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# Multi-Purpose Crew Vehicle

NASA scientists and engineers are working on a space vehicle that can take astronauts to the Moon, Mars, and beyond. This spacecraft is called the Multi-Purpose Crew Vehicle (MPCV). The MPCV must be designed to serve multiple functions and operate in a variety of environments. The MPCV will require many support systems which include launch vehicles, in-space transportation, navigation and communication, life support, extravehicular activity (the ability to leave the spacecraft) and mission operations support.

Your mission is to design a MPCV that includes the following items:

- A place for the crew
- Fuel tank
- Rocket boosters
- Storage space for life support( air, water, food, and waste)
- Storage place for cargo
- Power source (fuel cells)
- Landing system
- Other items if you can explain why

Make sure to:

- Label all parts
- Name the spacecraft



# Starship Gallery SPACE SHUTTLE



What material can you find in a space shuttle seat that you can also find in a mattress? \_\_\_\_\_



What can Robonaut do? \_\_\_\_\_  
What is unique to Robonaut's hands? \_\_\_\_\_



Did a Velociraptor really go into space? \_\_\_\_\_  
If so, what mission did it go on? \_\_\_\_\_



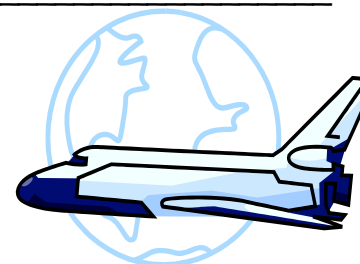
Name the three main parts of the Space Shuttle

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

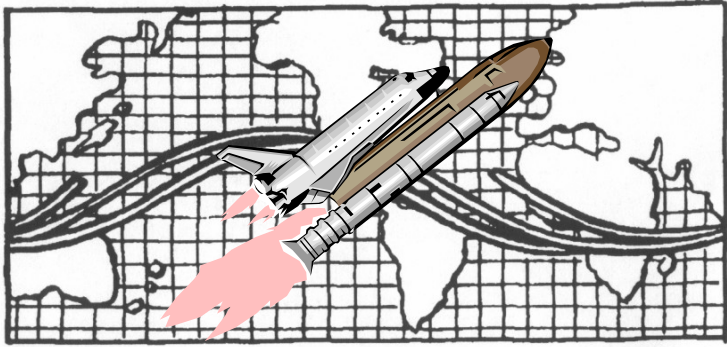


List the three retired orbiters in NASA's shuttle fleet


1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_





# 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 your questions until the end of the presentation.

 What is the current International Space Station mission? \_\_\_\_\_  
\_\_\_\_\_

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

 What is Curiosity? \_\_\_\_\_  
\_\_\_\_\_

 What is Curiosity's primary science objective? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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If (d) is 8m and (r) is 4m find (h).

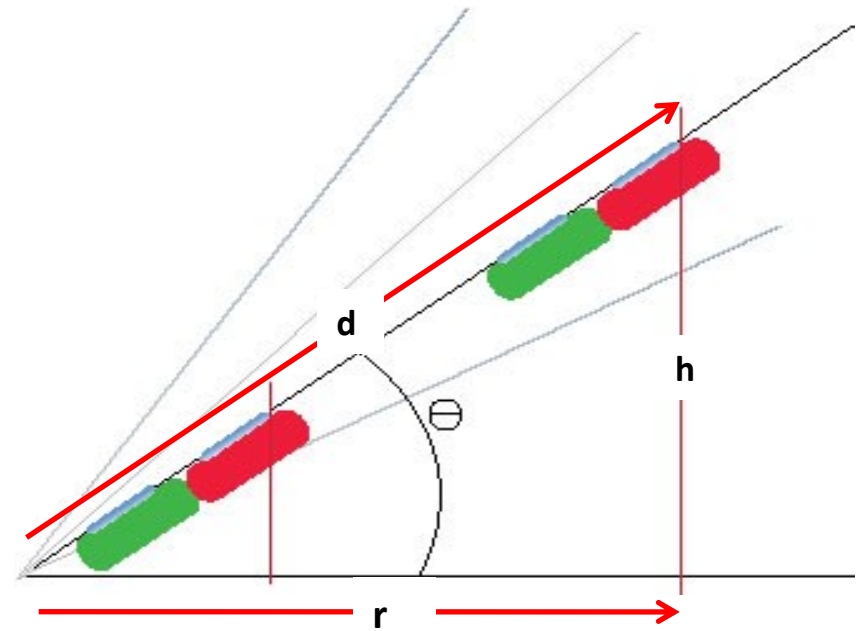


Figure A

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# Rocket Altitude

Scientists use math to determine how high their rockets go. Lets be rocket engineers and figure out how high our two stage balloon rocket would launch.

(use Figure A)

Use Pythagoreas' theorem to determine our altitude or (h) height.

$$a^2 + b^2 = c^2$$

If we can measure two sides of our triangle we can calculate the third. (d) is how far our rocket traveled. (r) is the point where the rocket reached the highest point.

So, since  $r^2 + h^2 = d^2$ , Our altitude becomes

$$h = \pm\sqrt{d^2 - r^2}$$



# TRAM TOUR ROCKET PARK



What 2 American astronauts did the Mercury Redstone spacecraft propel into space? \_\_\_\_\_



How long did Alan Shepard's flight last? \_\_\_\_\_



What was the purpose of the Little Joe II rocket? \_\_\_\_\_



How tall does a complete Saturn V vehicle stand? \_\_\_\_\_



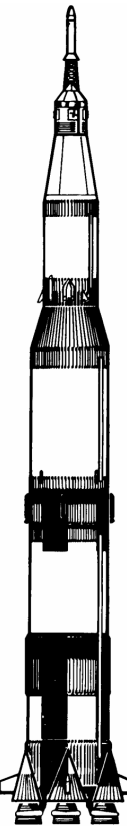
How many missions landed on the Moon during the Apollo missions?

A. 1

C. 6

B. 200

D. 17



Saturn V



# Multi-Purpose

What is the name of NASA's next generation spacecraft ?

\_\_\_\_\_



Which launch vehicle will carry the **Multi-Purpose Crew Vehicle (MPCV)**?

- A. Saturn V
- B. Space Shuttle
- C. Space Launch System
- D. Ares V



How many Astronauts can the new Orion MPCV fit for Space Station missions? \_\_\_\_\_

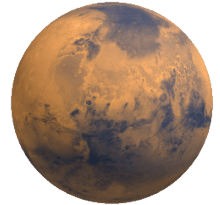


# Crew Vehicle

The Orion MPCV will have the capability of traveling beyond low Earth orbit.

Name 3 such places we may want to explore.

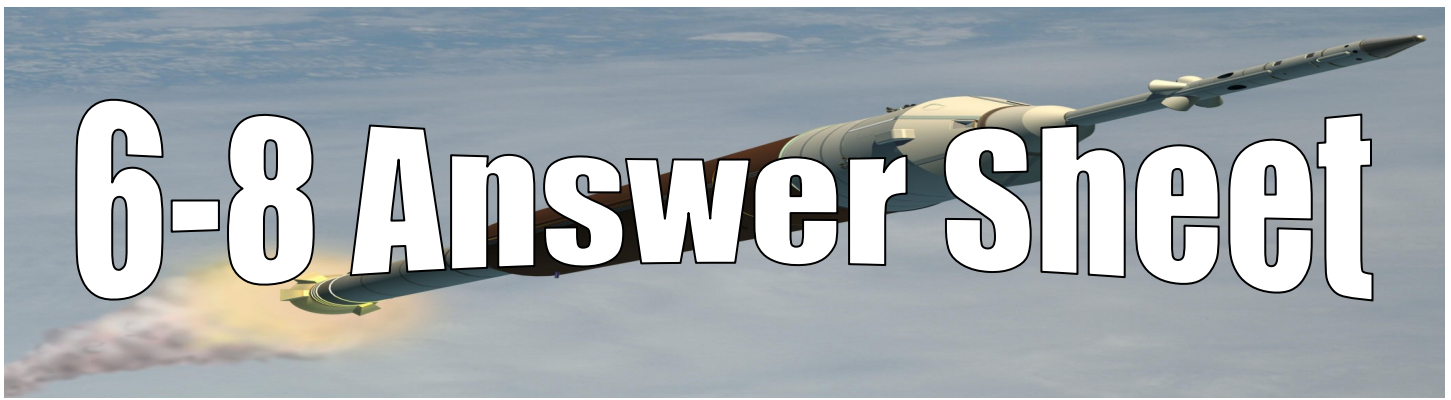
- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_



Which of the following statements best serve as the MPCV exploration vehicle?

- A. Carry the crew to space
- B. Provide emergency abort capability
- C. Sustain the crew during space travel
- D. Provide safe re-entry from deep space return velocity





Page 1

1. Mercury
2. Gemini
3. Apollo
4. Explorer 1
5. Werner von Braun
6. America
7. Saturn V
8. 3; 3
9. Apollo 17—America
10. Apollo Large Scoop, LM Storage Bag, Apollo Trenching Tool, Apollo Tongs

Page 2

1. Temper material
2. Perform spacewalks or extra-vehicular activities (EVA's); they have more dexterity than that of a suited Astronaut's hand
3. Yes; STS-65
4. Orbiter, External Tank, Solid Rocket Boosters (SRB's)
5. Endeavour, Discovery, Atlantis

Page 3

- 1,2 Please visit <http://spaceflight.nasa.gov> for current NASA space shuttle and International Space Station information.
3. NASA's Most Capable and Robust Rover to Explore Mars.
4. The rover will investigate whether the region has ever offered conditions favorable for microbial life, including the chemical ingredients for life.

Page 4

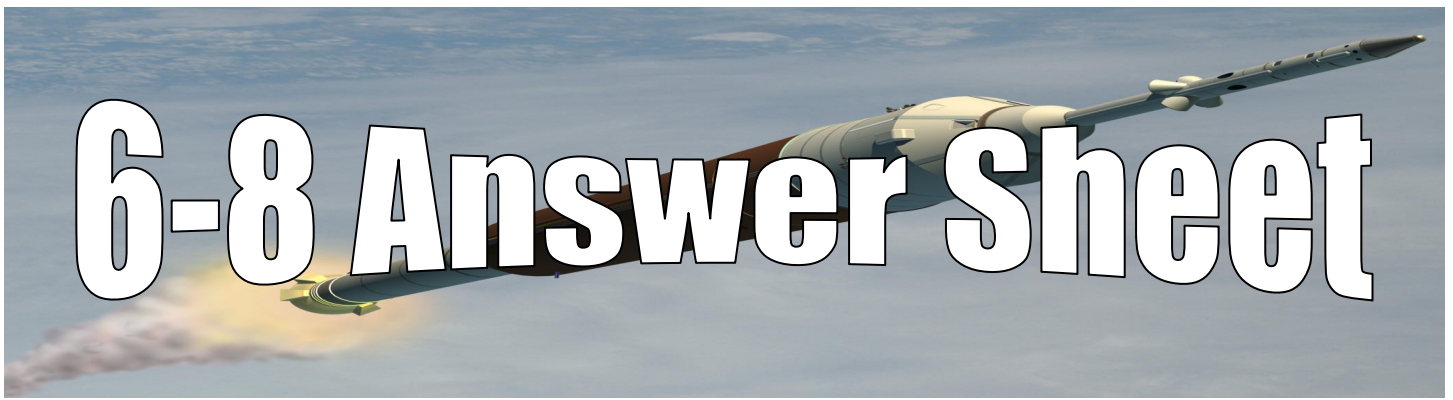
1. Alan Shepard & Gus Grissom
2. 15.5 minutes
3. Test launch for the Launch Escape System (LES)
4. 363 ft.
5. C. 6 missions—Apollo 11, 12, 14, 15, 16, and 17.

Page 5

1. Orion
2. C. Space Launch System (SLS)
3. 6 Astronauts for Space Station missions.

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1. A) Asteroids B) the Moon C) Eventually Mars  
([http://www.nasa.gov/mission\\_pages/constellation/orion/](http://www.nasa.gov/mission_pages/constellation/orion/))
2. A, B, C, and D



## Page 7-9

$$d^2=8$$

$$r^2=4$$

$$h = \pm\sqrt{d^2 - r^2}$$

$$64-16=48$$

$$\sqrt{48}=6.92820323$$

## Page 9-10

No exact answer. Teachers can expand this activity in the classroom by having the students build their MPCV out of recycled materials like

- Paper plates
- Plastic containers
- Milk jugs or cartons
- Craft sticks
- Tape
- Brads
- Staples
- Rubber bands
- String
- Balloons
- Cups
- Anything else you can think of or have your students bring.