

ACTIVITY I

THE HERITAGE OF FLIGHT

PART 1 Do certain dates make your year special, like birthdays, school vacations, and holidays? When you write those dates on a calendar, you are making a timeline that shapes your year. The timeline below begins more than 100 years ago, when Orville and Wilbur Wright achieved the first aircraft flight in history. Their plane, the Wright Flyer, only stayed aloft for 12 seconds during that first flight, but it was a milestone in aviation history! Only six years later, in 1909, American airplane designer Glenn H. Curtiss won the first-ever major international air race, flying at a blistering 46 mph (74 km/h) in the skies over Reims, France.

MILESTONES OF FLIGHT

1903	1909	1918	1927	1932	1933	1947	1969	1981	2006
Orville and Wilbur Wright's first successful self-propelled airplane flight.	Glenn H. Curtiss wins first major international air race, in Reims, France.	U.S. Army pilots begin the Post Office's first regular airmail route between Washington, D.C., and New York.	Charles A. Lindbergh completes the first solo, nonstop trans-Atlantic flight from the United States to Europe.	Amelia Earhart becomes the first woman to fly alone across the Atlantic from the United States to Europe.	A modern commercial airliner flies for the first time, with 10 passengers and 400 pounds of luggage onboard.	Charles E. Yeager breaks the sound barrier in the Bell X-1, the first aircraft to exceed the speed of sound, flying at 670 miles per hour.	The first flight of the prototype of the Supersonic-transport (SST) aircraft Concorde, at faster than the speed of sound.	The first flight of the Stealth military aircraft, the Lockheed F-117A, which is invisible on radar.	Pilot Steve Fossett makes the longest flight around the globe without refueling, traveling some 26,000 miles.



Match the events on this timeline with the images of these airplanes by drawing a line from each plane to the date when it flew. You will notice that airplanes have changed a lot in the last century!

PART 2 The new film, *Air Racers*, shows the excitement of vintage World War II planes that compete at the Reno National Championship Air Races. Look at the picture of the Wright Brothers' Flyer above and the P-51 Mustang that Steve Hinton flies in *Air Racers* below. What do they have in common?



Label these parts of each plane:

Wings (These provide **lift** to get the plane off the ground.)

Propellers (These provide **thrust** to power the airplane forward.)

Rudder (This part swings back and forth to steer the plane left and right.)

Elevators (These parts tip up and down to make the plane climb and descend.)

PART 3 Would you like to talk the way pilots do when they're chatting back and forth on their radios? Roger that! Match each definition below to the pilot "lingo," or slang, it describes.

Definition

- ___ okay
- ___ ceiling and visibility unlimited (the best flying weather)
- ___ aircraft
- ___ go as fast as you can
- ___ pilot
- ___ enemy aircraft
- ___ take it easy
- ___ any technical gear in the plane
- ___ heavy rain or fog
- ___ start the engine

"Lingo"

- light the fire
- gizmo
- bandit
- buster
- cavu
- roger
- birds
- driver
- throttle back
- great day for ducks

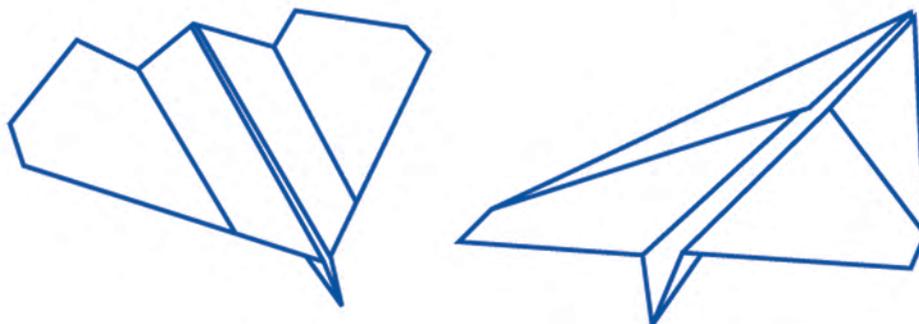
THE VALLEY OF SPEED

PART 1 The annual National Championship Air Races in Reno, Nevada, that are featured in the exciting new documentary film *Air Racers*, are the fastest competitions in the world, with planes clocking speeds at over 500 mph. With your group, brainstorm a list of all the different types of races you can think of. Then, with your class, rank them from slowest (turtle races) to fastest (airplane races).

Now try matching these well-known speedsters to their speeds:

- | | |
|---|--------------------------------|
| 1. ___ Fastest land animal, cheetah. | a. 267 mph |
| 2. ___ Fastest human, Usain Bolt, Olympic sprinter. | b. 200 mph (diving) |
| 3. ___ Fastest car, the Bugatti Veyron Super Sport. | c. 361 mph |
| 4. ___ Fastest NASCAR. | d. 70 mph |
| 5. ___ Fastest sea animal, Atlantic sailfish. | e. 212.8 mph |
| 6. ___ Fastest airplane, the X-43A jet. | f. 68 mph |
| 7. ___ Fastest bird, Peregrine falcon. | g. 23 mph |
| 8. ___ Fastest train, the MagLev. | h. Mach 9.6 (nearly 7,000 mph) |

PART 2 Now stage your own air race, like the pilots in *Air Racers*. First build a simple, straight-wing paper airplane. Then try a different style. You can find instructions for several styles at www.10paperairplanes.com.



Experiment with your own design, too. The sky's the limit! Decorate your airplanes with insignia and then stage an air show. Invite another class to attend your show.



THE HUMAN COMPONENT

PART 1 In *Air Racers*, you meet Steve Hinton, who inherited his passion for World War II military aircraft from his father. The Hinton family's business, the Planes of Fame Air Museum in Chino, California, is dedicated to preserving the legacy of the remarkable "warbirds"—planes built for combat during World War II. The museum is home to 150 aircraft, more than 50 of which are flyable. Like his father, Steve is a pilot of these vintage craft, and earned his license at age 17.

Air Racers shows how Steve prepares to break his father's record and become the youngest-ever pilot to win the Unlimited race at the Reno National Championship Air Races in 2009, flying a P-51 Mustang—the "Cadillac of the Skies." He's not only up against his dad's record—he also has to contend with G-force as he speeds through the air at up to 500 mph!

Steve won his second Unlimited Gold championship title the following year and set a new qualifying record at the 2011 event in Reno with a top speed of 499 mph (803 km/h).

Want to create your own G-force? You will need the following:

- A piece of string about three feet long
- Scotch tape
- A quarter (return it to the teacher when finished)



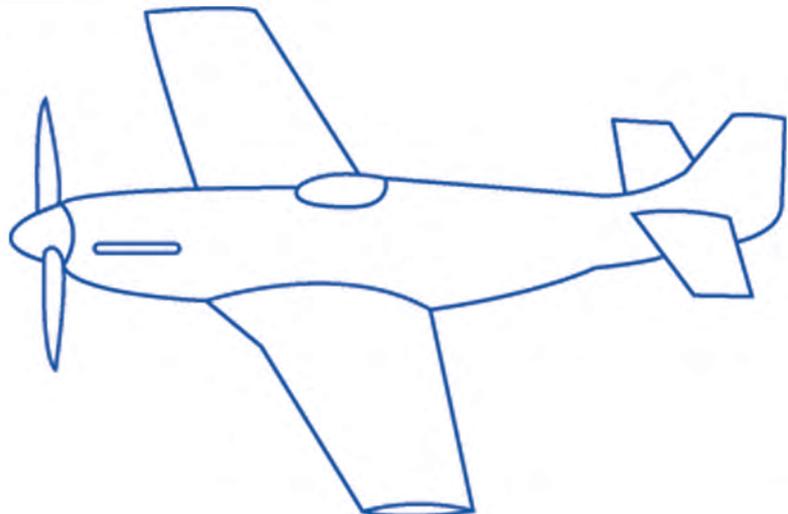
Next:

- Tie one end of the string around the coin as if you're wrapping a package.
- Wrap tape around the coin and string so the coin won't slip out.
- Hold the other end of the string and feel the weight of the coin. (That's the quarter under one G of force.)
- Make sure you have plenty of space around you. Hold the end of the string above your head and start swinging—very carefully!
- Does the coin feel different when you swing it slowly instead of fast?

What's going on? The faster you swing the coin, the heavier it feels. That's because the coin is under a G force greater than ordinary gravity. If it's spun fast enough, it can feel 5, 10, or even 50 times heavier than when it is at rest. (If the coin were a pilot, it would really be feeling those G's!)

G-force is the combination of gravity and motion. Accelerating, as a pilot does in a plane, increases the force of gravity affecting a body, making it feel heavier. When you're standing still, you're feeling one G. When you're in an airplane taking off, you feel much more G-force. Imagine how Steve Hinton feels as he makes the fast, tight turns in the Unlimited race!

PART 2 Part of the fun of participating in a competition like the Reno National Championship Air Races is being part of a team. Team colors and airplane decoration play an important role in the race. For one thing, the colors help spectators identify the planes as they zoom by. Steve Hinton's P-51 Mustang fighter plane, "Strega," is painted red and white, with a stylized 7 on the tail. Now it's your turn. Decorate this outline of "Strega" with your own colors and symbols, and write a sentence explaining why you chose them.

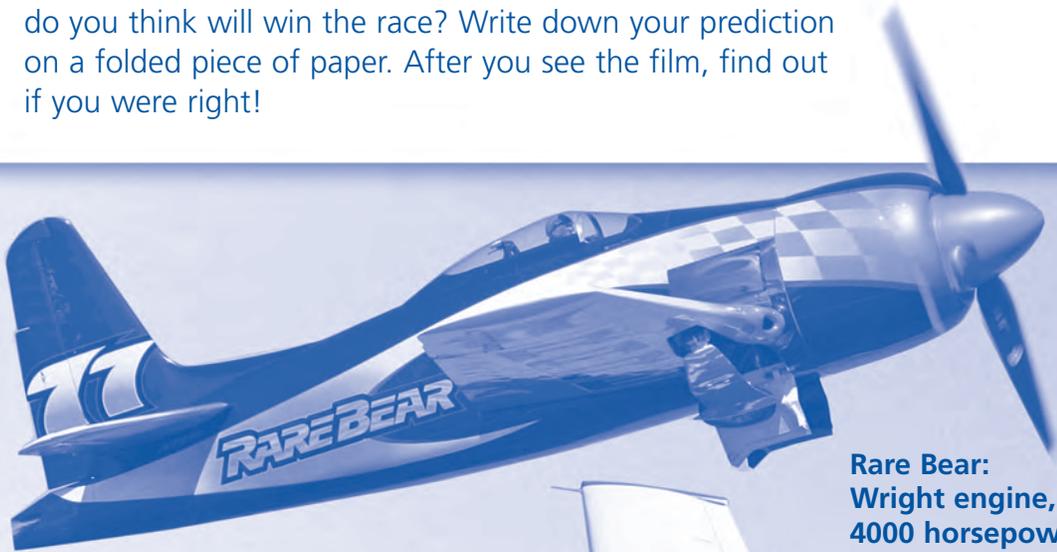


BUILT FOR SPEED

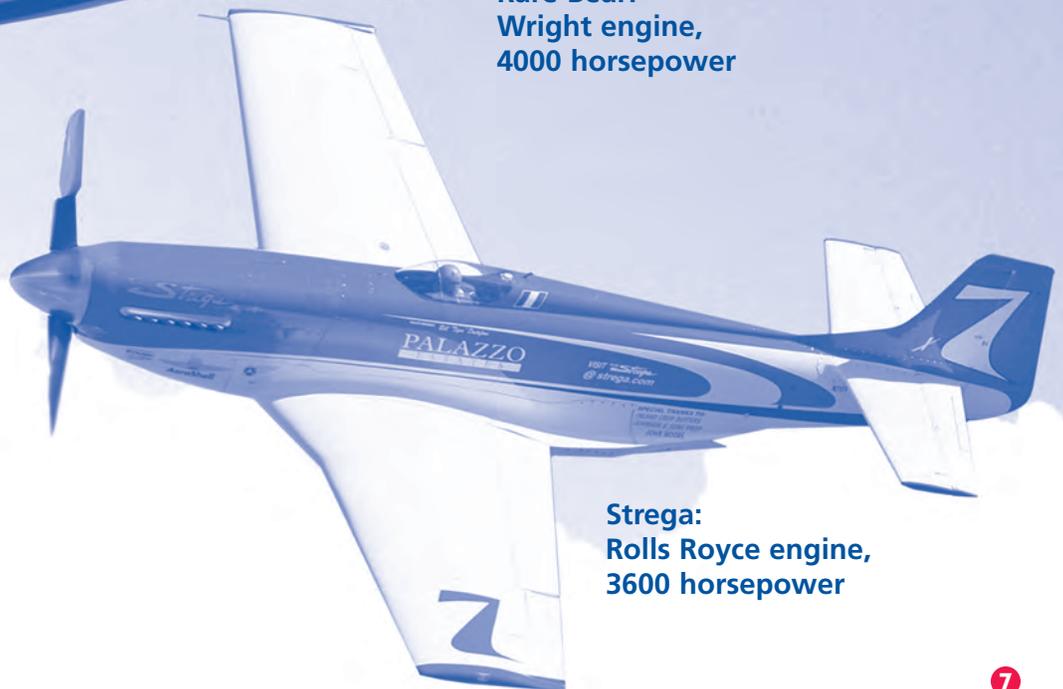
The rules at the Reno National Championship Air Races featured in *Air Racers* are simple—fly low, go fast, and turn left. The planes built for World War II aerial combat that are used in the races were, in fact, breakthroughs in airplane design at the time. These planes were built to be nimbler and more powerful than ever before. Before you view *Air Racers*, review the basics of what makes a plane take off and stay in the air once it is aloft.

Look closely at the pictures of the vintage fighter planes on this page that are two of the planes featured in the film. You'll see that airplane wings come in different shapes and sizes, but a wing's shape is always designed to create lift. The top surface is slightly curved, while the bottom is flat. This shape, called an airfoil, causes air to flow faster over the top of the wing than it does underneath the wing. The airflow on top of the wing has to cover a longer distance than the airflow under the wing, so it has to move faster. And this faster airflow creates lower air pressure on top of the wing, which pulls the plane up into the air. The difference between the lower air pressure on top of the wing and the higher air pressure underneath creates lift—an effect called Bernoulli's Principle.

Compare the wing shapes and the horsepower—the strength—of these two planes. Which one do you think will win the race? Write down your prediction on a folded piece of paper. After you see the film, find out if you were right!



Rare Bear:
Wright engine,
4000 horsepower



Strega:
Rolls Royce engine,
3600 horsepower