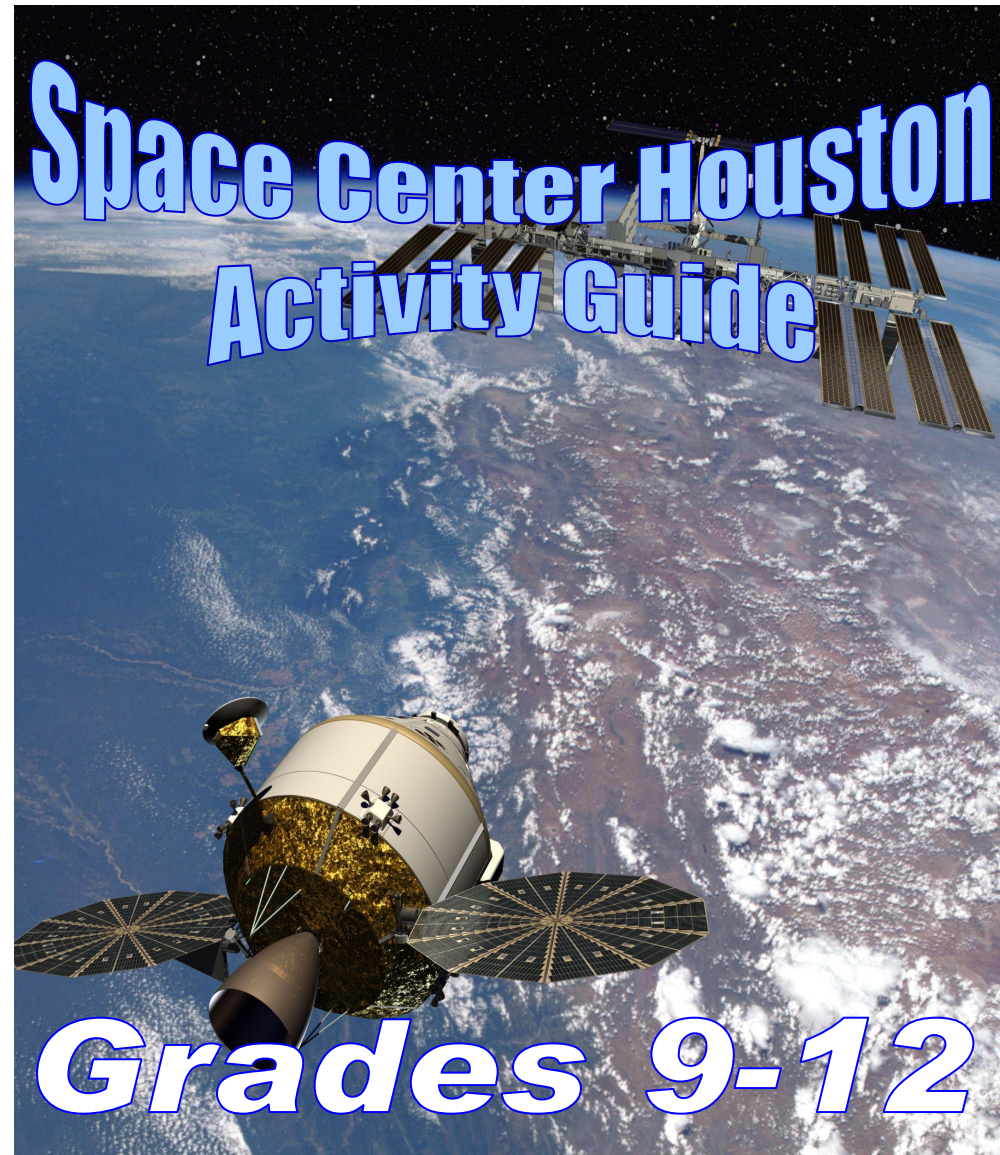


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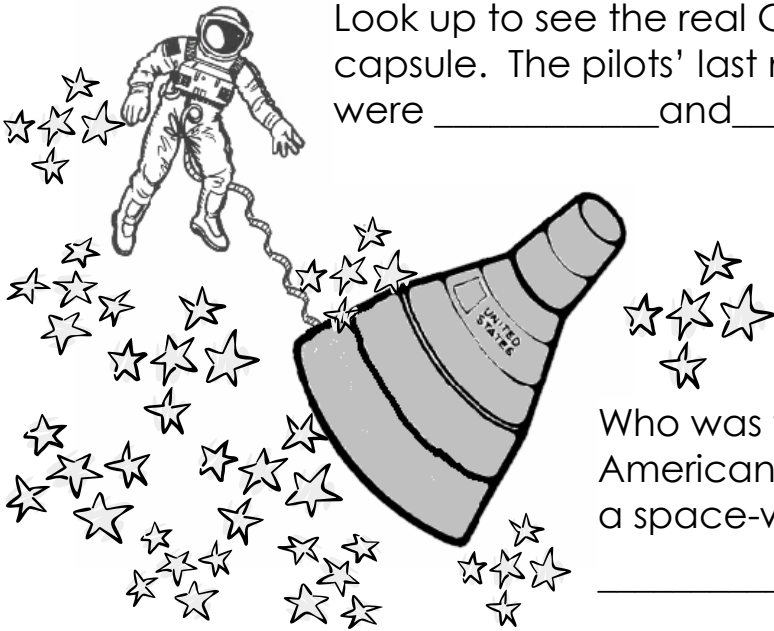
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# Starship Gallery

In the beginning, there were only seven astronauts-- the Mercury 7. The first capsule you see is called Faith 7. It was used on the last Mercury flight. The pilot's name was \_\_\_\_\_ and he made \_\_\_\_\_ orbits around the earth all alone.

Look up to see the real Gemini 5 capsule. The pilots' last names were \_\_\_\_\_ and \_\_\_\_\_.



Who was the first American to perform a space-walk?  
\_\_\_\_\_

What is the name of the rocket that took the Apollo astronauts to the Moon? \_\_\_\_\_

How many men have walked on the Moon? \_\_\_\_

What was the last Apollo mission? \_\_\_\_\_



# Reduced Gravity Flight

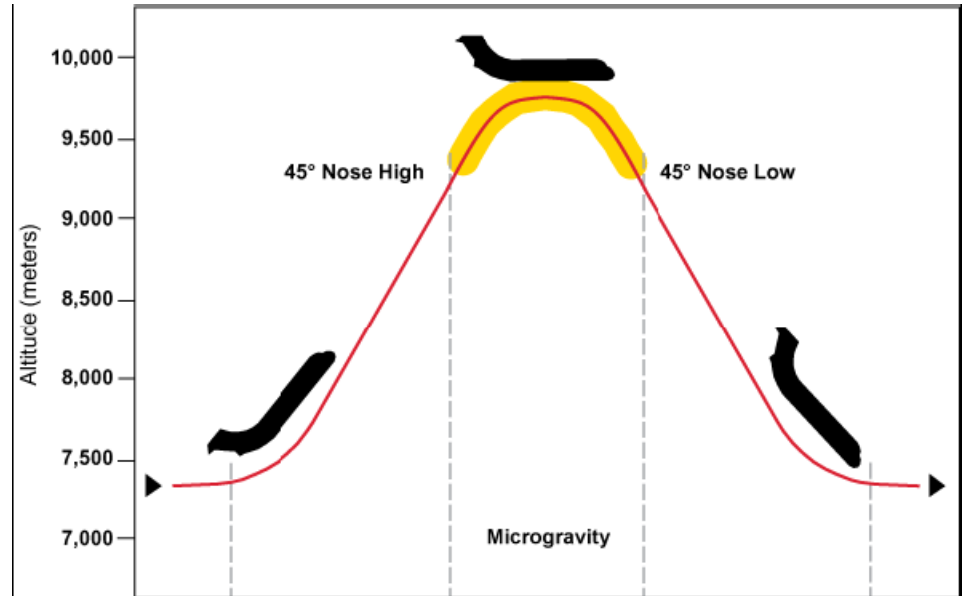


Figure A

2. Calculate the length of time the astronaut experienced microgravity during one parabolic maneuver. Substitute 9,144 into the quadratic equation and use the quadratic formula to solve for  $t$ .

$$y = -4.9t^2 + 87.21t + 9144$$



# Weightless Wonder

The C-9 jet is one of the tools utilized by NASA to simulate the gravity, or reduced gravity, astronauts feel once they leave Earth. The C-9 jet flies a special parabolic pattern that creates several brief periods of reduced gravity. A typical NASA C-9 flight goes out over the Gulf of Mexico, lasts about two hours, and completes between 40 and 60 parabolas. These reduced gravity flights are performed so astronauts, as well as researchers and their experiments, can experience the gravitational forces of the Moon and Mars and the microgravity of space.

Figure A shows the movement of the plane during a typical flight. The parabolic maneuver, where microgravity is felt, is highlighted. This is the part of the flight that you will focus on for the following questions. The function  $y = -4.9t^2 + 87.21t + 9144$  describes the altitude ( $y$ ), in meters (m), of the plane in relation to the time ( $t$ ), in seconds (s), after it started the parabolic maneuver. You will use this function to analyze the parabolic flight of the C-9.

- 
1. Using the defined function, at what altitude did the astronaut start to feel microgravity?



# Starship Gallery

S

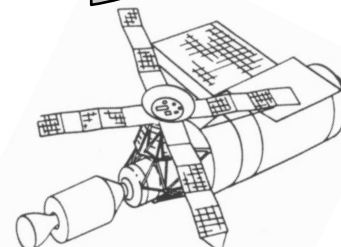
K

Y

L

A

B



Skylab was the first American Space Station.

What was Skylab designed for?

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The Skylab Program began in what year? \_\_\_\_  
And ended in what year? \_\_\_\_

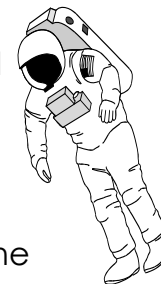
How many total astronauts lived on board Skylab? \_\_\_\_

The \_\_\_\_\_ on the ATM generated almost half of Skylab's electricity. What is the ATM used for?

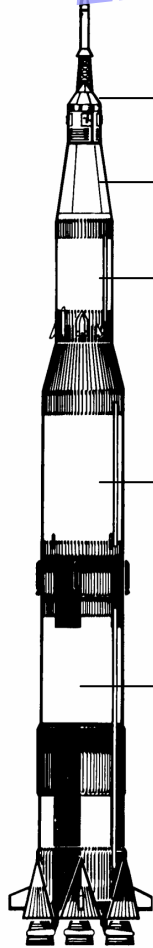
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# TRAM TOUR ROCKET PARK



★ Label the five main parts of the Saturn V rocket.

★ How long is the Saturn V rocket in feet? \_\_\_\_\_



★ If the Command Module has 210 cubic feet of space for three astronauts, how many cubic feet is allowed for each astronaut?  
\_\_\_\_\_  
\_\_\_\_\_



Saturn V



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Figure 4: Largest vertical cross-section of the Orion Multi-Purpose Crew Vehicle

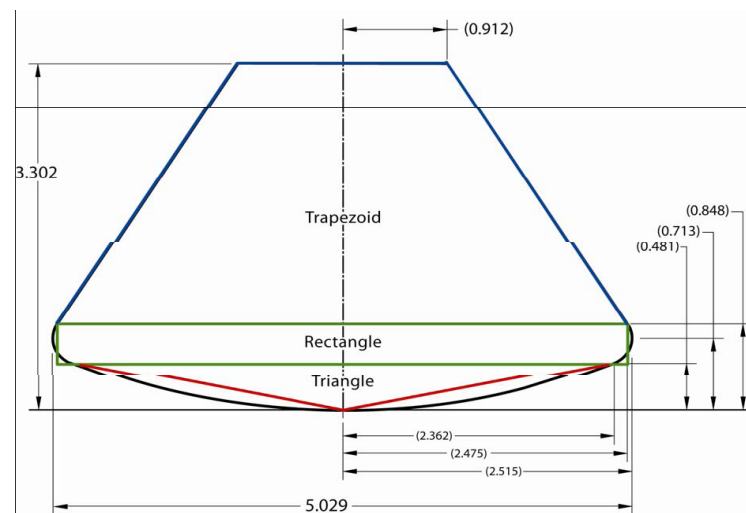


Table 1: Vertical Cross-Section Area Data

Figure	Area Formula	Area Formula with Values	Area (m <sup>2</sup> )
Trapezoid	$A = 1/2 (b_1 + b_2)h$		
Rectangle	$A = lw$		
Triangle	$A = 1/2 bh$		
Total Area			



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# Orion

## Multi-Purpose Crew Vehicle

### Objectives

- You will decompose a larger geometric shape into smaller parts.
- You will apply the proper area formulas for various geometric shapes.
- You will estimate the area of a complex geometric shape using decomposition methods.

### Problem

The Orion spacecraft will replace the space shuttle as NASA's spacecraft for human space exploration. The vehicle is designed to accommodate four to six astronauts traveling into space. This activity focuses on the Orion Multi-Purpose Crew Vehicle. You will find the areas of the largest vertical and horizontal cross-sections.

- To get a sense of the room inside the MPCV, find the area, in square meters (m<sup>2</sup>), for the largest vertical cross-section (Figure 3; Figure 4). Show how you would decompose, or break the figure into smaller parts, to estimate the total vertical area. You may use a calculator. Record your information in the table provided (Table 1).

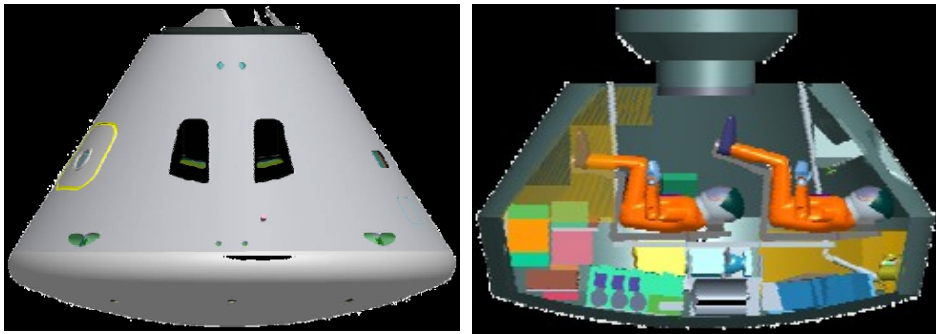
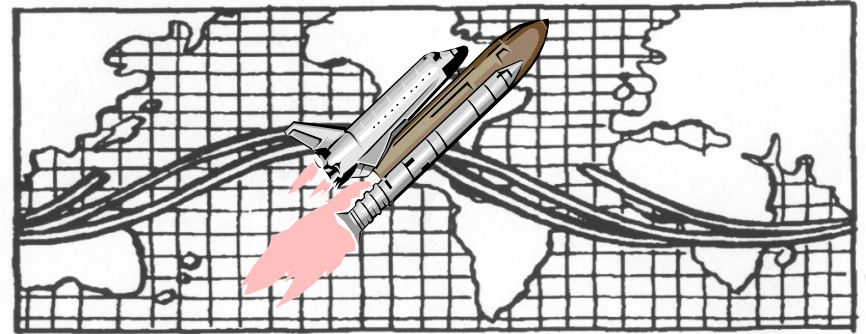


Figure 3: Vertical cross-section of the Orion MPCV (NASA Concept)



# Blast OFF Theater



**Grab your pencils and get ready to pay attention!**

**During the Blast OFF Briefing, your Mission Briefing Officer will answer the questions below.**

**Pay attention and keep your ears open! Please hold**

★ What's next for NASA? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

★ How many crew members are currently on the International Space Station? \_\_\_\_\_

★ What is Curiosity and it's primary mission? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

★ \_\_\_\_\_  
What is the name of NASA's next generation space craft? \_\_\_\_\_



# International



How long have people been living and working in space around the clock? \_\_\_\_\_

During the last decade how many nations have come together, setting aside boundaries and differences, to design, assemble, occupy, and conduct research on the **ISS**? \_\_\_\_\_

Name at least five of these nations.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



# Space Station

What is the name of the Canadian Space Agency's robotic handyman ?

\_\_\_\_\_

What year did it arrive at the **ISS**? \_\_\_\_\_



What is Robonaut 2 (R2)?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

On what flight did R2 arrive? \_\_\_\_\_

\_\_\_\_\_



What makes the Kibo Module so unique?

\_\_\_\_\_





# 9-12 Answer Sheet

## Page 1

1. Gordon Cooper; 22
2. Cooper; Conrad
3. Ed White
4. Saturn V; 12 men; Apollo 17

## Page 2

1. To teach about living and working in space for long periods of time. It also added important information about how the human body adapts to extended weightlessness.
2. May 14, 1973 and July 11, 1979
3. 9
4. 4 Solar Arrays; The Apollo Telescope Mount was the first observatory designed to be operated by humans flying above Earth's atmosphere.

## Page 3

1. Apollo capsule, SLA, S-IVB, S-II, S-IC
2. 363 ft.
3. 70 cubic feet

## Page 4

- 1.-2. Please visit <http://spaceflight.nasa.gov> for current mission information.
3. NASA's Most Capable and Robust Rover to Explore Mars. The rover will investigate whether the region has ever offered conditions favorable for microbial life, including the chemical ingredients for life.  
Learn more at [www.nasa.gov](http://www.nasa.gov). Type in "Curiosity Rover" in the search box.
4. Orion Multi-Purpose Crew Vehicle    Read more about the MPCV @ [http://www.nasa.gov/mission\\_pages/constellation/orion/](http://www.nasa.gov/mission_pages/constellation/orion/)

## Page 5

1. Over 10 Years    Construction began in 1998    The 3 man crew of Expedition 1 was first to inhabit the ISS on November 2, 2000.
2. 15
3. United States, Canada, Japan, Russia, Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom

## Page 6

1. Dextre (pronounced Dexter) is a robot with two smaller arms.
2. 2005    Read more @ [http://www.nasa.gov/missions/shuttle/f\\_isshand.html](http://www.nasa.gov/missions/shuttle/f_isshand.html)
3. R2 is the first dexterous humanoid robot in space.
4. STS-133 the final flight of Space shuttle discovery.    Much more @ [http://www.nasa.gov/mission\\_pages/station/main/robonaut.html](http://www.nasa.gov/mission_pages/station/main/robonaut.html)
5. It is the only external environment laboratory in space.

# 9-12 Answer Sheet

## Page 7-8

Total Area=Area of Trapezoid + Area of Rectangle + Area of Triangle

Figure	Area Formula	Area Formula w/ values	Area (m <sup>2</sup> )
Trapezoid	$A=1/2 (b_1+b_2)h$	$A=1/2x[(2x2.475)+(2x0.912)]x2.454$	A= 8.312
Rectangle	$A=lw$	$A=(2x2.475)x0.367$	A=1.817
Triangle	$A=1/2 bh$	$A=1/2x(2x2.362)x0.481$	A=1.136

$$A= 11.265\text{m}^2$$

## Page 9-10

1. At  $t=0$ , which would be 9,144 meters.

$$\begin{aligned}2. \quad y &= -4.9t^2 + 87.21t + 9144 \\ 9144 &= -4.9t^2 + 87.21t + 9144 \\ 0 &= -4.9t^2 + 87.21t \\ 0 &= t(-4.9t + 87.21) \\ t &= 0\text{s}, 17.8\text{s}\end{aligned}$$

The plane starts the parabolic maneuver at 0 seconds and ends at 17.8 seconds, thus the astronaut feels 17.8 seconds of weightlessness on each parabola.