

Station 2: Booklet—Aviation Operation

Location: Under the DC-3

Supplies:

- kits
- booklets
- pencils
- clipboards
- Leader's Answer Booklet

Instructions to the Station Leader:

Anything in **Bold** lettering is stuff you say to the students.

Any thing in *Italics*, is the correct answer to questions you are asking the students.

Anything in Regular typing is information or instructions for you, as the leader.

This station includes a short introduction from you, (see script below), "Aviation Operation Kits" and work booklets. You will split the students into groups of 2 or 3. Each group of 2-3 receives a work booklet, pencil and a Kit.

There is also an answer booklet printed in colour for you to use and take with you. You may have to give hints to the students, especially the if the students have not yet taken this subject in class or this is their first Station. There is also a Glossary of Terms if you need it.

At the end of each group's time at this station, please gather all of the work booklets and Kits. The work booklets will be handed to the teacher at the end of the program.

Please remember that the Kits will not look exactly like the aircraft that the students are learning about. It will be more like a concept than a replica. You can look at page 11 of the booklet for ideas of what the each configuration will look like. If you have questions, please ask. Thanks for your help! :-)

Script start:

Welcome to Station #2! My name is _____. We are going to talk about different aircraft designs, configurations and engines. The Museum has several air craft on display, but do they all look the same?

No

Each one was designed a certain way and often for a very specific reason. Above the wing of the DC-3 is a replica of the Silver Dart. It's flight was the very first "powered flight" in Canada. Why do you think that it was called the first "powered flight"?

The Silver Dart uses an engine and a propeller to fly.

But do we need an engine to power our flying machine?

No.

What else can we use to "fly"?

we can glide, or float through the air using, hot air balloons, parachutes and gliders etc.

That's right. So each type of aircraft has a job to do and needs to be designed appropriately. In order for us to explore what these designs are, we are going to split up into pairs and I am going to give each pair a kit and a work booklet. You have about 25 minuets before you will move on to the next Station. Before you do, please write your name on the work booklets and hand everything into me.

(hand out booklets, pencils and a kit to each group)

Glossary of Terms

Aileron—(pronounced: ale-er-on) One of the Control Surfaces. It controls Roll. This will tip or rock the airplane side to side.

Airfoil—A specific shape of the wing or rotary blade: the top of the wing is curved and the bottom is flat or straight.

Bernoulli's Principle—This states that as the speed of a moving fluid increases, the pressure within the fluid decreases. Concerning flight, Bernoulli's Principle has to do with the shape of an airplane's wing. The bottom is flat, while the top is curved. Air travels across the top and bottom in the same time, so air travels slower on the bottom (creating more pressure) and faster on top (creating less pressure). This creates lift.

Cockpit—Where the pilot and the co-pilot sit. This is where all of the controls are located for the control surfaces.

Control Surfaces—These are movable parts of the airplane that are essential to steering the airplane while on the ground as well as in the air.

Drag—Refers to forces that will slow down the aircraft or disrupt the airflow over the aircraft. In aircraft design the higher the amount of Drag means the less efficient the aircraft: the engine and propeller will have to work harder to propel the aircraft through the air, the lifting surfaces will have to create even more Lift to take off etc.

Elevator—One of the Control Surfaces. It controls Pitch, or elevation. It will extend above or below the Horizontal Stabilizer.

Engine—The power source for the aircraft. The engine will turn the Propeller or Rotary Blades to propel it through the air.

Flap—One of the control surfaces. It will extend down below the wing. It can be used to create extra Lift or to create extra Drag, which slows down the airplane's air speed in order to come in for a safe landing.

Fuselage—(pronounced: few-sell-awge) The "body" of the airplane. This is usually where cargo or passengers sit on larger airplanes. The Fuselage connects the cockpit to the Tail Section.

Helicopter, Airplane, Glider and Gyrocopter are different types of aircraft

Horizontal Stabilizer—It is the horizontal "mini-wing" usually located at the back of the airplane. It is essential to the stability of the airplane while in flight. The Elevators are attached to the Horizontal Stabilizer.

Lift—This is one of the elements that needs to be created in order for an aircraft to take off. This is caused by air flowing over the wings or other lifting surfaces. Because of the specific shape of the lifting surface, it will cause air to move faster on top than on the bottom. This creates a lower air pressure on top. The result is that the lifting surface will gravitate towards the lower air pressure, lifting the aircraft off the ground. It is opposite the force of gravity.

Lifting Surface—Any part of the aircraft that creates Lift. This could be wings, or rotary blades on a helicopter.

Propeller—These are blades that spin around causing the aircraft to move forward. They are attached to the engine. They can be located at the front or back of the aircraft.

Pusher Configuration—A specific design or configuration of an aircraft. This means that the Propeller is in the back of the aircraft pushing it through the air. Examples are the: Sea Bee, Silver Dart and Haseloh Gyrocopters.

Rotary Blades—These are the "wings" of aircraft such as Helicopters. They are in an Airfoil shape and create Lift.

Rudder—One of the Control Surfaces. It controls Yaw, which swings the tail of the airplane left or right.

Tail Section—The rear of the airplane. Usually it will consist of the Vertical and Horizontal Stabilizer as well as the Rudder and the Elevators.

Tractor Configuration—A specific design or configuration of an aircraft. This means that the Propeller is in the front of the aircraft pulling it through the air. Examples are the: DC-3 and Hawker Hurricane.

Vertical Stabilizer—It is the upright "fin" of the airplane. It is essential to the stability of the airplane while in flight. The Rudder is attached the Vertical Stabilizer.

Wing—The lifting surface. The wing needs air to move over and under it to create Lift. This is essential for flight.