

Civil Air Patrol's ACE Program

**Load the Shuttle
Grade 1 Academic Lesson #8**



Topics: shapes, arrangements (math)

Lesson Reference: NASA ["Load the Shuttle"](#)

The "Load the Shuttle" worksheets located in this lesson plan were modified from the original NASA pages. The payload bay and the shapes for the "Load the Shuttle" activity in this lesson plan were made larger in order to be more age-appropriate in terms of critical thinking and fine motor skills for first-grade students.

Length of Lesson: 45 minutes

Objectives:

- Students will use trial and error and critical thinking skills to arrange items within a given space.
- Students will define the terms cargo and payload.
- Students will understand the basic function/purpose of a space shuttle, particularly the payload bay.

Next Generation Science Standards:

- Science investigations begin with a question. (1-PS4-1)

CCSS Math:

- 1.G.2 - Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.

Background Information:

The shuttle, which was on the drawing board even before humans first landed on the moon in 1969, was envisioned as a way to deliver humans and cargo to and from a space station. First launched in April 1981, the space shuttle was the only spacecraft capable of delivering and returning large payloads and scientific experiments to and from space. Shuttle flights



supported the International Space Station; deployed and visited the Hubble Space Telescope; and deployed planetary spacecraft to study Jupiter, Venus, and the sun. In the orbiters' onboard laboratories, hundreds of experiments have helped scientists study the effects of microgravity on materials, plants, animals, and human beings to benefit life on Earth.

The Space Transport System (STS), commonly called the Space Shuttle, had a special space plane, called the orbiter. A total of six orbiters were built: Enterprise, Columbia, Challenger, Discovery, Atlantis, and Endeavour. All but the test orbiter, Enterprise, flew into space. After numerous successful missions, two orbiters in the fleet experienced fatal accidents which resulted in the loss of entire shuttle crews, as well as the orbiters: Challenger (years of operation: 1982-1986) and Columbia (years of operation: 1981-2003). Thousands of advances in technology and design were incorporated into the shuttle following its first launch. The shuttle fleet retired in 2011.

Fortunately, Disney's Buzz Lightyear, from the *Toy Story* movies, was able to fly aboard the shuttle prior to its retirement. Buzz, the 12" action figure, launched on May 29, 2008, aboard Discovery's STS-124 mission. After spending 15 months on the International Space Station (ISS), he returned to Earth on September 11, 2009, aboard space shuttle Discovery's STS-128 mission.

Materials:

- "Load the Shuttle" copies (one shuttle and selected shape skill level copy per student, or pair of students if working with a partner)
- scissors
- crayons
- glue stick
- two sheets of construction paper that are different colors
- tape
- computer with Internet and projection system (optional)

NOTE: Review the first enrichment/extension activity in the event you wish to conduct a sorting activity before presenting this lesson. (Students could save their shapes in a sealable plastic sandwich or snack bag to use again for this activity.)

Lesson Presentation:

1. Prior to the beginning of the lesson, place a whole sheet of construction paper on the board/wall. Cut the other sheet of construction paper into about 4-6 geometric shapes of your choice so that when correctly assembled, they form the original shape of the construction paper (like making a puzzle). Place a piece of tape on the back of each of the shapes you made. Place them individually near the whole sheet of construction paper on the board/wall.

2. Ask students if they have ever watched their parents/grandparents pack for a trip. Ask students to explain how someone packs correctly to go on a trip. What things must a person do?(e.g., know where you are going, know how long it takes to get there, know what the weather will be like, gather correct supplies, make sure items will fit in the suitcase or the vehicle)
3. Tell students that they will focus today on packing. One important part of packing is fitting items into a particular space. Using the construction paper and geometric pieces of the construction paper on the board/wall, ask for a volunteer to come forward to correctly fit the pieces of construction paper onto the whole sheet of construction paper. No pieces can overlap. Help students understand that by turning and placing the pieces carefully on the paper, all of the pieces will fit. Emphasize that the pieces do not overlap. Explain that it is okay to try different arrangements of the shapes until the best packing arrangement has been achieved. One way we learn is by trying different ideas and trial and error.
4. Tell students that they will get to practice packing today, but they won't be packing a suitcase or a car. They will be helping Buzz Lightyear, from the *Toy Story* movies, pack the "trunk" of the space shuttle! Ask students if they have heard of the space shuttle. Allow volunteers to verbally share information about the shuttle or draw a picture of the space shuttle on the board. (You could also reflect back on lesson 7 and have them use the SLS instead.)
5. Share background information about the space shuttle (or STS, the Space Transport System), found at ["The Space Shuttle"](#) and if, there is time, show the video, ["Buzz Lightyear's Space Station Mission Logs."](#)
6. Explain that the payload bay, located in the orbiter of the space shuttle is similar to the trunk of a car. It was used to hold items, usually very large items, for a space shuttle trip. The words cargo and payload refer to materials or goods. What kind of cargo was transported in the payload bay of the space shuttle? It has carried satellites, pieces of the International Space Station, science equipment for experiments, and even the Hubble Space Telescope! The payload bay was so large that a school bus could fit inside of it! Video ["Space Shuttle Payload Bay Timelapse"](#)
7. Distribute one Load the Shuttle sheet and accompanying items/shapes page to each student.
8. Provide the following directions:
 - o Instruct students to color each item/shape. (You may wish to refer to the items as cargo items, or you may wish to present the shapes simply as items from Buzz's house that he wants to take with him on his space trip.)
 - o Remind students not to glue the items in place until they have tried to fit as many items/shapes in the payload bay as possible.
 - o Have the students cut out each of the items/shapes and try to arrange as many as possible in the payload bay of the orbiter. (The payload bay area is labeled on the

worksheet and includes all of the space in the “dotted” pattern area.) Emphasize and demonstrate that the items they are packing into the payload bay cannot overlap!

- o Once students have packed the orbiter to the best of their ability, they should glue the items/shapes in place.

9. Allow students to see each other’s work and discuss the results. How many items (or pieces of payload/cargo) did each student fit into the payload bay?

Summarization:

Remind students that packing and arranging items in a given space is a skill that they will use in their lives. Ask students to think of things they have to pack or organize. (e.g., their backpacks, desks, papers in a folder, items to be packed in a suitcase, items to be packed in a lunch box, toys on a shelf, etc.)

Ask students if they had any “light bulb” moments with this activity. Possible realizations include: More items that are small in size fit into a defined space than items that are large in size. When placing items around a circular item, there is sure to be unfilled space. Trying different ways of packing can help you find ways to fit more items in a space than your first idea or attempt.

Character Connection: Explain that since we are all different, we probably have different ideas as to how things should be packed or arranged. Some of our ideas work better than others. We should be willing to compliment good work and learn from others. Additionally, it is nice to work together to accomplish a task. More than one idea can be shared, and that may help the task to be accomplished faster and better than working alone.

Assessment:

- teacher assessment of class discussion questions
- completed “Load the Shuttle” page (Student arrangements will vary.)

Below is an example of a grading method for level 1 items/shapes:

- o all items/shapes colored = 5 points
- o items/shapes placed in cargo bay = 10 points
- o items not overlapping = 10 points (subtract 2 pts for each overlapped item)
- o 5 items placed correctly in cargo bay = 75 points (15 points for each item)
- o 6 items placed correctly in cargo bay = 5 bonus points

Additional activity ideas to enrich and extend the primary lesson (optional):

- Use the shapes for a classification/sorting activity. Have students color and cut each shape (from as many levels as desired). Then, have students classify their items/shapes in a meaningful way. Shapes may be arranged by shape, number of sides, size, or color. Students may create a graph depicting the results.
- Display a learning center that allows students to practice packing using 3-dimensional objects. For example, a shoe box, cardboard box, or an actual suitcase could be used as a container. Items

for packing may include canned goods, small boxes of food (e.g., gelatin), small empty gift boxes, shape blocks, toys, books, etc.

- Allow pairs of students or students and parents to work together to complete NASA's original "Load the Shuttle" worksheet that displays a much smaller payload bay area and smaller shapes. The original activity pages are located at [NASA Load the Shuttle](#).
- Write a class story about the *Toy Story* characters using the Space Transport System to go into deep space on a space mission.

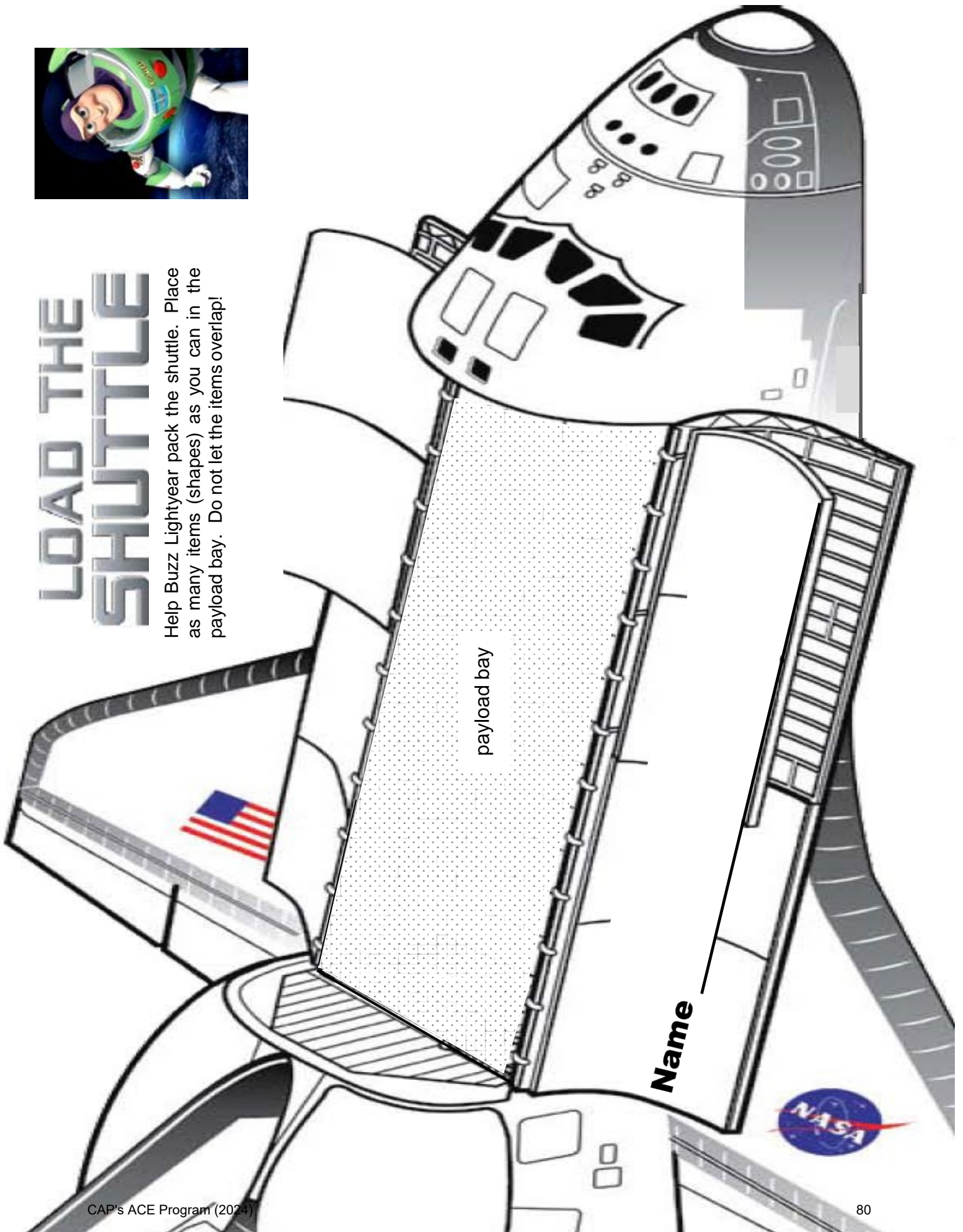
Associated Websites:

- Learn more about the space shuttle:
[NASA Space Shuttle](#)
[NASA "The Space Shuttle"](#)
- Learn more about [Buzz Lightyear's Space Station Mission Logs](#).



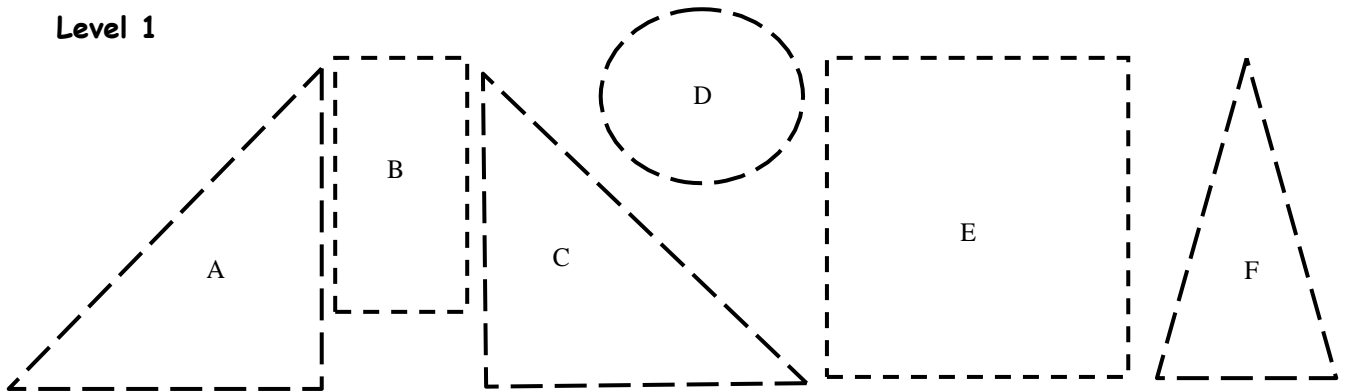
LOAD THE SHUTTLE

Help Buzz Lightyear pack the shuttle. Place as many items (shapes) as you can in the payload bay. Do not let the items overlap!

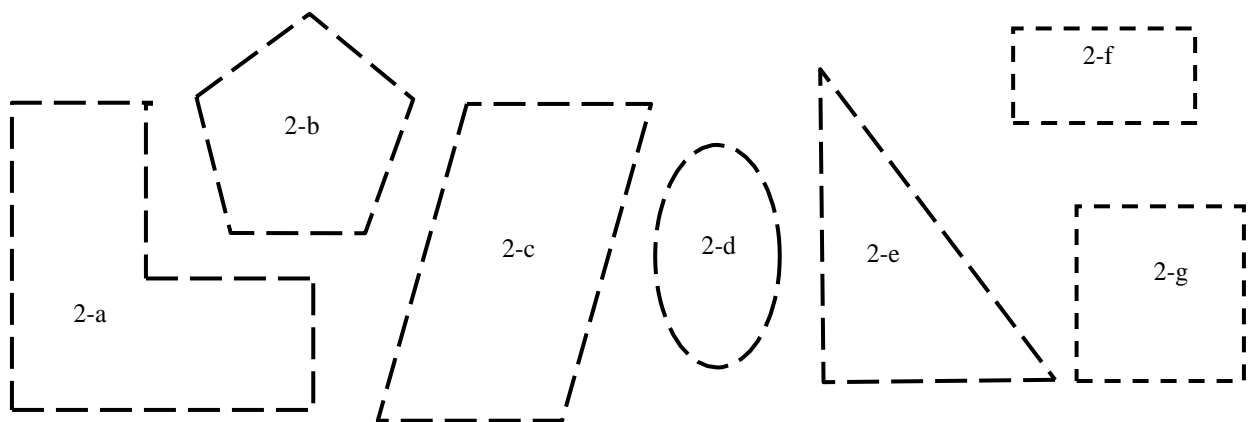


Teachers: The items/shapes have been labeled with a letter and/or number for ease of reference. For example, in "Level 1," there is only one "triangle A." The labels have no significance regarding the placement of the items/shapes into the payload bay.

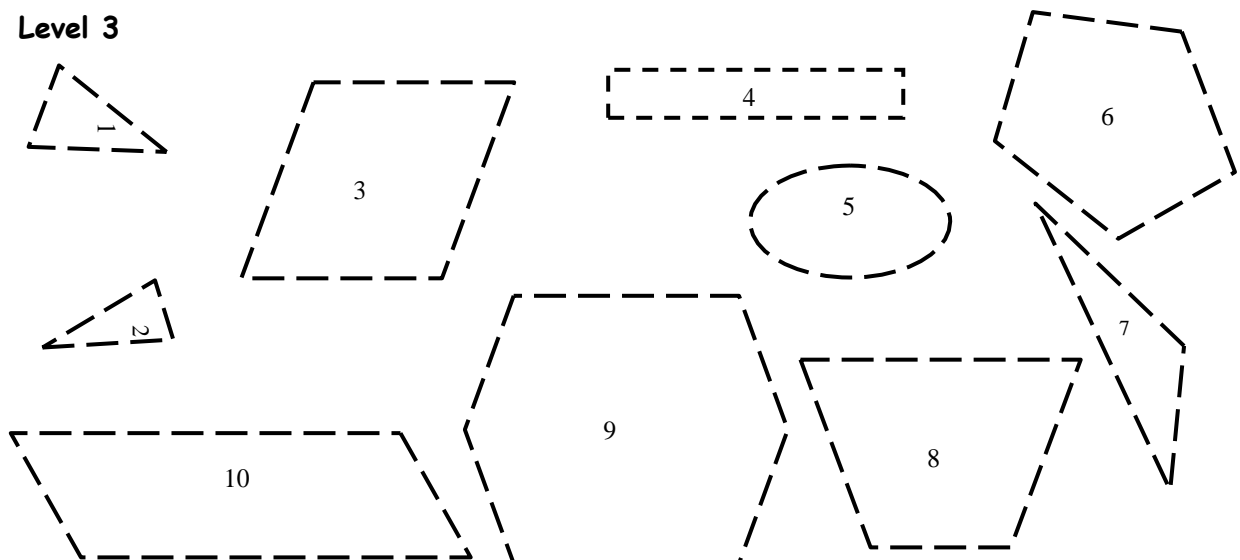
Level 1



Level 2

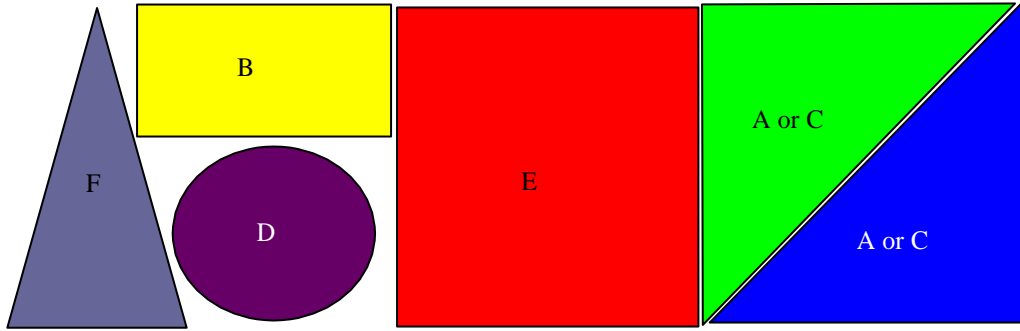


Level 3

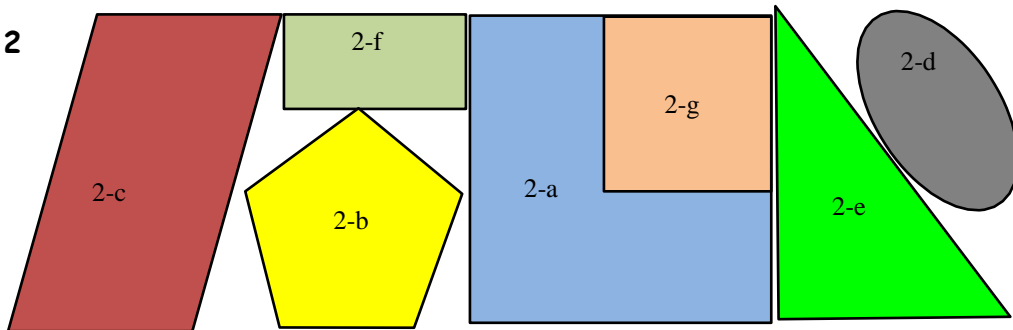


POSSIBLE arrangements of items/shapes into payload bay: (Results will vary.)

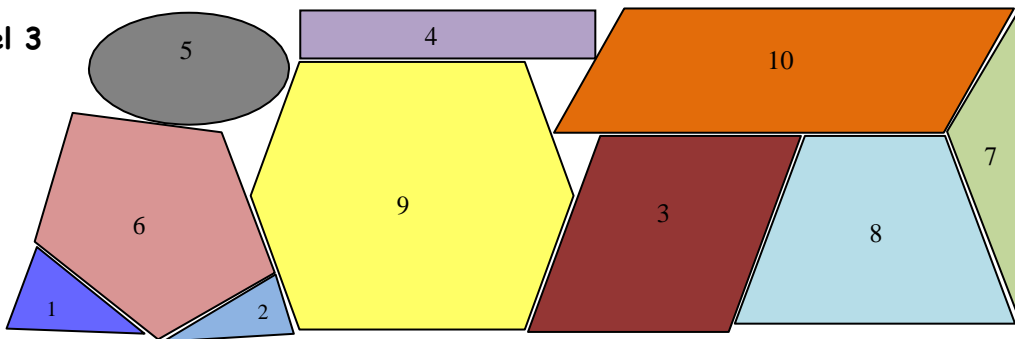
Level 1



Level 2



Level 3



Buzz and Shuttle Photos: Obtained on NASA Websites