

Name: MB 617

Math Practices and Problem Solving
Lesson 10-6
Use Appropriate Tools

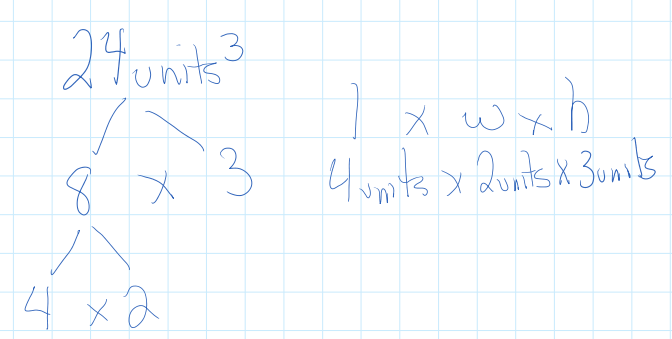
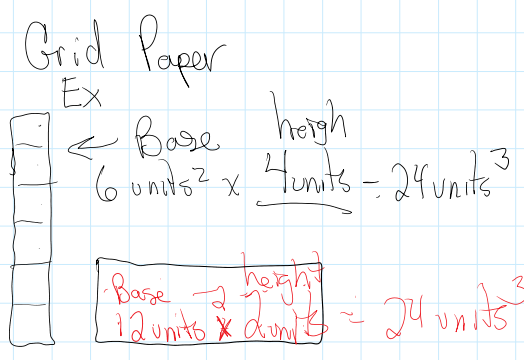
Solve & Share
 A space station is being built from 24 cubic modules. The space station can be any shape but the modules must be placed together so that entire faces match up with each other. Choose a tool to create two different plans for the space station. Explain why you chose the tool you selected.

Tools
 Cubes: 24 cubes to model the space station
 Grid Paper - Model the area of the base
 Factor Tree - To figure out possible dimensions

Thinking Habits
 Be a good thinker! These questions can help you.
 Which tools can I use?
 • Why should I use this tool to help me solve the problem?
 • Is there a different tool I could use?
 • Am I using the tool appropriately?

Look Back! **MP.5 Use Appropriate Tools** How did you decide which tool to use?
 Grid paper to find area and then used division to find the height.
 Or a factor tree to find 3 possible dimensions.

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Essential Question
 How Can You Use Appropriate Tools to Solve Volume Problems?

Jeremiah needs to build a display of boxes that is 4 feet tall. The boxes he uses are cubes that measure 1 foot on each edge. His display needs to look like a pyramid, with just one box in the top layer.

Top Layer **Top 2 Layers**

What do I need to do?
 I need to choose an appropriate tool to solve this problem.

How can I use appropriate tools strategically to help me solve this problem?

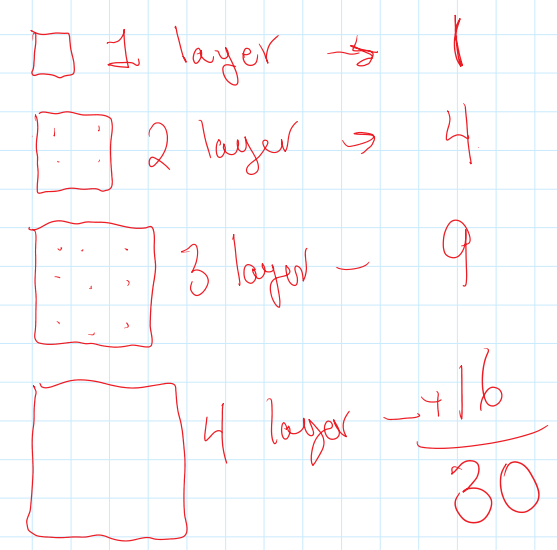
I can

- decide which tool is appropriate.
- use cubes to solve this problem.
- use the tool correctly.

Here's my thinking...
 I could use grid paper, but I will use cubes because building a display will make it easier to count the cubes. Each cube represents 1 box in the display. My display will have 4 layers because it needs to be 4 feet tall, and each box is 1 foot high. The display has $1 + 4 + 9 + 16 = 30$ cubes. So, Jeremiah needs 30 boxes in all to make his display.

Convince Me! **MP.5 Use Appropriate Tools** What tools other than cubes could you use to solve this problem? Explain.
 Grid paper to draw each layer.
 Geometry Computer apps
 Any stackable objects

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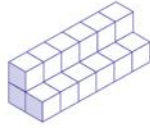


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Guided Practice

MP.5 Use Appropriate Tools

A paint store manager is going to build a display with same-sized cubes. The display will look like a staircase with 5 steps. Each step in the display will be 6 cubes long. The store manager needs to know the total number of cubes he will need to build the display.



1. What tool might the manager use to be sure that there is enough space for the display? Explain.

He could use a measuring tape to see if he has enough floor space.

2. The store manager will build the staircase display with 1-foot plastic cubes. What is the volume of the display? Explain how you used tools to decide.

$(1 \times 6) + (2 \times 6) + (3 \times 6) + (4 \times 6) + (5 \times 6) = 90$ cubes.
Each row was drawn on grid paper and added together.

Handwritten calculations for the staircase display:

- 1 row - 26
- 2 row - 12
- 3 row - 18
- 4th row - 24
- 5th row - 30

90

Independent Practice

MP.5 Use Appropriate Tools

Cindy plans to make a jewelry box shaped like a rectangular prism. She wants it to have a volume of 96 cubic inches.

Think about a tool you can use to help represent and solve the problem.

3. How can you find possible dimensions of the box?

I could use a factor tree with 96.
I could use 96 cubes to make a prism.

4. What could the dimensions of that jewelry box be?

$4 \times 8 \times 3$ $12 \times 3 \times 1$ $96 \times 1 \times 1$ $24 \times 2 \times 2$
 $2 \times 6 \times 8$ $4 \times 2 \times 12$ $6 \times 4 \times 4$

5. Can Cindy build the box so that it is twice as wide as it is tall?

Yes. She can build a model that is two cubes wide for every one cube tall.

6. Cindy has some ribbon to decorate the jewelry box. What tool might help her decide how much of the jewelry box she can decorate?

a ruler/tape measure to measure the length and width of ribbon and compare it to the jewelry box.

*For another example, see Set D on page 626.

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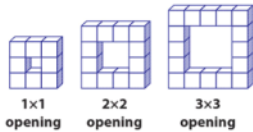
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Math Practices and Problem Solving

Common Core Performance Assessment

Flower Planters

An architect is designing flower planters for a park. Each planter consists of a border of 1-foot concrete cubes surrounding a square opening. Each concrete cube weighs 120 pounds. The diagram below shows the top view of some of the planters.



Remember to think about which tools make sense for these problems.

7. **MP.7 Use Structure** What is the total volume of a planter that has a 6×6 opening?

8. **MP.7 Use Structure** What is the total volume of a planter that has an 8×8 opening?

9. **MP.5 Use Appropriate Tools** What will be the total volume of a planter that has a 12×12 opening? Can you determine this by just using paper and pencil? Explain.

10. **MP.4 Model with Math** Each concrete cube used to make the planters costs \$3.00. What is the total cost of the cubes needed for two planters with 6×6 openings, two with 8×8 openings, and two with 12×12 openings? Write an expression that represents the total cost.

Handwritten diagram showing a factor tree for 96:

- 96
- 12 x 8
- 3 x 4 x 8

Below the diagram, it says: $l \times w \times h$

needed for two planters with 6×6 openings, two with 8×8 openings, and two with 12×12 openings? Write an expression that represents the total cost.