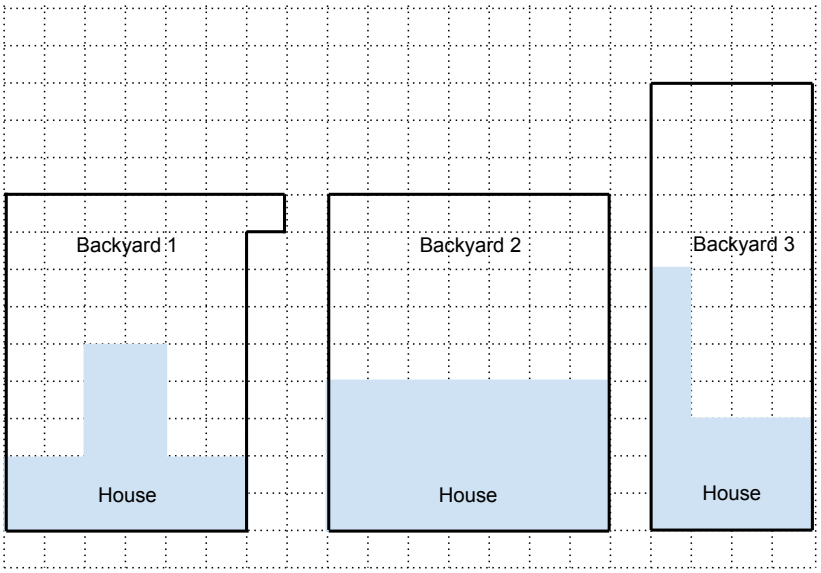
Problem of the Week
Problem A and Solution
House Hunt

Problem

The Ali family is looking for a new house with a large backyard. They are trying to decide between the 3 homes shown below.



Each square in the grid represents one square unit.

A) Which house has the backyard with the largest area? Explain your thinking.

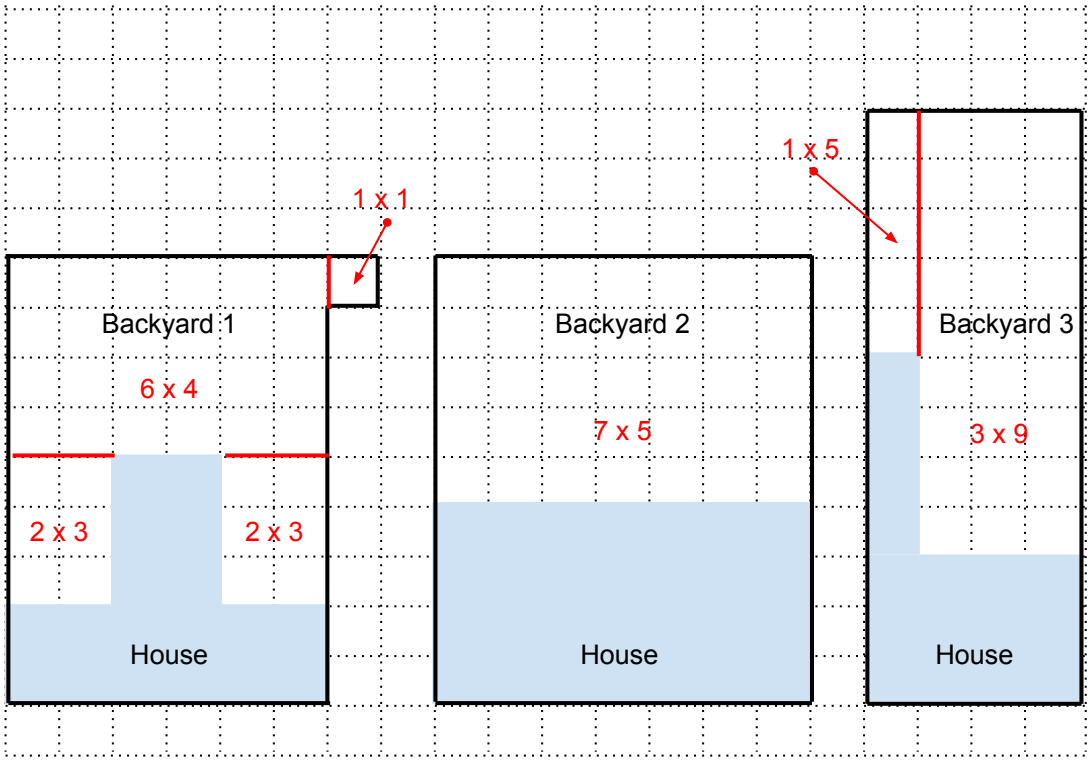
B) A *lot* is the property that contains the house and the backyard. The family wants to install an invisible fence around their property to keep their pets safe. They will need to know the perimeter of the lot that they buy. What is the perimeter of each lot?

Solution

A) There are many ways to solve this problem. One way to determine the area of each yard is to simply count the squares within each outlined backyard.

Some students may decide to break the yards up into smaller, more manageable rectangles, in order to count the units.

Students may also use the formula $l \times w$ to determine area for each of the smaller rectangular components in the backyards, adding the products of each section to determine the overall area.



You can calculate the areas for each of the backyards by looking at the areas of rectangles that make up each yard.

Area of backyard 1:
$(6 \times 4) + (2 \times 3) + (2 \times 3) + (1 \times 1) = 24 + 6 + 6 + 1 = 37$ units^2.
Area of backyard 2: $7 \times 5 = 35$ units^2.
Area of backyard 3: $(1 \times 5) + (3 \times 9) = 5 + 27 = 32$ units^2.

So the first house has the backyard with the biggest area.

B) Looking at the diagrams, you can calculate the perimeters:

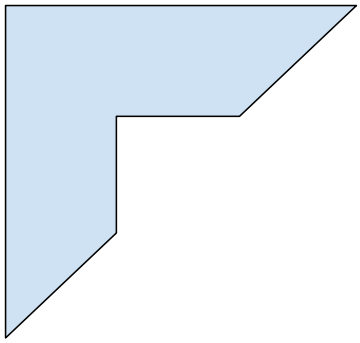
Perimeter of lot 1: $6 + 9 + 7 + 1 + 1 + 8 = 32$ units.
Perimeter of lot 2: $7 + 9 + 7 + 9 = 32$ units.
Perimeter of lot 3: $4 + 12 + 4 + 12 = 32$ units.

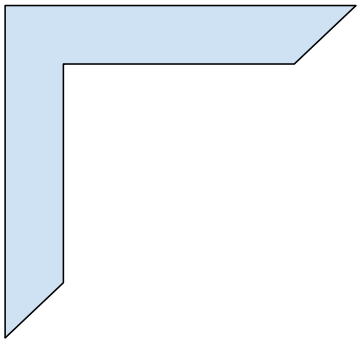
Teacher's Notes

This question asks about area and perimeter. There is no general relationship between the area of a shape and its perimeter.

In some cases, like regular polygons or circles, the area of the shape has a direct relationship with its perimeter. For example, if you double the perimeter of a square this will increase the area by four times. Similarly, if you increase the circumference of a circle by three times, the area will increase by nine times.

It is possible to draw a shape that has the property that: as the perimeter increases, the area decreases. An example of this would be a shape that includes a concave angle. Consider these two images:





They are the same shape, but the image on the left has a larger area than the image on the right, and the image on the right has a larger perimeter than the image on the left.