Problem of the Week
Problem A and Solution
Storage Containers

Problem
Jillian has two plastic containers that are the same height. The dimensions of these containers are shown below:

She always seals her containers with a lid when she stores things.

A) If Jillian filled each container with water, which container would hold more water? Justify your answer.

B) Jillian has many wooden blocks that are cubes with side lengths of 4 cm. Which container would hold more blocks if the blocks had to lie flat in the container? Justify your answer.

Solution

A) Since the containers are the same height, the capacity of each will depend on the area of each base. By either using the formula \( \text{area} = \text{length} \times \text{width} \), or by drawing the bases on grid paper, we see that:

Area of the base of Container X = \( 25 \times 18 = 450 \) cm\(^2\).
Area of the base of Container Y = \( 20 \times 20 = 400 \) cm\(^2\).

Since the area of the base of Container X is greater than the area of the base of Container Y, that tells us Container X would hold more water.
B) To maximize the number of blocks in each container, Jillian can stack layers of blocks, where each layer is a rectangle made of blocks lying flat. The diagram below shows the largest rectangle of blocks that will fit in each container.

When we count the blocks, we see that $6 \times 4 = 24$ blocks can fit in one layer in Container X, while $5 \times 5 = 25$ blocks can fit in one layer in Container Y. Therefore Container Y can store more of these blocks than Container X.