

# MAKERSPACE CARDBOARD CHALLENGE!

## Lesson Plan

### Air and Space Travel

Lesson Plan for *Cardboard Rocket Challenge!*

Grade 3

#### Objective

To help students understand the difference between how airplanes and rockets move.

#### Things Needed

- *Cardboard Rocket Challenge!* book
- Computer access for students
- Access to the NASA Spaceplace article “Why Can’t an Airplane Just Fly Into Space? Why Do We Need Rockets?”: <https://spaceplace.nasa.gov/dr-marc-rockets/en/>
- Air and Space Travel worksheet (attached)

#### Before the Activity

Read *Cardboard Rocket Challenge!* as a class. Print out a copy of the Air and Space Travel worksheet for each student. Pass out worksheets and pencils.

#### Activity

Help students pull up the NASA Spaceplace article on their computers. Explain that the article will help students understand the difference between airplanes and rockets. Students should read the article on their computers and use it to answer the questions on the Air and Space Travel worksheet.

#### Evaluation

Using the attached answer key, give students 1 point for each correct answer, for a total of 10 points. (Note: Question 1 and question 7 are worth two points since they have two questions.)

#### Standards

This lesson plan may be used to address the Common Core State Standards’ reading standards for informational texts, grade 3 (RI 3.1, 3.2, 3.3).



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# Air and Space Travel

1. How high can large passenger airplanes fly? Why can't they fly higher than that altitude?
2. How do airplanes move forward?
3. How do airplanes' wings help them counter the downward pull of gravity?
4. How thin is the air 19 miles (30 km) above Earth?
5. The lowest Earth-orbiting spacecraft orbit at what altitude?
6. How do Earth-orbiting spacecraft help scientists make observations about Earth?
7. Which of Isaac Newton's laws explains how rockets move? What does this law say, and how does it relate to the movement of rockets?
8. How do rockets burn fuel?



## Air and Space Travel **ANSWER KEY**

1. How high can large passenger airplanes fly? Why can't they fly higher than that altitude?

Large passenger airplanes can reach 7.5 miles (12 km) above Earth. They cannot fly higher than that because the air is too thin to hold the planes up.

2. How do airplanes move forward?

An airplane's engines push the airplane forward.

3. How do airplanes' wings help them counter the downward pull of gravity?

Air flows over and under an airplane's wings. The wings are designed so that more air flows underneath, pushing the wings upward.

4. How thin is the air 19 miles (30 km) above Earth?

The air is 100 times thinner than at sea level.

5. The lowest Earth-orbiting spacecraft orbit at what altitude?

125 miles (200 km) above Earth's surface

6. How do Earth-orbiting spacecraft help scientists make observations about Earth?

They can take pictures of Earth's changing surface and study pollution in the atmosphere. They can also observe Earth's weather and long-term climate changes.

7. Which of Isaac Newton's laws explains how rockets move? What does this law say, and how does it relate to the movement of rockets?

Newton's third law states that for every action there is an equal and opposite reaction. Rockets work by shooting out a ton of high-speed material opposite the direction they are going. So, rockets move forward by shooting a bunch of material out their back ends.

8. How do rockets burn fuel?

Rockets do not depend on air. Instead, they carry oxygen tanks—the oxygen is mixed with the fuel just before it is burned.

