ACTIVITY: Language

IF PILOTS HAVE TO SPELL OUT WORDS ON THE RADIO, THEY USE AVIATION'S PHONETIC ALPHABET:

Alpha	**Q**uebec (kuh-BEK)
Bravo	**R**omeo
Charlie	**S**ierra
Delta	**T**ango
Echo	**U**niform
Foxtrot	**V**ictor
Golf	**W**hiskey
Hotel	**X**-ray
India	**Y**ankee
Juliet	**Z**ulu
Kilo	
Lima (LEE-muh)	**3** Tree
Mike	**9** Niner
November	**0** Zero
Oscar	All other numbers
Papa	standard pronunciation

SPELL OUT THE FOLLOWING WORDS USING THE PHONETIC ALPHABET:

1. PILOT _____

2. AIRPLANE _____

3. SCHOOL _____

4. Name of your school mascot _____

5. Your city or town _____

6. Your first name _____

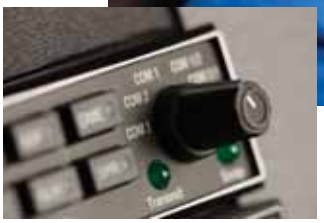
7. Your teacher's name _____

8. The color of your school bus _____

WHEN PILOTS TALK ON THE RADIO, THEY USE STANDARD, ABBREVIATED WORDS THAT STAND FOR TYPICAL MESSAGES OR IDEAS.

See if you can match these messages with the correct radio language!

Message	Radio Language
1. No, I can't do that	_____ Roger
2. I heard you	_____ Say Again
3. Didn't understand, repeat	_____ Wilco (Hint: Will Comply)
4. Yes	_____ Unable
5. Yes, I'll do that	_____ Affirmative



ACTIVITY: Language

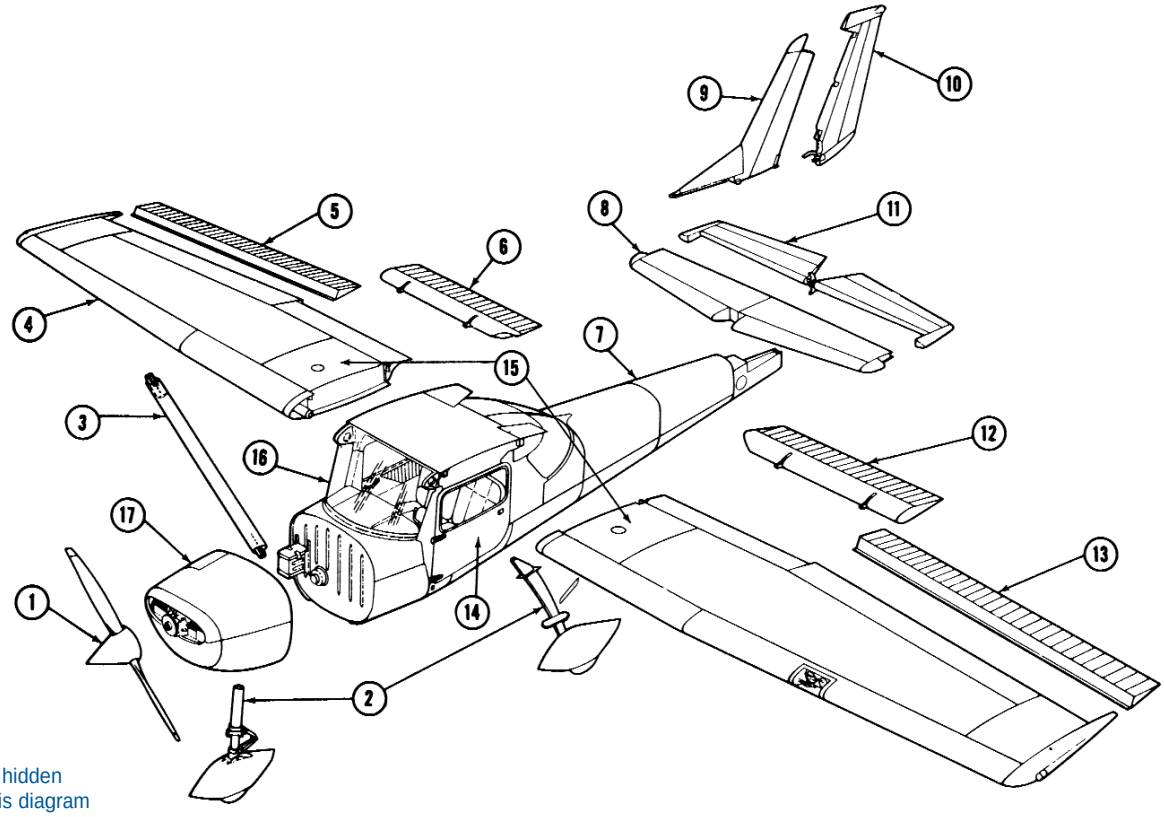
AIRCRAFT ARE CALLED ON THE RADIO BY THEIR "TAIL NUMBER" (THEIR FAA REGISTRATION NUMBER.)

In the United States, they all begin with "N" ("November.")

How would you call these aircraft on the radio? Use the phonetic alphabet for all letters.

ACTIVITY: Aircraft Basics

THE MAIN PARTS OF AN AIRPLANE



* Left wing strut hidden under wing in this diagram

THE MAIN PARTS OF AN AIRPLANE

1. Propeller
2. Landing Gear
3. Right Wing Strut*
4. Wing
5. Right Aileron
6. Right Flap
7. Fuselage
8. Horizontal Stabilizer
9. Vertical Stabilizer
10. Rudder
11. Elevator
12. Left Flap
13. Left Aileron
14. Door
15. Fuel Tanks
16. Windshield
17. Engine Cowl

ACTIVITY: Aircraft Basics

DID YOU LEARN THESE NEW WORDS?

The "body" of an airplane: F_ _ _ _ _ _ _

The "hood" that covers the engine: ENGINE C _ _ _

The flight control on the horizontal stabilizer that raises or lowers the nose: E _ _ V _ _ _ _

Like on a boat, the flight control on the vertical stabilizer that turns the airplane's nose right or left: R _ _ _ E _

The role of the airplane's tail is to balance and steady its flight. That's why its horizontal part and its vertical part are both called a: S _ _ B _ _ _ Z _ _

Near the tip of the wing, the flight control that banks the wing for a turn is an: A _ _ _ R _ _

Also on each wing is a F _ _ _ . When lowered for takeoff and landing, it changes the shape of the wing to create more lift.

On a high-wing airplane, a pole-like structure provides additional support to the wing. It is a: S _ _ _ T

ACTIVITY: Aircraft Basics

WRITE THE NAME OF EACH PART OF AN AIRPLANE UNDER ITS PICTURE:

_____

_____

Wing Strut

Propeller

_____

_____

Flap

Rudder

_____

_____

Aileron

Elevator

_____

_____

Tail

Wing

ACTIVITY: Flight Controls

FOLLOW THESE INSTRUCTIONS TO BUILD YOUR OWN GLIDER.

MATERIALS:

Sheet of paper
Paper clips
Room to throw

TO DO IT:

Folded Paper Glider

1. Fold paper in half lengthwise and crease.

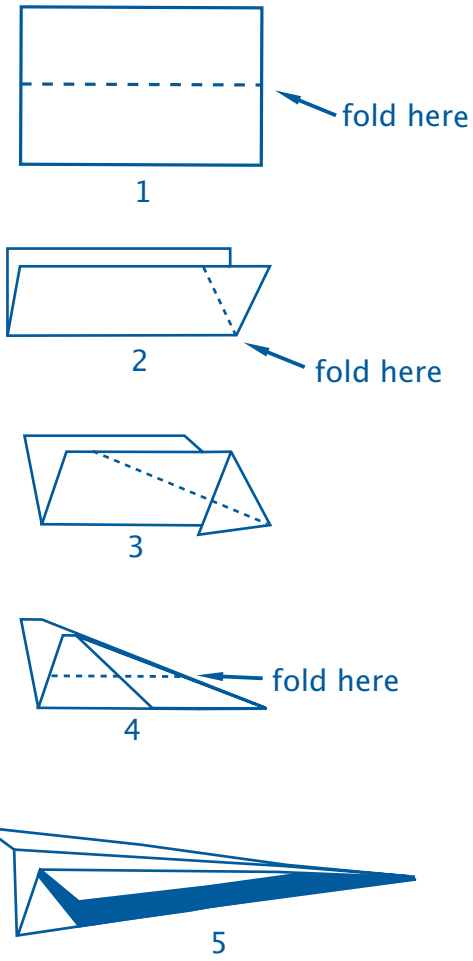
2. Fold down the corner of one side so the edge is even with the folded side of your original crease. Flip paper over and repeat to form a point.

3. Fold down the angled edge on one side so it is even with your original fold. Flip and repeat. You should now have a more narrow point.

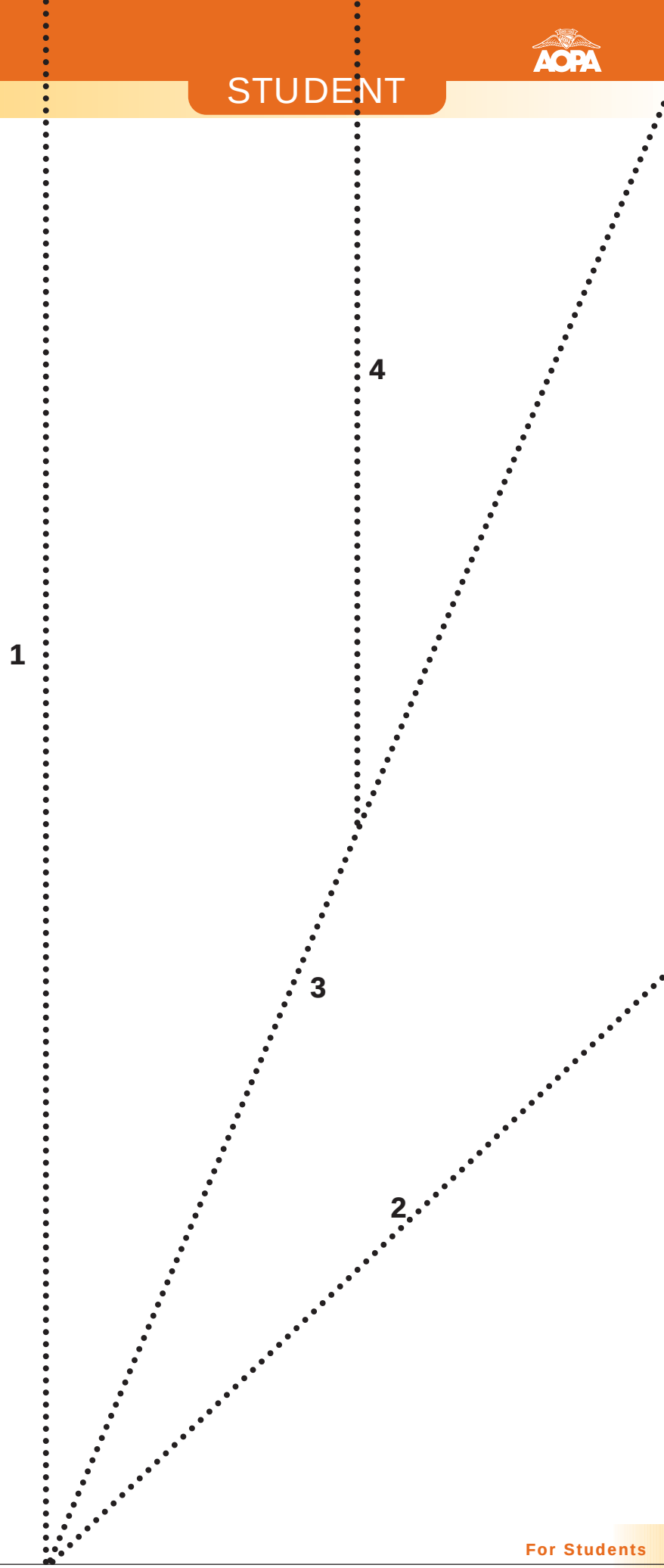
4. Make a third fold that brings your new top edge even with the bottom of your original fold.

5. Push up the wings so they are perpendicular to the body of your airplane. Try launching your airplane

   (Tip: If it seems "nose heavy" use paperclips near the rear of the airplane to add weight and help keep the nose up. You may need 2-3 paperclips)



FOLLOW THESE INSTRUCTIONS
TO BUILD YOUR OWN GLIDER.



ACTIVITY: Flight Controls

CIRCLE ONE OR FILL IN THE BLANKS:

1. To turn the plane, the pilot turns the control wheel **LEFT / RIGHT** to start a left turn.
2. Turning the control wheel makes the wings tilt or "B __ __ __."
3. To start a turn to the right, the pilot would turn the control wheel to the **LEFT / RIGHT**.
4. To help coordinate the turn, the pilot uses the R __ __ __ __ R.

CIRCLE ONE:

1. To facilitate a left turn, the pilot pushes the **LEFT / RIGHT** rudder pedal.
2. To start a climb, the pilot **PUSHES FORWARD / PULLS BACK** on the control wheel.
3. To start a descent, the pilot **PUSHES FORWARD / PULLS BACK** on the control wheel.

ACTIVITY: Aerodynamics

CIRCLE ONE OR FILL IN THE BLANKS:

1. A propeller moves an airplane _____ by creating thrust.

2. For every action there is an _____ and _____ reaction, according to Newton.

3. Air flowing over and under the wings generates _____ which makes an airplane conquer gravity and fly.

4. _____ is air resistance created by airplane parts in the air stream.

TRUE OR FALSE:

1. _____ Air moves slower around the curved top part of a wing.

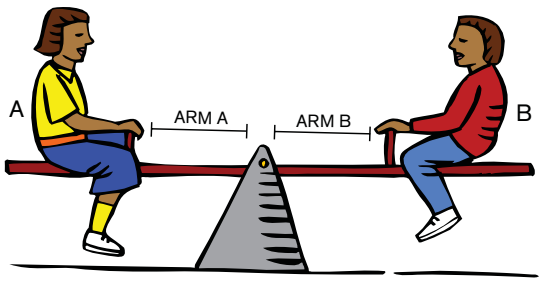
2. _____ Air moving over the wing creates higher air pressure above the wing.

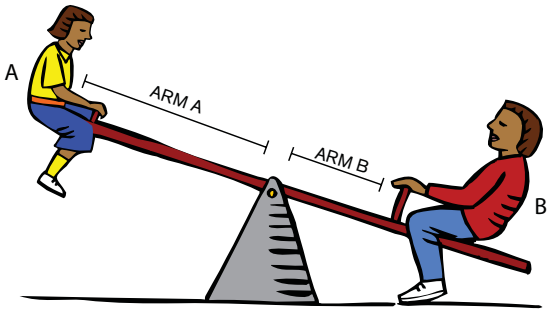
3. _____ Lift can overcome the effects of gravity.

4. _____ The shape of a wing has no affect on how much lift is produced.

ACTIVITY: Weight and Balance

AS ON A TEETER-TOTTER, ALL WEIGHTS IN AN AIRPLANE (OCCUPANTS, FUEL, CARGO) MUST BE BALANCED.





On a teeter-totter, the point where the weight of each child is balanced is called the **fulcrum**. Balancing the teeter-totter is determined by the product of: 1. the weight of each child 2. the distance of each child from the fulcrum.

(weight of Child A x Arm A = weight of Child B x Arm B)

On an airplane, the fulcrum is called the **center of gravity** (CG). It reflects the sum of a number of weights along the length of the plane (like having several children on one side of the teeter-totter, not just one!) Some of these weights include:

1. the pilot and front seat passenger
2. the back seat passengers
3. cargo/baggage behind the back seat
4. the weight of fuel in the wings
5. the weight of the plane itself

Because the engine (in front) is the heaviest part of a plane, most of these varying weights are on or behind the plane's center of gravity (at the wing).

ACTIVITY: Weight and Balance

CIRCLE ONE OR FILL IN THE BLANKS:

1. The point where a teeter-totter rests is called a fulcrum. **TRUE / FALSE**

2. Kathryn and Kim each weigh 85 pounds they are sitting equally far from the center of the teeter-totter, they will B __ __ __ __ __ __ each other.

3. Jeffrey weighs 95 pounds and Jennifer weighs 72 pounds. Jennifer will have to sit **CLOSER / FARTHER AWAY** from the center than Jeffrey to counter-balance Jeffrey's weight.

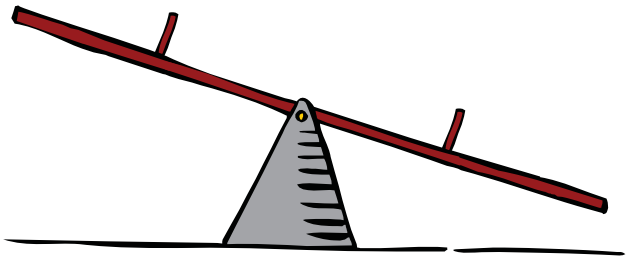
4. The distance from the center of balance (fulcrum) to the weight of each child is call the A __ __.

5. Two factors determine if each child will be in balance:

A. the child's W __ __ __ __ __ and

B. the distance to the center of balance (__ __ M)

6. The one point on a beam (like our teeter-totter) where all weights and distances balance is called the fulcrum. In an airplane, it is called the center of G __ __ __ __ __ __.



ACTIVITY: Weight and Balance

CIRCLE ONE OR FILL IN THE BLANKS:

1. In the air, the weight of the plane, its equipment and all the people, cargo and fuel in it have one __ E __ __ __ __ of __ __ __ __ I __ __.

2. In the air, the center of gravity is somewhere along the W __ __ __, where the center of lift also is located.

3. The engine in the very front of the plane is one of the heaviest parts of the plane. No wonder the distance from the engine to the wing is **SHORTER / LONGER** than the distance from the wing to the tail.

4. The plane's front seats and fuel in the wings are very close to the center of gravity and the center of lift.

A. Carrying a heavier pilot and passenger in the front seats will likely have **A LARGE / A SMALL** effect on the balance of the airplane.

B. Carrying more fuel will add weight, but will have **A LARGE / ALMOST NO** effect on the balance of the airplane.

5. The passenger seats are in the rear of the plane, and the cargo bin is even further back (behind the rear seats and well behind the wing).

A. Carrying passengers in the rear seats will likely have an effect on the plane's balance. **TRUE / FALSE**

B. Carrying a little cargo in the cargo bin will have no effect on the plane's balance. **TRUE / FALSE**

6. The safe flight of an airplane depends on both __ __ __ G __ __ and __ __ L __ __ __ __ .

ACTIVITY: Instruments

NAME AND READ EACH INSTRUMENT

Name: _____

Speed: _____ knots

_____ mph

Name: _____

Altitude: __ , __ __ __ feet

Name: _____

Heading: _____ degrees

Name: _____

Is plane climbing? _____

Flying level? _____

Descending? _____

Name: _____

Altitude: __ , __ __ __ feet

Name: _____

Plane is banking:

___ Right? ___ Left?

Name: _____

Plane is turning:

___ Right? ___ Left?

Name: _____

Plane is banking:

___ Right? ___ Left?

ACTIVITY: Instruments

READ THE INSTRUMENTS* TO ANSWER THE QUESTIONS BELOW:

1. What is the airplane's indicated airspeed?
   __ __ __ knots
2. At what altitude is the airplane?
   __ , __ __ __ feet

3. The airplane is in a turn.
   What two instruments tell you?
   A. ARTIFICAL __ __ __ __ __ __ __
   B. TURN __ __ __ __ __ __ __ __ __ __ __

4. The airplane is descending.
   What instrument(s) tell you?
   V __ __ __ __ __ __ __
   S __ __ __ __
   I __ __ __ __ __ __ __ __

5. What direction is this plane flying?

THINK IT THROUGH... .

Since the airplane is banked and turning, is the airplane's heading going to change or stay the same?

_____

Since the airplane is descending, will the airspeed likely stay the same, decrease or increase?

_____

Read the Vertical Speed Indicator. How long will the airplane take to descend 1,000 feet? _____ minutes

ACTIVITY: Weather

Low stratus

Cumulonimbus

Pilots watch the clouds, because clouds can indicate the kind of weather in store for a flight.

FILL IN THE BLANKS OR CIRCLE ONE:

A. Stratus means flat or "on one level."

"Low stratus" (clouds near the ground) can be part of a wide area of poor weather near weather fronts. A stratus cloud at ground level is called F __ __.

Pilots who are certified to fly using instruments only can fly in the low ceilings and poor visibilities typical of low stratus clouds.

B. Cumulus means "clumped." Large, tall cumulus clouds can have dark bottoms (bases) indicating they have grown vertically and now block out the sun's light.

When clouds grow enough vertically, they can produce R __ __ __ by elevating their water vapor until it cools and condenses into water drops which are heavy enough to fall. We call this precipitation.

When these clouds grow very tall (20,000 to 50,000 feet) and get very dark, they are called cumulonimbus – the cloud structure of a typical T __ __ __ __ __ __ storm.

If cumulonimbus clouds have grown massively in vertical development, rain will likely be **light / moderate / very heavy.** (circle one)

Cumulonimbus clouds grow with afternoon heat or when two air masses meet in a "front." At a front, warmer and cooler air meet. The warmer air is forced __ __ , making tall clouds that produce rain or thunderstorms.

ACTIVITY: Weather

Fair weather cumulus

High cirrus

Pilots can fly by avoiding these areas or flying around them.

C. Fair weather cumulus have little height (vertical development.) They have **little / great** potential to produce rain.

D. Cirrus clouds high altitudes where it is cold, are made of ice crystals, not water vapor. They usually indicate nothing but good flying weather.

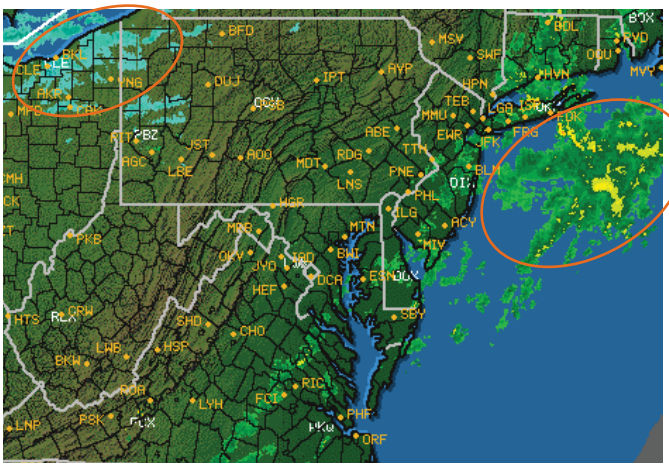
Near tall mountains, some types of windblown cirrus clouds can indicate turbulent air flow over the mountain – showing pilots areas of turbulence to avoid.

Clouds are the pilot's "road signs" to weather in the area.

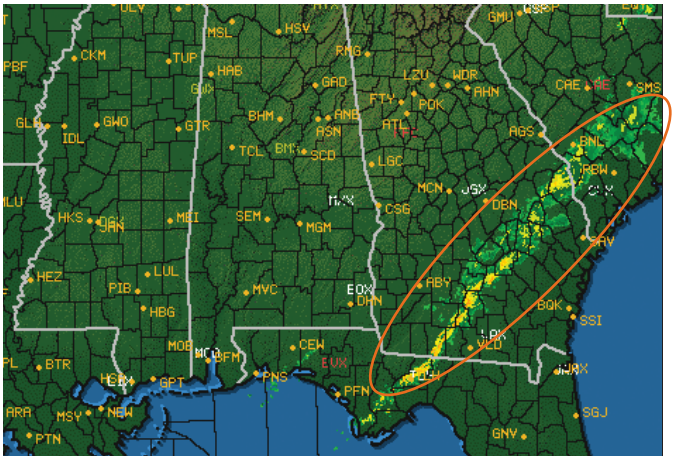
ACTIVITY: Weather

TODAY, PILOTS HAVE MORE THAN CLOUDS TO TELL THEM WHAT'S AHEAD.

WHAT DO THESE SATELLITE IMAGES TELL YOU ABOUT THE LOCAL WEATHER?



Map 1



Map 2

Weather reports, satellite photos and weather radar tell what the weather is beyond what can be seen.

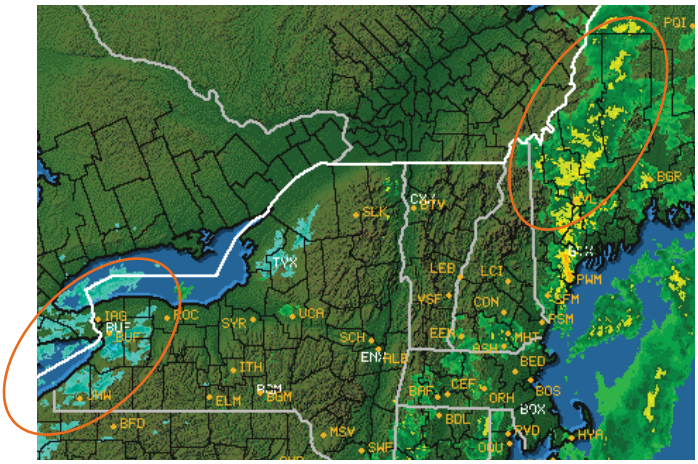
WHAT DO THESE RADAR IMAGES SAY ABOUT WEATHER IN THESE AREAS?

MAP 1: A line of R __ __ __ extends from Virginia to Connecticut. An area of R __ __ __ extends off-shore into the Atlantic. The heavier rain is shown in YELLOW.

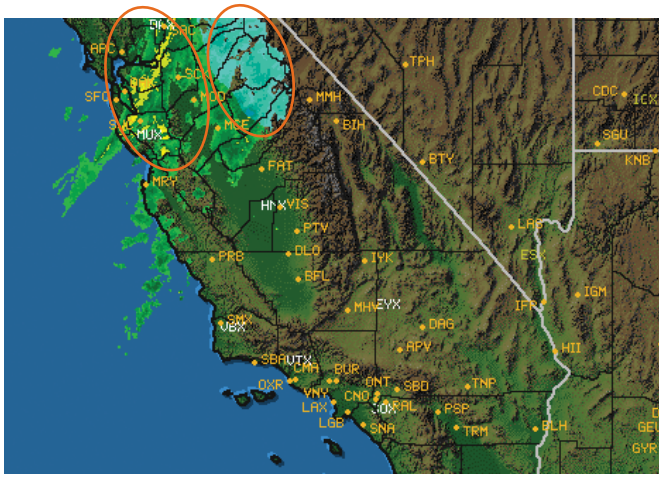
In northern Ohio and NW Pennsylvania, there is "lake effect" S __ __ __ blowing downwind of the Great Lakes, since precipitation in areas below freezing is shown in BLUE.

MAP 2: The Florida Panhandle, Georgia and South Carolina have a line of H __ __ __ __ rain and thunderstorms storms shown in YELLOW.

ACTIVITY: Weather



Map 3



Map 4

MAP 3: In Maine, there are embedded T _ _ _ _ _ _ storms shown in YELLOW. (Embedded: hidden inside areas of general rain.)

To the west, on the border with Canada, there is also L _ _ _ E _ _ _ _ _ snow (in blue) downwind of two Great Lakes.

MAP 4: Northern California near San Francisco and the normally warmer coast has an area of rain and a L _ _ _ of heavier rain (in YELLOW.)

An area of S _ _ _ is shown (in BLUE) in the normally colder Sierra Nevada, tall mountains east of the city near the Nevada border.

ACTIVITY: Weather

FILL IN THE BLANKS OR CHOOSE ONE:

1. Generally, **BAD / GOOD** weather is associated with high-pressure areas (H on the weather map) while L __ __ pressure areas (L on the weather map) often bring **POOR / BETTER** weather.

2. Air flows from high pressure areas towards __ __ __ pressure areas. Atmospheric pressure, called b __ __ __ m e t r i c pressure, is measured by a b __ __ __ m e t e r. When a Low is approaching, __ __ __ __ m e t r i c pressure **rises / falls**.

3. In the Northern Hemisphere, air circulation around a High is clockwise. Air circulation around a Low is c __ __ __ __ __ __ -clockwise.

4. The J __ __ Stream is described as a "river" of strong winds that snakes around the globe at high altitudes, where jets fly. It helps steer Highs and Lows (and associated storm systems) in their movement across the U.S.

5. Because of prevailing winds and the rotation of the e __ __ __ __, weather in the U.S. generally moves from West to __ __ __ __.

6. Temperature, wind and a __ __ pressure can change as a front passes by. After a cold front passes, it usually will be W __ __ __ y and cooler.

7. Since the cold front was probably generated by the inflow from a high pressure area, barometric pressure after a front passes will probably **fall / rise.**

8. Heating of the earth's surface by the sun during the day can cause c __ __ __ __ s to form or grow, if enough moisture is in the air. Lots of heating causes vertical development, leading to r __ __ __ or even a t __ __ __ __ __ __ storm.

TRUE OR FALSE

_____ Air tends to flow from areas of low pressure to areas of high pressure.

_____When two air masses meet, it is called a front.

_____Pilots cannot fly in the rain.

_____At higher altitudes, water vapor in clouds can create ice on aircraft, even in the summer.

ACTIVITY: Time

AVIATION TIME – FOR YOUR TRAVELS AROUND THE WORLD!

Aviators use "military time" or the "24-hour clock", rather than the 12-hour clock we know that goes around twice each day. Why? To eliminate confusion about "a.m." and "p.m." and to make time comparisons and conversions easier. Converting 12-hour to 24-hour time:

No difference in morning hours, just precede with a "0" (6:00 a.m. = 0600)
After 12:00 noon, just add 12 to the hours (3:00 p.m. = 1500)
In either case, minutes follow hours (no colon) (0615, 1530)

24-HOUR TIME: TRY IT OUT!

1. 1200 is 12:00 Noon. What time is 1PM? __ __ __ __

2. If you eat dinner at 6PM, what 24-hour time is that? __ __ __ __

3. If you start studying at 8 PM, what time is that? __ __ __ __

4. If you go to bed at 10 PM, it's.... __ __ __ __ in 24-hour time.

5. Oh, it's late! It's one minute before midnight, or __ __ __ __

DID YOU KNOW? "WORLD TIME" IS AVIATION TIME

How many time zones are there around the world, allowing the sun to be almost directly overhead at noon in every place? _____ (Hint: How many hours in a day... one rotation of the earth)?

One time zone is the basis for all other time. It is centered in Greenwich, England – the historical center of sea and air navigation at 0 degrees longitude. Once called Greenwich Mean Time (GMT), it's now Universal Coordinated Time (UTC).

Each of 24 time zones has a letter. World standard UTC is the last one, the Z or "Zulu" time zone. In the U.S. (being west of England), local time is so many hours "behind" Zulu time. (The sun — rising in the east — rises earlier in England, well before it does here!)

To convert our local time to Zulu time, we add however many hours difference there is between the two time zones.

ACTIVITY: Time

TO CONVERT BETWEEN UTC AND YOUR TIME ZONE, ADD OR SUBTRACT.

	(HI)*	(AK)	(PT)	(MT)	(CT)	(ET)
Standard (Winter) time:	10	9	8	7	6	5
Daylight (Summer) time:	9	8	7	6	5	4

1. What U.S. time zone are you in? _____

2. In winter, you add how many hours to make Zulu time? ____

3. In winter, when is your local noon in Zulu time? __ __ __ __ Z

4. In winter, when is your local midnight in Zulu time? __ __ __ __ Z

5. In winter, your 7 a.m. breakfast is at what time, Zulu? __ __ __ __ Z

6. In summer (daylight time), 1200Z is at what local time? __ __ __ __ Local Time

7. In summer, 0000Z (the end of the 24-hour clock and the beginning of a new day GMT) is at what time where you live? __ __ __ __ Local Time

* Hawaiian Aleutian Standard Time (HAST)

ACTIVITY: Temperature

Aviation, uses the Celsius (C) temperature scale rather than Farenheit (F).
It makes temperature calculations easier. Celsius is also called Centigrade because it has only 100 degrees between water freezing (0C rather than 32F) and water boiling (100C, not 212F.)

Use the following formulas to convert from Celsius to Farenheit or Farenheit to Celsius:

$$C = (F - 32) \times 5/9 \quad \text{or} \quad F = (C \times 9/5) + 32$$

WHAT DOES CELSIUS FEEL LIKE? (FILL IN THE BLANKS)

15C is a slightly chilly… __ __ F

20C is a comfortable… __ __ F

30C is a pretty warm… __ __ F

Body temperature is 98.6F or about… __ __ C

40C is a hot, hot….. __ __ __ F

C to F? Try it in your head!
- Double Celsius
- Subtract 10%
- Add 32

Why do pilots care about temperature?

AIRPLANE PERFORMANCE DECREASES WITH TEMPERATURE
Higher temperatures really mean that air molecules are moving faster. The air is therefore "less dense." The propeller cannot "grab" the air as well. The wing cannot generate as much lift.

1. Airplane A's takeoff performance decreases 10% for each 10C increase in temperature. If it normally needs 2,000 feet for a safe take-off, how much runway is needed when temperature is 30C above normal?
_____ feet of runway

2. Will a 3,000 foot runway be enough? **YES / NO**

ACTIVITY: Speed

THE SPEED OF PLANES, LIKE BOATS, IS MEASURED IN "KNOTS" OR NAUTICAL MILES (NM) PER HOUR.

A nautical mile is 15% larger than a regular "statute" mile.

To convert from miles to nautical miles, or mph to knots: Divide by 1.15
To convert from nautical miles to miles, or knots to mph: Multiply by 1.15

TRY IT:

1. 100 knots is __ __ __ miles per hour.

2. 100 miles per hour is __ __ knots.

3. Surface winds near a thunderstorm can be 70 knots or __ __ mph!

4. A jet flying at 500 knots is going __ __ __ miles per hour.

AVIATION WEATHER REPORTS SHOW WIND SPEEDS IN KNOTS. WHY?

Airspeed + / - Winds Aloft = Groundspeed

To the plane's airspeed, the pilot has to add a tailwind or subtract a headwind to know "groundspeed" — how fast the plane is travelling over the ground.

1. You're flying at 100 knots with a 20-knot tailwind. Your groundspeed is __ __ __ knots.

2. You're flying at 100 knots with a 20-knot headwind. Your groundspeed is __ __ knots.

3. This 20-knot headwind (at 100 knots airspeed) cuts the plane's groundspeed by __ __ per cent.

4. In a plane flying at 200 knots airspeed, a 20-knot headwind cuts the plane's groundspeed by __ __ per cent.

ACTIVITY: Time/Speed/Distance

TIME/SPEED/DISTANCE CALCULATIONS ARE KEY TO FLIGHT PLANNING – TO PREDICT WHEN YOU'LL ARRIVE, AND TO KNOW HOW MUCH FUEL TO CARRY.

1. With 100 knots airspeed and 20 knot headwind, how long will it take to fly to a city 160 nm ahead?

____ hours

2. With a 150 knot airspeed and 30 knot tailwind, how long will it take to fly to a city 360 nm ahead?

____ hours

LET'S DO SOME REAL-WORLD FLIGHT PLANNING:

Assume the following for the questions below:

Your destination is 300nm away from you.
Your airplane flies at a cruise speed of 120 knots.
Fuel consumption is a constant 8 gallons per hour (gph).
For safety, you must have at least 30 minutes of fuel remaining on arrival.

1. It's 12:00 noon and you must be at your destination by 2 p.m. You will make it on time if you have a ___ knot tailwind.

2. If you have NO tailwind, how long will it take you to reach your destination?

___ hours ___ minutes

3. If you have 24 gallons of fuel remaining, you'll need a tailwind of ___ knots to land with one hour of fuel remaning.

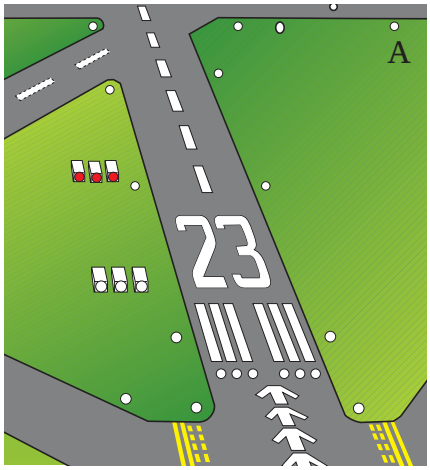
4. With NO tailwind and clear weather at your destination, will you have 30 minutes of fuel remaining when you arrive? **YES / NO**

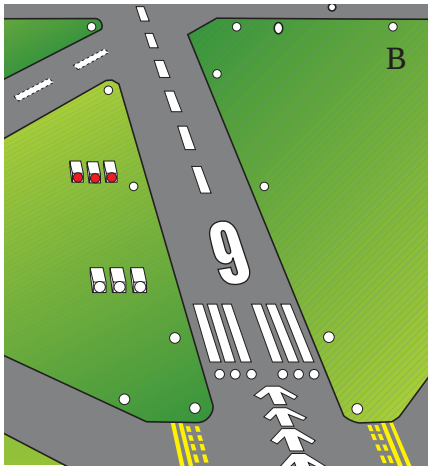
5. If there is bad weather at your destination, and you have NO tailwind, how much flying time will you have left to fly and find an alternate airport for landing? _____ minutes.

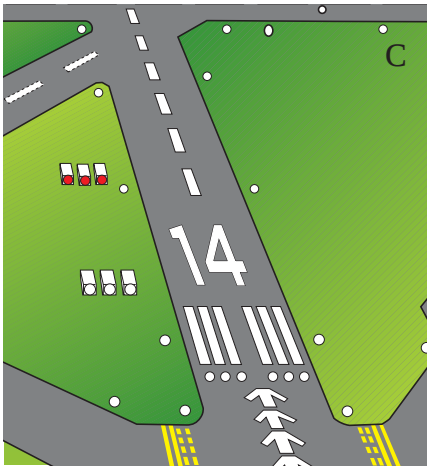
ACTIVITY: Runways and Wind

RUNWAYS ARE IDENTIFIED BY THEIR NEAREST COMPASS HEADING (OMITTING THE LAST ZERO OF THAT HEADING.)

Since runways have two ends, the opposite end of the runway has the opposite (reciprocal) compass heading.







What is the approximate magnetic compass heading of runway... A ___ B ___ C___ ?

What is the runway number at the opposite end of runway... A ___ B ___ C ___ ?

Airplanes land or take-off best on a runway (most closely) aligned into the wind. Wind is reported by the compass direction it's blowing from and its speed. The third digit of the compass heading is omitted.

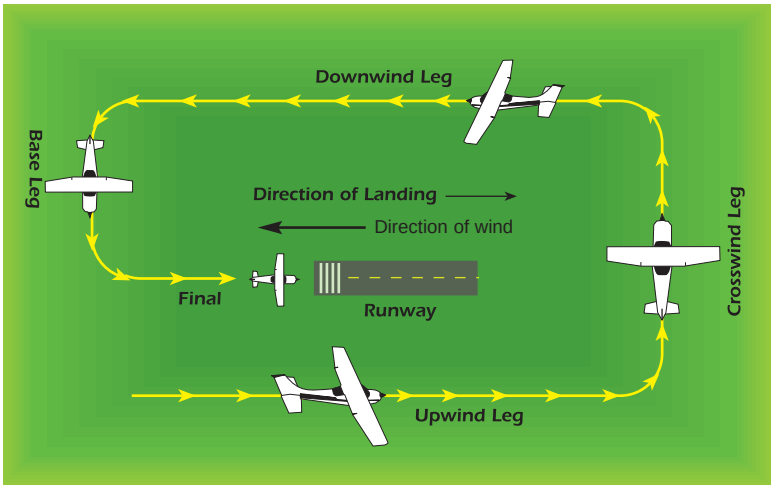
Example: For wind from 270, Runway 27 would be best.

CHOOSE THE BEST AVAILABLE RUNWAY FOR THESE WINDS

Circle the runway you should use. (Both runway ends are shown.)

WIND	Which end of the runway?
225 degrees or SW	Runway 4/22
From the south 180	Runway 17/35
200 degees or SW	Runway 9/27
150 degrees or SE	Runway 14/32
60 degrees or NE	Runway 13/31

ACTIVITY: Traffic Patterns



In the example above, airport traffic moves around the landing runway in a rectangular traffic pattern making left turns, under standard procedures.

The sides (legs) of this rectangular pattern are named in relation to the wind blowing down the landing runway, except for the BASE leg (heading back to "the base") and the FINAL leg.

CIRCLE ONE OR FILL IN THE BLANKS:

1. You're entering the airport area in same direction as the runway that is most aligned into the wind. You'll fly the **DOWNWIND / UPWIND** leg first.

2. After you fly along the landing runway, you'll pass the far end of the runway and turn left onto the __ __ __ __ __ W I N D leg.

3. To fly along the runway back towards the landing end, you'll turn left again. With the wind on your tail, you're on the __ __ __ __ W I N D leg.

4. After passing the end of the landing runway, you'll turn left toward the final approach course. This is the __ __ __ __ leg.

5. Finally, you're flying straight towards the runway "on __ __ __ __ __."

ACTIVITY: Computer Tools

MATERIALS:

Flight simulator program for PC or Mac Joystick (flight yoke not required)

Aeronautical chart of your local area, including nearest airport, if available

TO DO IT:

- Load your favorite airplane—or a trainer aircraft like a Cessna 172 or Piper Warrior—and search for your local airport in the database. Set that airport as your launch point.
- Access the checklists within the program to start the engine and taxi out to the runway. (What does the local weather tell you about the winds? Can you figure out which runway would be preferred?)
- As you accelerate down the runway, look at the airspeed indicator and note the speed at which you lift off into the sky.
- Climb straight ahead to 500 feet above the ground—check your altimeter to see when you've reached that altitude—and push the nose over a little to level-off so you can check for traffic in front of you.
- Continue your climb and begin a left turn, in a bank of about 30 degrees (using the attitude indicator), to a heading 90 degrees less than the runway heading. You'll need the heading indicator to know for sure when you get there (e.g. from runway 27 turn "left to 180 degrees").
- Depending on the graphics, you should be able to look at your map and pick out features on the ground like bodies of water. Most pilots fly using these ground references rather than fixating on the heading indicator. Keeping your eyes focused outside the cockpit helps you see other traffic (airplanes) before they come too close.

ACTIVITY: Computer Tools

- Once you reach 1,000 feet above the ground, level off your altitude. You should be ready to turn 90 degrees to the left again, for your downwind leg of the traffic pattern. Again, depending on the program, you may be able to switch views to see out your left window—the runway will be passing off your left wing in a couple of moments.

- Fly down the runway on the downwind leg, until the runway is about a mile and a half behind you, over your left shoulder. Lower your flaps 10 degrees.

- Using the tachometer, pull the power back to about 1,800 rpm and hold the nose level. Let the airspeed come down to about 85 knots, and deploy 10 degrees of flaps.

- Turn 90 degrees left again for the base leg, and continue your descent at 500 fpm (feet per minute) using the vertical speed indicator.

- When you are almost perpendicular to the runway, after a few seconds, turn a last 90 degrees to the final leg of the approach, keeping about 85 knots on the airspeed indicator.

- Go to 30 degrees flaps, and let the airplane slow down to 70 knots.

When you touch down, you've successfully completed your first virtual traffic pattern—one of the most challenging parts of learning to fly. If you want more, check out the training modules within your favorite flight sim game, or check out sim sites on the web for add-on aircraft, scenery, and scenarios.

ACTIVITY: Aviation in History

DRAW A LINE FROM SOME OF AVIATION'S PIONEERS (ON THE LEFT) TO THIER AIRCRAFT OR ACCOMPLISHMENT (ON THE RIGHT.)


Library of Congress

Charles Lindbergh flew this to Paris in May, 1927…

Neil Armstrong was first to do this…


NASA


Library of Congress

Orville and Wilbur Wright built and flew this, the first powered, controllable airplane…

William T. Piper's Piper Aircraft built thousands of these for private flying and pilot training after World War II

The company Clyde Cessna started (in 1927) has built 40,000 of these, the most-produced single airplane model in history….

Leonardo da Vinci imagined a human-powered aircraft 400+years ago…

Chuck Yeager, first to fly faster than the speed of sound, flew this…

Eileen Collins was the first woman commander of the….


NASA

Space Shuttle

_ _ _ _ _ Cub

Ornithopter


NASA

Bell X1


NASA

July, 1969


Library of Congress

December 17, 1903

_ _ _ _ _ _ 172

The Spirit of St. Louis

ACTIVITY: Aviation in History

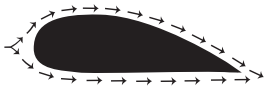
FROM THE FOLLOWING TO FILL IN THE BLANKS BELOW:

Cessna	Harriett Quimby	Paris	1912
Chuck Yeager	Leonardo da Vinci	Armstrong	Piper
Bernoulli	Amelia Earhart	1947	1969
1903	Willa Brown	New York	Wright
1920s	Bessie Coleman	Tuskegee	Armstrong
General	Space Shuttle	Military	Eileen Collins


Library of Congress

1. Two brothers, Wilbur and Orville _____, mastered lift, power and flight control to make the first successful powered, controlled flight in 19 __ __.

2. Centuries earlier, the first person to study the problems of flight scientifically was the Italian _____. He lived from 1452 to 1519.



3. The _____ Effect – the principle that air moving faster over the curved top of a wing creates a partial vacuum and "lift" — is named for this 18th Century Italian.

4. The first American woman to learn to fly was _____.


2002 National Air and Space Museum, Smithsonian Institution


NASA

5. The first African-American woman to earn a pilot license was _____. She flew during the 19 __ __s.


Library of Congress

6. The first person to fly solo, non-stop across the Atlantic Ocean was Charles Lindbergh. In 1927, he flew from _____ to _____.

ACTIVITY: Aviation in History


NASA

7. _____ was the first woman to cross the Atlantic in a plane and the first woman to fly across the U.S. She tried to fly around the world in 1937.

8. Three longtime pioneers in airplane manufacturing all started in the 1920s or 1930s, but their companies' modern planes are still numerous at any airport. They are _____, _____ and Beech.

9. A leading pilot, she was a pioneer in aviation and flight training for African-Americans in the 1930s and 1940s. She was _____.

10. A small group of African-American pilots were trained to fly for World War II at a famous Historically Black College in Alabama, from which they took their name. They were The _____ Airmen.


NASA

11. The first person to fly faster than Mach 1 – the speed of sound – became well-known after the book and movie, "The Right Stuff." Air Force pilot _____ flew the rocket-powered X-1 to "break the sound barrier" in 19 __ __.

12. Early U.S. astronauts were selected from the nation's best military test pilots. Alan Sheppard was the first launched into space – a suborbital "shot" in 1961.

In 1962, John Glenn (later a U.S. Senator) was the first American to orbit the earth – the goal of Project Mercury.

Later, civilian pilots became astronauts. By July, 19 __ __, former civilian test pilot Neil _____ was the first person to walk on the Moon – the goal of Project Apollo.


NASA

ACTIVITY: Aviation in History

13. Eileen Collins was the first woman to pilot and later command the _____.

14. Circle one: More than **6,000 / 60,000 / 600,000 / 6 Million** Americans currently have an active pilot license.

15. Airlines fly 700+ million passengers between the country's 400-700 largest airports every year.

16. Circle one: General Aviation carries more than **10,000 / 100,000 / One Million / Ten Million / 100 Million** people a year.

17. General Aviation is all of aviation except the airlines and the _____.

AVIATION AND YOU

1. Your nearest airport is _____ (airport name) in _____ (town name.)

2. The airport providing airline service to your town is _____.

Hint: Are they the same airport? Did you forget a local airport that's closer than the airline-service airport?

ACTIVITY: Aviation in History

SELECT A PILOT OR AVIATION PIONEER TO RESEARCH

ANSWER THE FOLLOWING ON WHOEVER YOU CHOSE TO MAKE A PRESENTATION TO THE CLASS:

1. What contribution did this person make to aviation?

2. Why did you select this person? What personal qualities or actions did you find most worthwhile?

3. Did this person overcome some obstacle to accomplish whatever they did? If so, what was it?

4. Did this person invent something that is still used in aviation today?

5. Did this person do something that has an impact on non-pilots? If so, how or what?