

Name _____



AIR RACE CLASSIC

TEACHER'S WORKBOOK

arc
Air Race Classic



www.airraceclassic.org

AIR RACE CLASSIC FAQ (Frequently Asked Questions)**1. WHAT IS THE AIR RACE CLASSIC?**

The Air Race Classic is an all-women's cross country airplane race that began in 1977 and is flown during daylight hours and under VFR (visual flight rules) during the last two weeks of June.

2. WHAT ARE THE QUALIFICATIONS OF THE RACERS?

Racers must be women pilots who are certified as a Private Pilot or higher grade by the FAA (Federal Aviation Administration). The racers work in teams of two and the pilot or co-pilot must hold either a current instrument rating or have a minimum of 500 flight hours as PIC (pilot in command). Both pilot and copilot must hold a current medical certificate and show evidence of a required flight review or added rating. The team may carry extra teammates who have a current student certificate or current or expired medical certificate.

3. WHAT KIND OF AIRPLANES CAN BE ENTERED?

Fixed wing airplanes of not less than 100 and not more than 600 horsepower are eligible to be flown in the race.

4. HOW CAN THE RACE BE FAIR SINCE THERE IS A VARIANCE IN THE HORSEPOWER?

Airplanes are assigned a handicap based on results of a flight on a square course at a designated altitude. All airplanes must have a current annual inspection and can only be modified through FAA airworthiness specifications. Rigid rules govern the eligibility of the airplanes which undergo an inspection before and after the race.

5. HOW LONG IS THE RACE?

The race route varies each year and is approximately 2500 statute miles in total. The race consists of eight or nine legs each one between 150 and 350 statute miles in length that must be completed in four days.

6. HOW ARE RACERS TIMED?

Racers fly over a timing line at each airport and this time is recorded by personnel on the ground. This occurs at the start and finish of each leg. The cumulative times become the score for the team and is compared to scores for other teams.

7. HOW IS THE WINNER DECLARED?

The goal for each team is to beat their handicap speed as much as possible. The team that surpasses its handicap by the greatest amount of speed compared to all the other racers wins the race.

8. WHAT ARE THE PRIZES FOR THE WINNERS?

Monetary awards and medals are given to the top ten teams. Leg prizes are given to winners not in the top ten and consist of monetary awards and medals. The approximate total purse for the race is \$16,000. A trophy is awarded to the top placing college or university team.

9. WHAT ARE THE 'SECRETS' TO WINNING?

The goal is for a team to fly the 'perfect' cross country race. This means that a variety of conditions be considered and planned carefully: (1) weather including winds aloft which will produce the greatest thrust, (2) airplane knowledge, (3) navigational expertise, (4) weight consciousness—flying as light as possible without compromising safety, (5) compatible pilot and copilot.

10. WHY DO WOMEN RACE AIRPLANES?

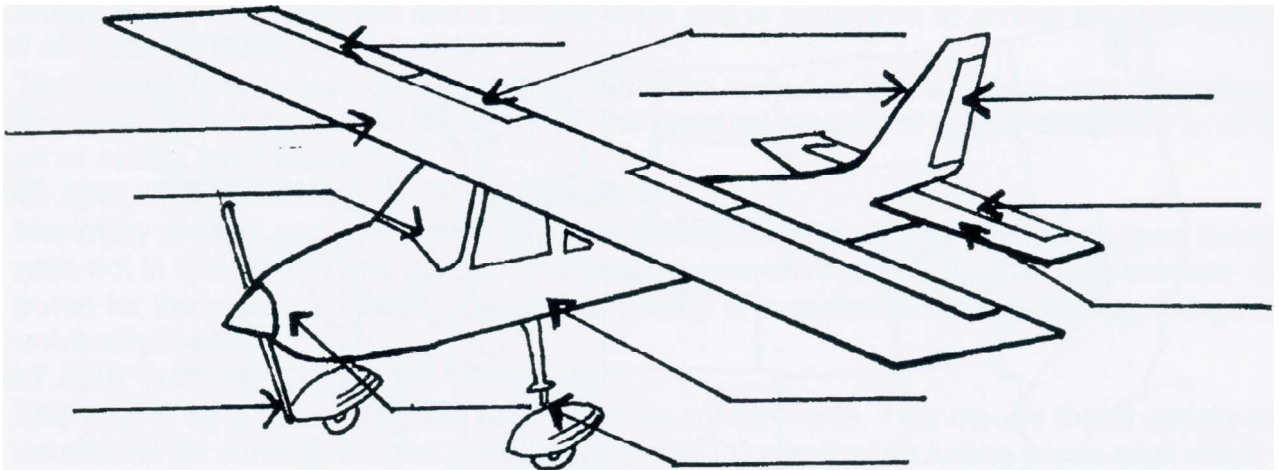
According to a recent study, women race to sharpen aviation skills, for the challenge, to see the country, and to enjoy the competition, camaraderie of women, & experience.

ACTIVITY SHEET (Suitable for Elementary Grades) Reproducible

- The Air Race Classic logo consists of three birds. The official colors of ARC are red and white.
DIRECTIONS: Fill-in the birds in red.

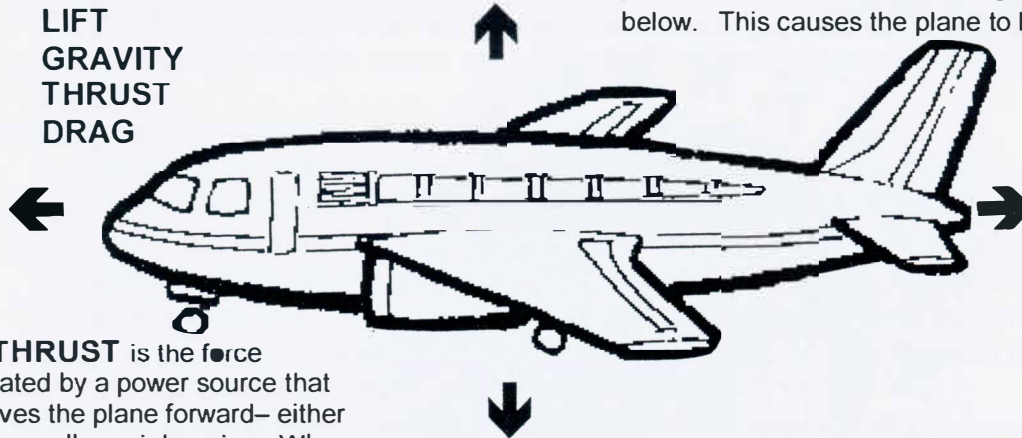


-
- **PARTS OF AN AIRPLANE:** Label the parts of the airplane with the following terms: *ailerons, cockpit, rudder, elevator, propeller, fuselage, flaps, landing gear, engine, vertical stabilizer, horizontal stabilizer, wing.*



WHAT MAKES AN AIRPLANE FLY?**Answer: Airplane's four forces, parts of an airplane, and the shape of the wing****FOUR FORCES:**

LIFT
GRAVITY
THRUST
DRAG



LIFT is created by the shape of the wing, which makes air pressure above the plane's wing less than the pressure below. This causes the plane to lift upward.

DRAG is the force that slows the forward movement of the plane through the air. When drag is increased, the plane slows down.

THRUST is the force created by a power source that moves the plane forward— either by propeller or jet engine. When the thrust is greater than the drag, the plane moves forward.

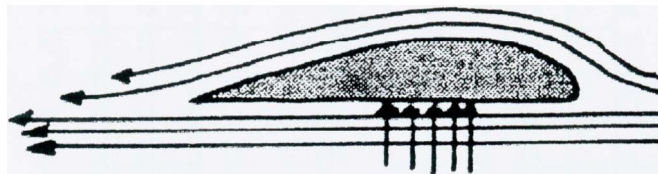
GRAVITY is the force pulling the plane down. When gravity is stronger than the lift, the plane goes down.

SHAPE OF THE WING: Notice the shape of the wing in the drawing. Most airplane wings are shaped this way. The top of the wing is curved and the bottom is flat. As a plane flies, some of the air moves over the wing. Some of it goes over the top.

The air going over the top must travel farther and faster to reach the back edge at the same time as the slower air going underneath. This makes air pressure going over the top of the wing lower than the air pressure going across the flat bottom.

Since there is less air pressure above, and more pressure below, the airplane gets the LIFT it needs.

Faster moving air creates less pressure...



VOCABULARY

- AILERON-hinged surfaces on the wings which control rolling movement.
- AIRPLANE-a mechanically-driven, fixed-wing, heavier-than-air craft.
- AIRPORT-a tract of land or water for the landing and takeoff of an aircraft.
- COCKPIT-the inside area of an airplane where the pilot and copilot sit.
- CROSS COUNTRY-a flight which must have a landing point more than 50 nautical miles from the original departure point.
- ELEVATOR-hinged flaps on the rear surface which control climb and dive.
- ENGINE-part of the airplane that provides power which generates thrust.
- FEDERAL AVIATION ADMINISTRATION (FAA) - governmental agency which regulates aviation.
- FIXED WING AIRPLANE-aircraft which has wings permanently fixed to fuselage.
- FLIGHT REVIEW-pilot conducts flight under supervision of a certified flight instructor and is evaluated in aeronautical proficiency.
- FUSELAGE-main body of an airplane which encases the cabin and storage areas.
- HORIZONTAL STABILIZER-fixed surface which is used to control horizontal rotations (yaw).
- INSTRUMENT RATING-advanced rating in which proficiency is demonstrated in navigation of an airplane solely by reference to instruments
- LANDING GEAR-wheels attached to bar which provide cushion when taxiing or landing an airplane
- LEG-distance between departure and landing points.
- NAVIGATIONAL AID-electronic or visual device which designates point to point guidance.
- PILOT IN COMMAND (PIC) - the pilot who is responsible for the operation and safety of the airplane.
- PRIVATE PILOT-certification for a pilot.
- PROPELLER-an airfoil which an engine turns to provide thrust.
- RUDDER-control surface hinged to the back of the vertical fin.
- RUNWAY- a level surface either paved or grass on which an airplane can takeoff and land.
- RUNWAY MARKINGS-standard symbols painted onto runways and taxiways that indicate various rules to follow.
- VERTICAL STABILIZER - fixed surface which is used to control pitch of airplane
- VISUAL FLIGHT RULES (VFR) -rules that govern procedures for conducting flight in visual conditions.
- Weather - atmospheric conditions which affect life; refer to short term events as opposed to climate
- Winds aloft - speed of winds at 3000, 6000, 9000, 12000, 18000, 24000, 30000, 34000, and 39000 feet above sea level.
- Wing - a part of an airplane that generates lift

3. FILL IN THE BLANK

WORD BANK

weather

women

handicap

weight consciousness

timing line

42

winner

money

2400

VFR

winds

teammates

daylight

compatible pilot/copilot

private pilot

two

medals

- The Air Race Classic has been in existence for _____ years.
- The Air Race Classic is flown during _____ hours and under _____ conditions.
- Racers must be _____ pilots who are certified as _____ or higher.
- Racers work in teams of _____ and may carry extra _____.
- Airplanes are assigned a _____ based on a monitored flight in a square course at a designated altitude.
- The race route varies each year and is approximately _____ statute miles in length.
- Racers are timed by flying over a _____ at each airport.
- The _____ of the race is determined by the team that bests its handicap by the greatest amount of speed.
- A secret to winning is to consider the _____ including _____ aloft which will produce the greatest thrust.
- Airplane knowledge, navigational expertise, _____, and _____ are also considered important in winning.
- Winners are awarded _____ and _____.

4. INVESTIGATIONS (ELEMENTARY)

- What are the four forces on an airplane? How does an airplane fly?
- Pilots communicate over the radio in 'phonetic' alphabet.
- Wilbur and Orville Wright are credited with *inventing* the Wright Flyer and accomplished the first successful powered flight. Research their work and be able to talk about their experience.
- Describe the parts of an airplane: *aileron, wing, cockpit, engine, rudder, propeller, flaps, fuselage, elevator, landing gear, horizontal and vertical stabilizers.*
- What skills do you think are necessary to be a pilot? An airplane mechanic? An airport controller?
- Research different types of airplanes and their flight configurations.
- Research navigational skills necessary to fly cross country.

INVESTIGATIONS (ADVANCED)

- Research weather forecasts and charts. Review abbreviations and contractions commonly used by the weather service. Predict weather in specific locations based on existing reports.
- Invite a meteorologist to present a program on weather prediction and the role of weatherman.
- Study the laws of physics and be able to discuss what makes an airplane fly.
- Research the Bernoulli Principle and explain how an airplane flies.
- Obtain a sectional chart which is used for navigation by pilots. Study the legend and chart a cross country course, identifying airports, elevation changes, mileage, and significant data necessary for a successful flight.
- Obtain a compass and chart courses utilizing directional figures found on a compass.
- Investigate the powerplant of an airplane. A commonly used powerplant is the gasoline-powered internal combustion engine. Research the mechanics of power and how thrust is produced.
- Determine what items a pilot would carry in an airplane for survival. Consider flight over mountains, desert, water, winter and summer weather temperatures.

RESOURCES (Air Race Classic)

- <http://www.airraceclassic.org>
- Jessen, Gene Nora (2002) *Powder Puff Derby of 1929* Illinois: Sourcebooks, Inc.
- Mallery, Pauline L. (2000) *Racing in the Skies* North Carolina: Fine Books Publishing Co.
- The Ninety-Nines, Inc. [online] Available gopher: www.Ninety-nines.org/arctips.html Air Race Classic tips, July 25, 2000
- Ringenberg, Margaret J. (1998) *Girls Can't Be Pilots* Indiana: Daedalus Press
- Tennyson, Elizabeth A. (2001 October) *Racing to Learn* Flight Training, 26-34.
- Van Newkirk, Carolyn J. (2001) *History of Women's Air Races* Oklahoma: The Ninety-Nines, Inc.
- Walters, Claire L. (1999) *This Flying Life* California: Air Woman Press

RESOURCES (Aviation)

- Websites:
 - www.mnaero.com/aved 24 page booklet entitled *Historical Aircraft Connect-the-Dots* Minnesota Department of Transportation Office of Aeronautics. Click on "Students" then "Activity Book".
 - <http://ksnn.larc.nasa.gov/aeroplane/activity.html> Construct an edible Wright Flyer using graham crackers, pretzel sticks, and frosting. Recipe from NASA's Kids Science News Network.
 - www.first-to-fly.com/Adventure/Workshop/modelkits.htm Construct your own Wright Flyer model from \$14.95 through \$69.00.
 - <http://store.doverpublications.com> Color the drawings of 47 aircraft including the Concorde and the Spirit of St. Louis. *History of Flight Coloring Book* by A. G. Smith, Dover Press
 - <http://earlybirds.org/menu.html>. Download three views and plans to build pioneer aircraft models. Early Birds of Aviation
- Other Resources:
 - Yoder, Carolyn P., Editor-in Chief (1984 December) *The Wright Brothers and the Story of Aviation* Cobblestone 1-48.

AVIATION SECTIONAL (VFR chart)

Use the legend as a guide and see how many symbols you can find on the chart.

AIRPORT TRAFFIC SERVICE AND AIRSPACE INFORMATION

Only the controlled and reserved airspace effective below 18,000 ft. MSL are shown on this chart. All times are local.

- Class B Airspace
- Class C Airspace (Mode C See F.A.R. 91.215/AIM.)
- Class D Airspace
- Class E (fsc) Airspace
- Class E Airspace with floor 700 ft. above surface.
- Class E Airspace with floor 1200 ft. or greater above surface that abuts Class C Airspace.

2400 MSL Differentiates floors of Class E Airspace greater than 700 ft. above surface

4500 MSL Class E Airspace ceiling at 1900' AGL unless otherwise designated as shown above.

Class E Airspace low altitude Federal Airways are indicated by center line.

Intersection - Arrows are directed towards facilities which establish intersection.

Total mileage between NAVAIDs on direct Airways. **169**

Prohibited, Restricted, Warning and Alert Areas Canadian Advisory and Restricted Areas

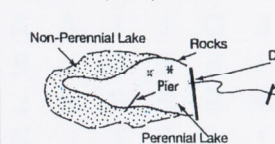
MOA - Military Operations Area

Special Airport Traffic Areas (See F.A.R. Part 93 for details)

TOPOGRAPHIC INFORMATION

- Roads
- Road Markers
- Railroad
- Bridges And Viaducts
- Power Transmission Lines
- Aerial Cable
- Landmark Feature - stadium, factory, school, golf course, etc.
- Outdoor Theatre
- Lookout Tower P-17 (Site Number) 618 (Elevation Base of Tower)
- Coast Guard Station
- Race Track
- Tank - water, oil or gas
- Oil Well
- Water Well
- Mines And Quarries
- Mountain Pass 11823 (Elevation of Pass)

(Pass symbol does not indicate a recommended route or direction of flight and pass elevation does not indicate a recommended clearance altitude. Hazardous flight conditions may exist within and near mountain passes.)



OBSTRUCTIONS

- 1000 ft. and higher AGL
- below 1000 ft. AGL
- Group Obstruction
- Obstruction with high-intensity lights May operate part-time
- Elevation of the top above mean sea level
- Height above ground
- Under construction or reported; position and elevation unverified

NOTICE: Guy wires may extend outward from structures.

MISCELLANEOUS

- Isogonic Line (2000 VALUE)
- Ultralight Activity
- Flashing Light
- Hang Glider Activity
- Marine Light
- Glider Operations
- Parachute Jumping Area (See Airport/Facility Directory)
- VPXYZ VFR Waypoints (See Airport/Facility Directory)
- NAME (VPXYZ)

AIRPORTS

- Other than hard-surfaced runways
- Seaplane Base
- Hard-surfaced runways 1500 ft. to 8069 ft. in length.
- Hard-surfaced runways greater than 8069 ft. or some multiple runways less than 8069 ft.
- Open dot within hard-surfaced runway configuration indicates approximate VOR, VOR-DME, or VORTAC location.

All recognizable hard-surfaced runways, including those closed, are shown for visual identification. Airports may be public or private.

ADDITIONAL AIRPORT INFORMATION

- Private (Pvt) - Non-public use having emergency or landmark value.
- Military - Other than hard-surfaced. All military airports are identified by abbreviations AFB, NAS, AAF, etc. For complete airport information consult DOD FLIP.
- Heliport Selected
- Unverified
- Abandoned - paved having landmark value, 3000 ft. or greater
- Ultralight Flight Park Selected

Services - fuel available and field tendered during normal working hours depicted by use of ticks around basic airport symbol. (Normal working hours are Mon thru Fri 10:00 A.M. to 4:00 P.M. local time) Consult A/FD for service availability at airports with hard-surfaced runways greater than 8069 ft.

