used their imaginations to design interesting homes for Iggy. Gillis teaches at Bird Middle School, East Walpole, MA 22032-1338. Brendan and Peter capitalized on their experiences with keeping pets in their backyards. As did the other students, they realized that a cir-

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*Edited by HOPE FLORENCE, Department of Mathematics, College of Charleston, Charleston, SC 29424. This department shares the thinking of middle school students as they explore and communicate mathematics. It highlights students’ work, including projects, investigations, or creative solutions to the problems in the monthly menu. Original student work will be included along with sufficient information about the activity so that readers can try the ideas with their students. Please send manuscripts to the editor.*

Annie  
 First I wanted to figure out whether the shape of the fencing would have few sides to it or little sides to it. The logical answer is the circle because it seems to be stretching the most room. ie: If you take a square no matter what, a circle seems to be larger but I wanted to be sure so I tested out a few shapes by plugging the value of 60 in.

Square: Side = 15,  $15^2 = a$ ,  $A = 225$ ,  $C = 60$

Tri-angle: Base = 10, Height = 17.3,  $10^2 + 17.3^2 = 20^2$ ,  $300 = b^2$ ,  $b = 17.3$ ,  $A = 173$

Circle: Radius = 9.5,  $A = 283.5$ ,  $2\pi R = C$ ,  $2\pi(9.5) = 60$ ,  $R = 9.5(2)$ ,  $\pi R^2 = A$ ,  $(\pi 9.5)^2 \approx 283.5$

Rectangle: Length = 18, Width = 12,  $A = 216$

The more equal the sides are for rectangles, the larger the Area. So the largest Area of the rectangles was a Square. ( $A=225$ ) I then tried a triangle but that was less than the Square. So I concluded that the more sides to a shape there is, the larger the surface area. The Circle has the most sides and an Area of  $\approx 283.5$  which was the highest.

Fig. 1 Annie illustrates her explanation.

Claire  
 To find the largest living space for Iggy I found the area of different shapes. The largest area I found was a circle. It was hard to find the area because you first need to know the radius, which we don't know. To find the radius I used guess and check. I tried to find the radius that would give me 60 as a circumference. I found that 9.5 was fairly close, it gave me a circumference of 59.66 ft. Later I realized that if I did the inverse of the formula for the circumference I would get a more exact answer of  $r = 9.554140127389$ . Using a guess and check method it would look like this:

$(C = d \times \pi)$   
 $d = \frac{C}{\pi}$

Circle 1: Radius = 9.5, Circumference = 59.66 ft, Area = 283.385 ft.<sup>2</sup>

Circle 2: Radius = 9.554140127389, Circumference = 60 ft, Area = 286.624128217 ft.<sup>2</sup> (Rounded Area = 286.6 ft.<sup>2</sup>)

Therefore, I think a circular shape would give Iggy the most room.

Fig. 2 Claire describes her strategy.

Brendan & Peter  
 Period 3  
 MATH  
 IGGY'S PLACE

We made Iggy's living area against the side of John's house. The wall of his house is 38.22 ft. long. The area of Iggy's new living space is 573.25 ft. squared. We found this by doubling the amount of fence that we had and found the area of that. Then we divided that by two, and that is the largest area that we could find with one wall.

John's House  
 Wall = 38.22 ft  
 Area = 573.25 ft squared  
 Wall = 38.22 ft  
 60 ft  
 Scale = 1cm = 5 ft

Fig. 3 Iggy currently shares a wall with John.

KERRI  
 IGGY'S HOME  
 The IGGY HOME  
 Area = 287 ft.<sup>2</sup>  
 radius = 9.554 ft.  
 diameter = 19.108 ft.  
 Area = 287 ft.<sup>2</sup>  
 1cm = 19.108 ft.  
 Iggie!  
 Kaitlin

Fig. 4 Kaitlin and Kerri draw Iggy's home to scale.

circle would enclose the greatest area for Iggy. However, they decided to incorporate other material, like the side of John's home. Using a wall of the house for one side, they designed a semicircular pen that enclosed twice as much area as the circle. Their innovative approach is explained and illustrated in figure 3. Figure 4 shows Kaitlin and Kerri's version of Iggy's home drawn to scale.

Other ideas to solve the problem included using string to form and test different enclosures (1 cm = 1 ft.) and using graph paper to draw shapes and compute the area by counting squares.

Congratulations to all students who successfully solved this problem and made Iggy's world a bigger and better place! (▲)