A Day at the
Alberta Aviation Museum

Alberta Schools Grade 6 Science

TEACHER PACKAGE

2010

In the interest of safety to both people and the exhibits, please maintain supervision of your group at all times.

Aircraft Exercise Questions

1. Balloon

a. Describe the shape of the balloon in flight
quite round, inverted pear, light bulb, etc

b. What forces the balloon into that shape?
air pressure inside the envelope

c. What is the lifting force?
the air inside the balloon is warmer and less dense than the air outside it.

d. What do the gauges in the basket measure?
altitude, rate of climb or descent, direction

e. How does the pilot control the altitude of the balloon?
by warming the air or letting it cool

f. What do the tanks in the basket hold?
propane for the burner

2. Beech 18 or C-45 Aircraft (Lethbridge Air Service)

a. What type of engine provides the power?
Radial air cooled piston engines

b. What is the skin of the elevator made of?
fabric

c. What feature helps to streamline the aircraft in the air?
retractable landing gear

3. **Barkley Grow (Yukon Queen)**

   a. **What parts of the aircraft have been streamlined?**

      1. ***-landing gear has wheel pants or fairings***

      2. ***-nose is rounded***

4. **deHavilland Mosquito (Hairless Joe)**

   a. **What material has been used to construct the fuselage?**
      -plywood

   b. **What are the advantages of using this material?**
      -lighter, cheaper, more available at the time

   c. **What are the main drag reducing features of this aircraft?**
      -retractable wheels, rounded nose, streamlined shape

5. **Vickers Viking (Amphibian)**

   a. **Describe the fuselage design or what does the fuselage look like?**
      -looks like a boat, designed for water takeoff and landing

   b. **How is the thrust system different from other aircraft in the museum?**
      -the propeller is behind the engine and pushes instead of pulling the aircraft

6. **Waco (Red and White Biplane)**

   a. **How is more lift produced on this aircraft?**
      -it has two wings (biplane)

   b. **Are there penalties for this additional lift?**
      -increased weight and drag

7. **Fairchild 71C** **(folding wings)**

a. **What are the fuselage and tail covered with?**
-fabric

b. **Name the components of the tail that DO NOT move.**
-horizontal stabilizer
-vertical stabilizer

8. **Cranwell** **(one side of fuselage has no covering skin)**

a. **The internal structure looks quite fragile. Why not make it sturdier?**
-keep weight to a minimum

b. **What is the purpose of the criss crossed wires?**
-increase strength

9. **F86 Sabre** **(swept wings)**

a. **What feature on this aircraft can deliberately create drag?**
-speed brakes

c. **Why is this aircraft not fabric covered?**
-speed of flight is too high for fabric covering

c. **Sweeping the wings back allows what?**
-higher speed flight

d. **What is the type of propulsion system?**
-turbo jet engine

10. **Avro Anson** **(twin engine, yellow aircraft)**

a. **What is the purpose of the flat surfaces hanging down from the trailing edge of the wings?**
-the flaps increase lift, for slower speed flight without stall

Physics of Flight:

1. List the four main forces of flight with a brief explanation of each.

a. ***thrust***

b. ***lift***

c. ***drag***

d. ***weight***

2. Wings provide lift for stable flight. Explain the role of ailerons and how they work with wings in flight.

-ailerons move up or down from the trailing edge of the wing to decrease or increase lift for that wing. This causes the aircraft to move on the longitudinal axis.

3. Horizontal Stabilizers keep the aircraft in level flight. Explain use of the Elevators as a control surface at the trailing edge of the Stabilizer

-elevators move up or down from the trailing edge of the horizontal stabilizer to decrease or increase the lift of the stabilizer. This causes the aircraft to pitch up or down.

4. Explain the role of the Rudder in flight.

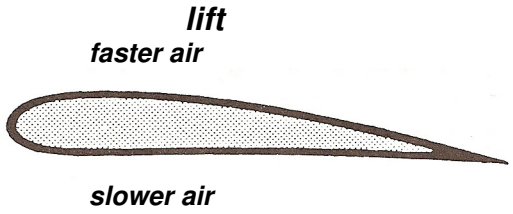
-the rudder moves left or right on the vertical stabilizer. This causes drag on the left or right side of the aircraft, and causes the aircraft to yaw to the right or left.

5. Contrast the ways that ailerons and elevators move. Explain why the difference is necessary.

a. Ailerons move…. ***Opposite to each other, simultaneously causing additional lift on one wing and decreasing lift on the other***

b. Elevators move…. ***up or down together, creating more or less lift at the horizontal stabilizer***

6. **Draw the airflow around the wing cross section shown below and use Bernoulli's principle to label the areas of Fast Air, Slower Air, and Lift.**



7. **On the above wing, as the Angle of Attack increases, the Centre of Lift shifts: (choose one)**

   a. **forward** ***-the centre of lift shifts forward***

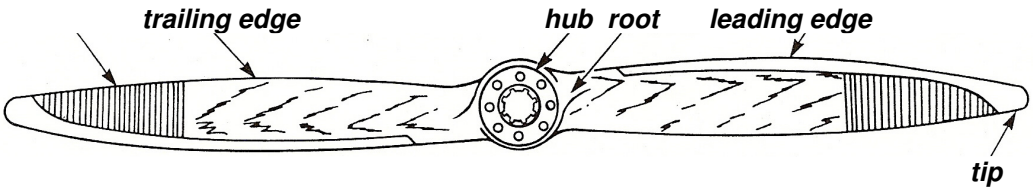
   b. **rearward**

8. **To make a more stable wing, the overall shape is given a slight bend, referred to as:**

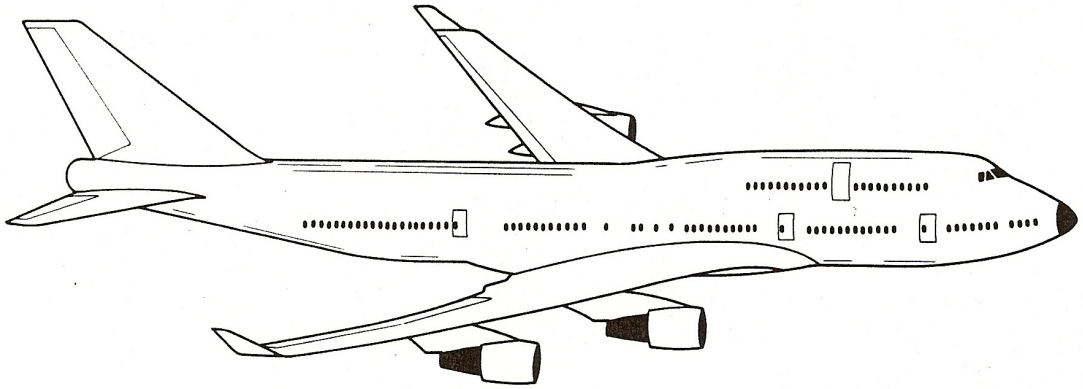
   -dihedral

9. **Propeller blades have a front surface curved like the upper surface of an airplane wing. As the propeller spins, the air pressure in front of the blades __*decreases*____. The ____*higher*__ pressure behind the blades moves toward the _____*lower*_____ pressure area in front and so produces thrust. The faster the propeller spins, the greater the force of thrust.**

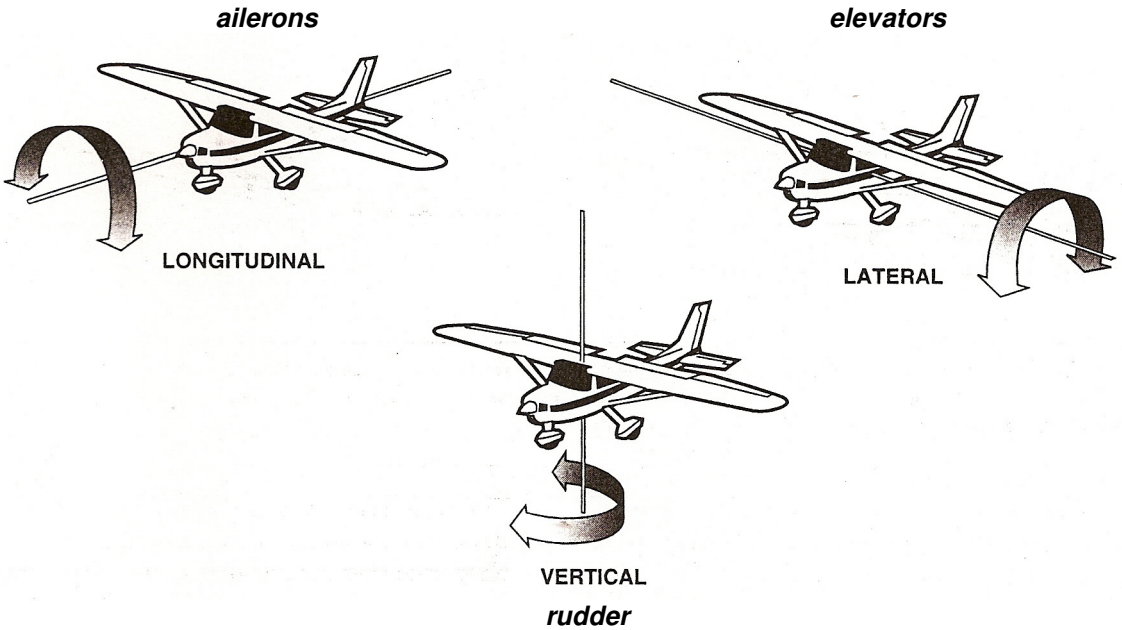
10. **Label the Hub, Root, Leading Edge, Trailing Edge, and Tip on the propeller diagram below.**



11. On the drawing of the aircraft below, add labels to identify Ailerons, Vertical Stabilizer, Elevator, Rudder, Leading Edge, Nacelle and Empennage.



12. On the drawing below, label the control surfaces that produce movement on each axis.



Glossary of Terms

Ailerons	**-Control movement on the Longitudinal Axis -movable control surface at trailing edge of Main Wing**
Airfoil	**A shaped structure that creates lift by movement through the air (Wing, Propeller, Stabilizer)**
Cockpit	**Forward part of the fuselage where the pilots are situated**
Dihedral	**Slight upward angle of wings to increase stability**
Elevators	**-Control movement on the Lateral Axis -movable control surface at trailing edge of Horizontal Stabilizer.**
Empennage	**Tail structure of the aircraft**
Flap	**Retractable surface on the lower part of the wing used to increase LIFT for takeoff and drag for landing**
Fuselage	**Body of the aircraft**
Horizontal Stabilizer	**Small wings on tail of aircraft**
Landing Gear	**Wheels, Skies or Floats (also called undercarriage)**
Leading Edge	**The front edge of an Airfoil**
Nacelle	**Engine enclosure**
Rudder	**-Controls movement on the Vertical axis -movable control surface at trailing edge of Vertical Stabilizer.**
Trailing Edge	**The rear edge of an Airfoil**
Vertical Stabilizer	**Vertical fin at rear of aircraft**
Wheel Pants	**Streamline enclosure around wheels on aircraft where landing gear cannot be retracted**

ALBERTA AVIATION MUSEUM

Grade 6 Teacher Feedback Form 2009/10

Please do us the favour of taking a couple of minutes to complete this form. We wish to improve both the program content and quality of instruction. Return this form to the museum instructor. Thank you for your assistance.

School:_____ Date: D M Y / /

	(circle one)
Student interest level in displays and aircraft	**good fair poor**
Curriculum fit of program	**good fair poor**
Usefulness of print materials	**good fair poor**
Suitability of classroom space	**good fair poor**
Instructor's presentation of program	**good fair poor**
Instructor's explanation of theory and parts of aircraft	**good fair poor**
Did the instructor maintain the student's interest	**yes no**
Student reaction to program	**good fair poor**
Assistance of museum personnel	**good fair poor**
Overall rating of program	**good fair poor**
Will you use this program again next year?	**yes no**

Is there anything you would like added or subtracted from the museum program presented to your class today?

Additional comments

Edmonton Aviation Heritage Centre

Main Floor

268 ft. x 325 ft.= 87.100.00 Square Feet

Created by Barbara Cloney
on 20 November 2002
Updated: 13 January 2006