

Civil Air Patrol's ACE Program

Round the Runways Grade 3 Academic Lesson

Topics: forces of flight, rounding large numbers (science, math)

Length of Lesson: 45 minutes

Objectives:

- Students will experiment with flight.
- Students will round whole numbers to the nearest 10 and 100.

National Standards:

Next Generation Science Standards:

- 3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
- 3-PS2-2. Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

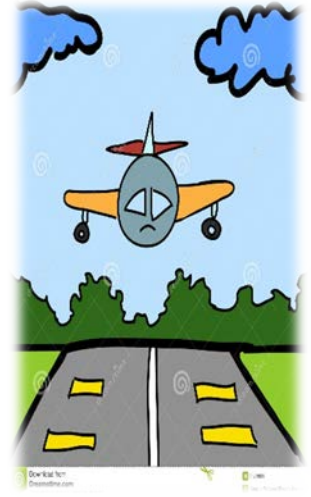
CCSS Math:

- 3.NBT.A.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

Background Information:

A glider is a special kind of aircraft that has no engine. Gliders come in a wide range of sizes. But, all gliders need a way to get into the air.

- a. Gliders can be towed by another airplane into the air and then set free to glide. View [video of airplane tow and release](#). See how the airplane lands after releasing the glider. The airplane is ready to tow the next glide up!
- b. Gliders can also be launched (much like a catapult) with a machine called a winch.
 - (1) See the [Glider Winch Launch video!](#)
 - (2) See, also, the [video of a winch launch from different angles](#) within the glider, which nicely shows how the glider begins to soar on its own after its "wheel gear" is pulled inside the plane.
- c. To see a towed glider and several winch launches, as well as the glider soaring with the eagles or a paraglider, and, a smooth landing, watch the [Winch Launch video](#).



Info gained from the videos:

- 1- When listening to the videos, you can hear the pilots speaking of finding a **thermal** in which to soar for long periods. This "thermal lift" used for a glider to soar, much as the birds use. It is energy gained by using rising air due to heat. (There are other sources of energy used for lift in gliders, but we will just discuss thermal lift.) A pilot (and bird) try to find these thermal lift sources (rotating heated air) to continue to rise in the air until they find another thermal location. If they cannot find any other "lift sources," the glider will be pulled back down to Earth by the force of gravity. The pilot will have to maneuver the planes wings to control the descent or drop back down to the landing area in a smooth manner. (As seen in the last video.)
- 2- When listening to the videos, you can hear **large numbers** of altitude and distance being discussed, as pilots of any flying vehicle will use. When flying airplanes and gliders, pilots use rounded numbers to estimate distances from one destination to another. This math tool helps pilots keep talking to a minimum on the radio, so that all communication can be heard and understood between the pilots and the air traffic controllers. (Imagine if pilots called out the large numbers exactly as they are presented to them, such as 125, 897.78. Instead, a quick rounding of the numbers makes that communication quick and clear, such as 126, 000.)

The foam gliders provided by CAP are an excellent way for students to study the basics of aerodynamics, typically the four forces of flight: lift, thrust, drag, and gravity. But, in a glider, thrust is not needed for flight. What? To get a better understanding of the three forces of a glider and how the glider uses these forces for flight, see [NASA's Three Forces of a Glider](#). (Wonderful graphic and description for background information.) To get a very clear understanding of how a glider pilot uses lift to continue soaring, the video [How a Glider Works](#) is an excellent overview, good for teachers and students! (**The best video to use.**)

Students will not be using a tow plane or a winch to launch their foam gliders, but, will use their hand motion to provide the power of lift for the glider to soar until gravity pulls it back to the ground.

They will also not be using extremely large numbers for their flight distances, but they will use numbers on a runway they can round to the nearest ten or hundred whole number. Show the video, [Rounding Numbers Song | Nearest 10 & 100 Rap](#), to understand rounding.

Materials:

- foam flyer glider kits (provided by CAP for students)
- 8 copies of "Round the Runways" photos at the end of this lesson (any combination)
- copy of the "Gliding in for a Landing" worksheet for each student- found in this lesson
- pencils

Lesson Preparation:

- Copy and enter numbers on the 8 runways you prepare. Tape these runways on the floor in an open area so the students can spread out in their groups to fly their foam gliders. (Use some numbers with only tens and some with hundreds.)

Lesson Presentation:

1. Ask students if they have ever flown in a glider. Discuss how quiet and peaceful it must be to fly in a glider alongside the birds. (Show one of the videos in the Background Information to ensure they know what flying in a glider is like.) Tell them that today, they will be flying gliders and trying to land on the runway as smoothly and quietly as possible.
2. Discuss with students why flying is preferred over driving. (faster to get to long distances, it is more fun, the scenery is better) Tell students that flying covers many miles in a shorter amount of time. Pilots use Distance Measuring Equipment (DME) to help determine miles they need to travel. They will need to report these numbers to air traffic controllers (ATC) on the radio. Many times, pilots round the number of miles that are to be flown to get to their destination.
3. Discuss with students that pilots must communicate as effectively as they can in the briefest amount of time with the ATC. Being able to round huge numbers from the DME makes the pilots and the air traffic controllers get their information out quickly and clearly, and then off the airwaves so that other pilots can communicate their locations.
4. When using the DME, pilots can round to the nearest whole numbers, tens, or hundreds. Tell students that today they are going to pretend to be pilots and use their rounding skills to the closest ten or hundred whole number.
5. Assemble students into groups of four. Tell the students that each student in each group will take a turn flying their foam glider to land on one of the 8 runways. Wherever their glider lands, students will round the runway number to the closest ten or hundred. They should complete their "Gliding in for a Landing" worksheet after each flight and landing.
6. **SAFETY:** Go over safety rules with students. You may wish them to wear safety goggles. Ask students to leave plenty of space between themselves and other students who are flying their planes. Remind students to take turns flying and be aware of their surroundings, watching for planes that may be coming their way. (You may want to allow students to practice flying their foam flyers at this point.)

7. After all students have completed two landings and rounded their numbers, have students complete the rest of the "Gliding in for a Landing" worksheet. When time is up, have the students exchange their "Gliding in for a Landing" worksheet with another. Have students check the rounded numbers of the other and return sheets.

Summarization:

Ask students to share some things they learned today about rounding numbers and about gliders. Ask them to discuss why pilots and air traffic controllers use rounded numbers in their communications on the radio. Have students tell ways rounding numbers may be helpful in their lives. (Examples: rounding up or down the actual time to complete a task; rounding up the number of students in the class in order to buy snacks and ensure everyone gets one, etc.) Have the students name jobs where people need to be able to round numbers.

Character Connection: Remind students that just as gliders need thermals to allow them to continue to lift when soaring, they, too, need people and things to allow them to soar in life. Without lift, the glider will spiral down to the ground, and, for people, without good influences in their lives, they will also spiral down without a very good landing. So, to remain soaring in life, they need to look for good "lift," such as good people, good activities, and good food and exercise.

Drug Demand Reduction (DDR) Connection: Available on page 9 of the ACE guide.

Assessment:

- teacher observation
- answers to class discussion questions
- "Gliding in for a Landing" answers

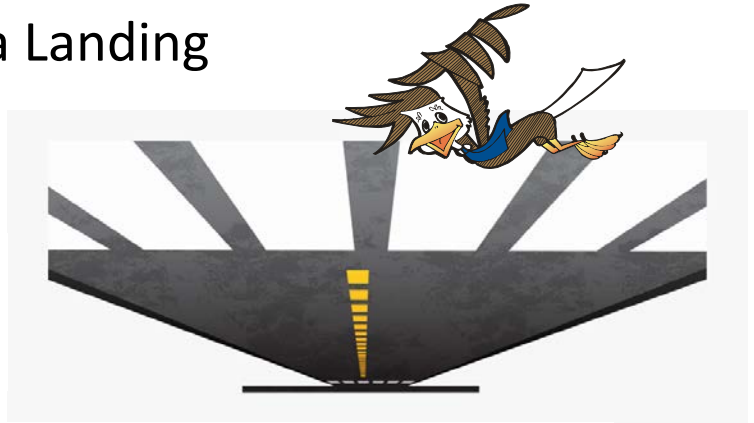
Additional activity ideas to enrich and extend the primary lesson (optional):

- Have students complete a teacher-made worksheet on rounding numbers (using addition and subtraction).
- Allow students to create their own runways and the lengths on the runways.
- Allow the students try to sing the Rounding Numbers Rap song found in the Background Information section.
- Lead students in the following activities using their foam gliders:
 - See whose plane can fly the farthest distance (measured by their footsteps) and round the number of steps to the nearest ten.
 - See whose plane can hit a designated target that is labeled with different numbers. Have the students round the number to its closest ten or hundred number.
- Have students write a story about flying across the country in a glider, using the thermals to fly like a bird.

Additional Resources:













- ["How to Round to Tens and Hundreds!"](#) (video)
- ["Rounding to the nearest 10 | 3rd grade | Khan Academy"](#) (video)
- [Rounding Numbers](#) (math game)
- [Rounding numbers crocodile game](#) (math game)
- ["How Do Airplanes Fly?"](#) (video to explain forces acting on aircraft)
- ["Glider Planes For Kids"](#) (video showing gliders in flight)
- ["Air Traffic Control"](#) (Behind The Scenes At The Airport: Episode 3 video)

Gliding in for a Landing



Name _____

Complete each answer by rounding to the closest number you are told to. Then, circle whether you rounded UP or DOWN.

5. On my first glider landing, I landed on the runway with the number _____ . I rounded that number to _____ .  
4. On my second glider landing, I landed on the runway with the number _____ . I rounded that number to _____ .  
3. As if you are using the pilot's Distance Measuring Equipment (DME), round the distance from a school to an airport of 36 miles to its closest ten whole number. _____  
2. Pretend you are a glider pilot using the DME, and round the distance from the take-off site to the next landing site of 187 miles to its closest hundred whole number. _____  
6. Pretend you are a pilot talking to the air traffic controller (ATC) and round the distance of 42 miles to land to its closest ten whole number. _____  
1. Pretend you are a pilot trying to determine how much fuel you will need for your flight of 456 miles. Round that distance to the closest hundred whole number. _____  

Round to the nearest

Whole Number



Round to the nearest

10



Round to the nearest

100

