Scaled Art

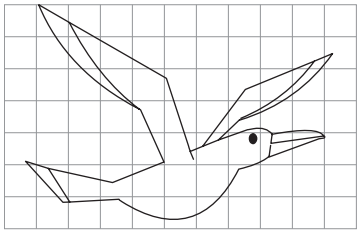
Your Challenge

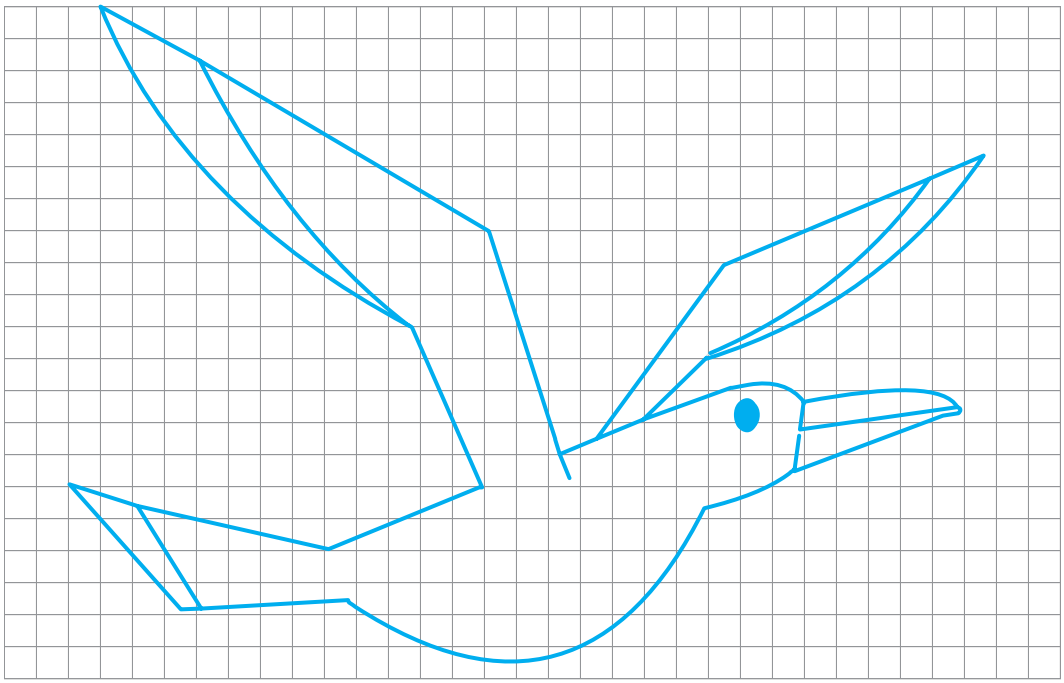
➤ **You are painting a mural for a food vendor at the beach. As part of the mural, you need to enlarge the drawing of the bird below using a scale factor of 3.**

Consider the following as you begin your drawing:

- height and width of scaled drawing
- points on the original drawing that fall on or near grid line intersections
- where to place the drawing so the entire figure will fit on the grid once scaled up
- strategies to achieve a drawing that is scaled by a factor of 3

➤ **Draw the scaled picture on the grid below.**





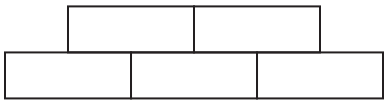
Name:

Building Bricks

Your Challenge

➤ **You are in charge of choosing and buying bricks to cover the front surface of a retainer wall for a flower bed. Describe your choices for each situation below.**

Note: For stability, bricks are usually stacked so that a brick in one row is centered over where two bricks join in the row below it, like this:



Building a wall with this method may require cutting bricks in half for the ends of rows.

1. The wall must be 2 feet high and 14 feet 8 inches long. Three sizes of bricks, all 4 inches deep, have been chosen. Each size brick has a different associated cost. Assume the bricks pack tightly and do not require mortar. Which brick type would you choose? Explain.

Brick Type	Height (in.)	Length (in.)	Cost
Roman	2	12	$0.40 each
Jumbo	3	8	5 bricks for $2.00
Economy	4	8	5 bricks for $3.00

Possible answer: The unit rate or cost for each brick is

Roman: $0.40, Jumbo: $0.40, and Economy: $0.60.

To build the wall with each type of brick, I found how many bricks of each type I would need for the height and length, then multiplied to find the total number of bricks. Then I multiplied by each unit cost to find the total cost. The wall must be 24 inches high and 176 inches long.

Roman: 12 bricks high by $14\frac{2}{3}$ bricks long = 176 bricks; 176 × $0.40 = $70.40

Jumbo: 8 bricks high by 22 bricks long = 176 bricks; 176 × $0.40 = $70.40

Economy: 6 bricks high by 22 bricks long = 132 bricks; 132 × $0.60 = $79.20

The Jumbo and Roman bricks are the same cost. I can't make a full row out of the Roman bricks, so every row would need to have at least one brick cut on the end of each row. For the Jumbo bricks, I only have to cut bricks for the ends of every other row. I would choose the Jumbo bricks.

Name:

Building Bricks

2 Will your choice change if the wall dimensions must instead be 6 feet 4 inches high and 12 feet long? Explain.

Possible answer: Yes. In this wall, the cost for the Roman and Jumbo bricks are again the same, but this time the Jumbo bricks won't fit evenly into the height. I would choose the Roman bricks for this wall.

The Crop Is Always Greener...

Your Challenge

➤ **You are working for a large farm that grows wheat. You must calculate the percent of pure live seed in three different wheat seed products to determine the best buy.**

Here is some information you will need:

- When seed is packaged, only a percent of the package is wheat seed. The rest is something else such as chaff, other seeds, or soil. The percent of content that is wheat seed is called the *purity*. For example, if the purity of a wheat seed package is 80%, that means 80% of the content is wheat seed.
- Not every seed that is planted will germinate (develop into a seedling). *Percent germination* is an estimate of the percent of seeds that will develop. It is calculated by testing a sample and dividing the number of seeds that germinate by the total number of seeds tested.
- Pure live seed (PLS) is the estimated percent of seed that will germinate. PLS is calculated by multiplying the percent of pure seed (purity) in a container (written as a decimal) by the percent germination (written as a decimal).
- Seed packages have labels showing both purity and percent germination.
- To determine the amount of content needed to provide 1 pound of viable seed, divide 1 by the PLS (written as a decimal).
- To determine the cost of 1 pound of viable seed (seed that will germinate), divide the cost per pound by the PLS (written as a decimal).

➤ **On the Recording Sheet, find the cost of 1 pound of viable seed for each of the three seed options. Then find the amount of seed needed to provide 1 pound of viable seed. Explain which seed is the best value.**

Seed A	Seed B	Seed C
• Purity: 95% • Germination: 87% • Price: $2.10 per pound	• Purity: 80% • Germination: 85% • Price: $1.95 per pound	• Purity: 72% • Germination: 65% • Price: $1.75 per pound

Name:

The Crop Is Always Greener...

RECORDING SHEET

Possible work:

Seed A:

PLS $= 0.95 \times 0.87 = 0.8265 = 82.65\%$

For 1 pound of viable seed, you must purchase $\frac{1}{0.8265} \approx 1.21$ pounds of seed.

Cost per pound of viable seed: $\frac{\$2.10}{0.8265} \approx \$2.54$

Seed B:

PLS $= 0.80 \times 0.85 = 0.68 = 68\%$

For 1 pound of viable seed, you must purchase $\frac{1}{0.68} \approx 1.47$ pounds of seed.

Cost per pound of viable seed: $\frac{\$1.95}{0.68} \approx \$2.87$

Seed C:

PLS $= 0.72 \times 0.65 = 0.468 = 46.8\%$

For 1 pound of viable seed, you must purchase $\frac{1}{0.468} \approx 2.14$ pounds of seed.

Cost per pound of viable seed: $\frac{\$1.75}{0.468} \approx \$3.74$

I would recommend to farmers that they purchase Seed A. Although it is the most expensive per pound of content, it has the highest pure live seed percent and costs less per pound of viable seed than the other products. Farmers will need to purchase less seed to have the same crop than if they buy Seeds B or C. For Seed A, the cost of viable seed is \$2.54 per pound, which is lower than Seed B (\$2.87 per pound) and Seed C (\$3.74 per pound).