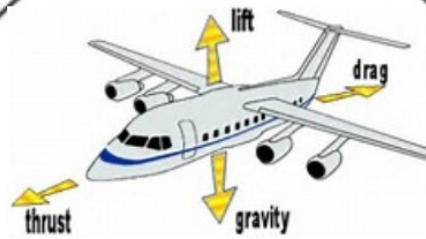


Discover the Excitement of Flight
Suggested for
Grades 3 thru Grades 5
Grades 3rd to 4th



National Naval Aviation Museum—1750 Radford Blvd. Pensacola, Florida, 32508



Forces of Flight

Four Forces Affect Things That Fly:

1. **Weight** is the force of gravity. It acts in a downward direction—toward the center of the Earth.
2. **Lift** is the force that acts at a right angle to the direction of motion through the air. Lift is created by differences in air pressure.
3. **Thrust** is the force that propels a flying machine in the direction of motion. Engines produce thrust.
4. **Drag** is the force that acts opposite to the direction of motion. Drag is caused by friction and differences in air pressure.

All Four Forces Act on an Airplane

When an airplane is flying straight and level at a constant speed, the lift it produces balances its weight, and the thrust it produces balances its drag. However, this balance of forces changes as the airplane rises and descends, as it speeds up and slows down, and as it turns.

Only Two Forces Affect a Spacecraft in Space

A spacecraft has weight, even in orbit, and uses thrust to reach space and to maneuver. But lift and drag—both created by movement through air—are absent in the near vacuum of space.

DID YOU

KNOW ?

An airplane in flight is always in the middle of a tug-of-war with the four forces. For an airplane to takeoff, thrust must be greater than drag and lift must be greater than weight. To maintain level flight, lift must equal weight and thrust must equal drag. For landing, thrust must be less than drag, and lift must be less than weight.



HANGAR BAY ONE

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|---|------------------------------------|----|------------------------------------|
| 1 | WOMEN IN NAVAL AVIATION | 8 | BLUE ANGELS 4D EXPERIENCE |
| 2 | NAVAL AVIATION IN THE ARABIAN GULF | 9 | SP-5B MARLIN |
| 3 | VIETNAM POW EXHIBIT | 10 | COAST GUARD AVIATION EXHIBIT |
| 4 | O-1 BIRD DOG | 11 | HH-52 SEAGUARD |
| 5 | A-6 INTRUDER | 12 | APOLLO SPACE EXHIBIT |
| 6 | F-4N PHANTOM II | 13 | R4D-5L "QUE SERA SERA" |
| 7 | P2V-1 "TRUCULENT TURTLE" | 14 | MARINE ONE PRESIDENTIAL HELICOPTER |

Discover the Excitement of Flight

1. Daddy comes home to his family. After being away for a long time, it's wonderful to have Daddy home again! Ask students if any of them have parents who have been deployed and to tell about when they came home.



2. Marine One helicopter carried the President. It took him from the White House to Andrews Air Force Base, or to other places near Washington, D.C. Ask students: Have you ever watched the evening news on TV and seen the President getting into a helicopter much like this one with the Marine Guard standing by?

3. Que Sera Sera – 1st American plane to land on the ice at the South Pole. At 60 degrees below zero, it was super cold. Look up to see this plane with skis. It is a Douglas DC -3, R4D-5L and was called Que Sera Sera, meaning “what will be, will be.”



4. The Lunar Module landed the first men on the moon. This is a replica of the moon landing craft. Also look nearby to see what a lunar rover was like. It is featured in some of the moon pictures along the wall. If you pay close attention, you will even find a little piece of a moon rock and a watch one of the astronauts wore to the moon.

5. A lifesaving Coast Guard Helicopter. This is an HH52 and its blades fold down to stow away on the ship. This helicopter saved over 600 lives. Talk with the students about how the helicopter and crew go about saving lives and the importance of this work along our coasts.



Discover the Excitement of Flight



6. Is it a plane or a boat? It's a plane that floats! This is the SP-5B Marlin and is the last plane used as a flying boat in the Navy. It was designed for antisubmarine patrol and surface search. **Discuss with students why a plane would need to land on the water.**

7. Look up to see the Homeward Bound Pennant flying high. If a ship has been overseas for more than a year, a pennant like this one flies from the ship on its way home. It has one star for every month it has been away, and the red and white stripes are one foot in length for each person on the ship. After arriving back in the States, it is cut up into one-foot pieces and a section given to each crew member. The information stand near the Blue Angel jet shows pictures of some of these pennants.



8. Stoop with a Roof. The dome-like top piece of the E-2C Hawkeye is used to detect enemy aircraft and ships at great distances plus it has many other important duties. Its unique propeller design helps it perform well in all weather.

9. Truculent Turtle — a very long-flying plane. This P2V Neptune flew for over 2 days (55 hours and 17 minutes) from Australia to Ohio without refueling! It had on board all the fuel it could possibly carry. In addition, there was a fifth “crewman” on board – Joey, a baby kangaroo, gift from the Australia Zoo to the US Zoo. The word truculent means aggressively defiant, and turtles travel slowly. This plane was not fast, but it worked hard to stay in the air for so long. **This might be a good place to talk about the moral of the story of the Tortoise and the Hare—persistence.**

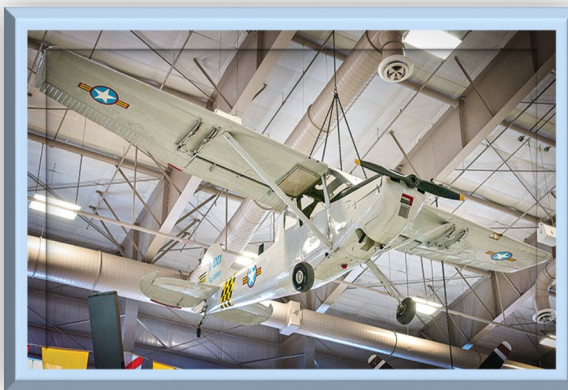


Discover the Excitement of Flight



10. Tonkin Gulf Yacht Club Stateroom aboard ship — fixed up to feel like a little bit of home. The space for each sailor on a ship is very small. Sometimes a sailor must live in a space this small for over a year. **Ask the students how they would fix up a little room like this.**

11. Hanoi Hilton Prison. Many Americans were taken prisoner during the Viet Nam War and held in terrible prisons much like this one. Life there was much more difficult and painful than we would think. **Explain what a prisoner of war is and ask what the students understand about life for prisoners of war.**



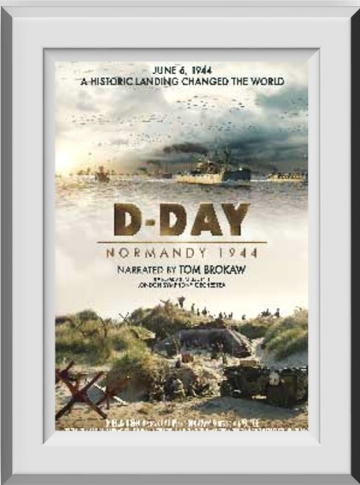
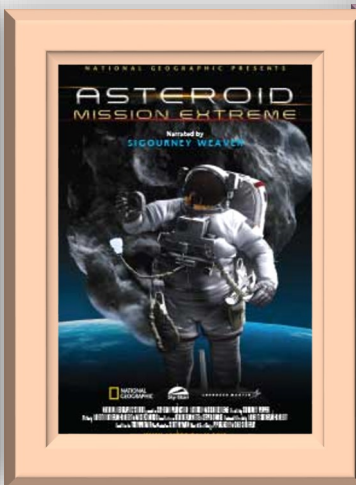
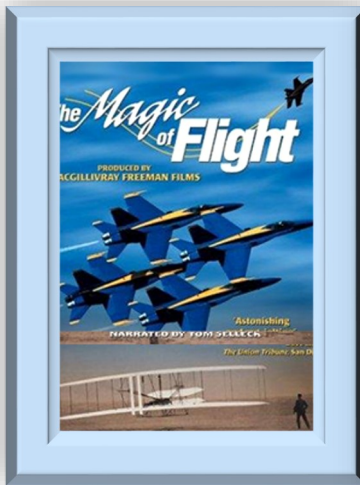
12. This tiny O-1 Bird Dog plane brought 7 people to safety and landed on an aircraft carrier. A South Vietnamese Air Force major flew his wife and 5 children from Saigon out to sea. As he was about to run out of fuel, he spotted an aircraft carrier and dropped a note to its deck. The runway was cleared and this little plane landed safely. The pilot had never seen a carrier before, but he was desperate to save his family.

13. Typewriters to strike fighters—women are an important part of naval aviation. At one time, women didn't fly planes in the Navy, they used typewriters and worked in offices. But now they do a lot of different jobs, and some even become pilots. **Ask students to talk about what they would like to do when they grow up.**





Upon your arrival at the Naval Aviation Museum, it is recommended you begin your visit by viewing one of our Giant Screen Theater movies, all of which provide educational entertainment at all grade levels. Each film has a corresponding Teacher's Guide.



Show Times:
09:30 a.m.
12:00 p.m.
&
3:00 p.m.

ShowTime:
10:30 a.m.

Show Times:
11:00 a.m.
1:00 p.m.
&
4:00 p.m.

ShowTime:
2:00 p.m.

Giant Screen Theater Movie Prices
\$5.00 per student with one free chaperone per ten students.

Flight Simulators Experience the Excitement



Flight Simulators

We have two state-of-the-art Max Flight Simulators; under your control, these high definition simulators are capable of air-to-air combat and stunt flying. Combined with patented, fully interactive 360 degree pitch and roll technology, kids and adults are sure to agree that Max Flight is one of the world's most exciting indoor attractions! **Price: \$20.00 for one or two people**

Motion Based Simulator

We have two different rides you may choose from in our Flight Simulator. In the Blue Angels Simulation, riders experience flight in a Navy F/A-18 Hornet, including high-performance turns and maneuvers. Or you can take off from an aircraft carrier and do battle in the Iraqi desert in the Desert Storm Simulation. **School rate (with Giant Screen film) \$4.00. School rate (without Giant Screen film) \$4.50**



The Blue Angels 4D Experience takes advanced 3D technologies to the next level of experience by employing interactive seats and unique special effects built into the theater itself. By creating a set of "4D" effects synchronized to the film production, the Blue Angels 4D Experience adds another layer of immersive and experiential fun for audiences of all ages. 4D theaters are a multi-sensory experience and are changing the way people enjoy movies. **Guests must be 5 years of age or 48" tall to ride the Blue Angels 4D Experience. School rate is \$5.00.**