

Name _____

Welcome to the Supercharged Science

Aviation Teleclass Webinar!

You can fill out this worksheet as we go along to get the most out of time together, or you can use it as a review exercise at the end of the class to see where your strengths are.

What we're going to cover today:

- The four forces of flight
 - Aircraft wing design
 - Aircraft structural components
 - Controlling aircraft in flight
 - Pressure, temperature, and density
 - Navigation methods
 - Aviation measurements (knots and nautical miles, longitude and latitude, and compass headings)
 - Aviation calculations
 - Reading sectional charts
 - The rules of flight separation
 - The principals of flight planning
 - How to read aircraft instruments
 - Air moisture content as a factor for flight and the danger of aircraft icing
 - How to read clouds
 - Local control towers
 - The international phonetic alphabet
 - Runway markings and lighting
 - Weather status and forecasts
 - How airports, aircraft and commercial flights are identified
 - Radio communications
 - First flight lesson
 - How to fly an airplane
 - How temperature, pressure, and density affect performance
-

Write down two things you really want to know about aviation:

1. _____

2. _____

Do this NOW: Write down WHY you want to learn about the things you just mentioned. What will it give you, or provide you with, or make possible for you if you now understand these things that you wanted to learn?

IMPORTANT: During class, you can either fill out the worksheet, OR if that's too stressful or a hassle, just set it aside and fill it out after class is over so you can enjoy watching the class.

Answer key is on the last page, so put it in a place where you won't be tempted to peek at the answers until after you've given it your best shot.

Material List for ALL experiments in the course:

- alligator clip leads, 2
- balsa wood flyer (the cheap kind without a rubber band or propeller, from toy stores)
- balsa wood, sheet 3" x 18" long
- balsa wood, two 1/8" x 3/8" x 12" long pieces
- batteries (AA) for your battery case
- battery pack, holds 2 AA
- bicycle pump
- car tire valve (use a 1/2" drill bit for the hole in the cap, and use pliers to pull the valve stem through the cap)
- [diaper genie](#) refill bag
- duct bag
- food dye
- funnel (small, 2-3" diameter at the open end; or make your own by taking a sheet of paper into a cone shape and snipping off the tip)
- hair dryer
- index card, 2
- masking tape
- motor, 3VDC
- paper, 10+ sheets
- paper clips
- pencil
- ping pong ball
- plastic bag, thin
- popsicle sticks, 5
- propeller (rip this off an old toy or hand-held fan or balsa wood airplane)
- razor
- rubber bands
- rubbing alcohol
- scissors
- soda bottle, 2L size
- soda cans, 2
- straws (50)
- tack
- tape
- towel
- water bottles, 2
- wood pencil with eraser

OPTIONAL: Sectional chart from your area in the US:

https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/vfr/

(Don't print it out, just view it on your screen. You'll use this *after* class if you want to.)

During the Lesson:

You can look over the worksheet so you know what to listen for as you go through the class with me, or you can go through it along with me during class. OR... flip it over and forget about it and just enjoy the class. When class is over, flip it back over and fill it out and be amazed at how much you've picked up and learned!

1. Aviation is the _____ side of aeronautics, including the

design, production & operation of _____.
2. Airplanes are heavier than _____, propelled by an

engine, and use _____ surfaces (wings) to generate lift.
3. Aircraft are _____ for specific purposes.
4. The atmosphere is a layer of _____ surrounding Earth

held by gravity.
5. Pressure differences cause gases to _____.
6. Higher pressure always _____.

7. Four Aerodynamic Forces are: _____,
_____, _____ and
_____.
8. Faster moving air generates _____ pressure on the
bottom of the ball. Higher pressure on _____ of the ball
keeps the ball in the funnel.
9. Airflow is _____ over the top of the wing, creating a
lower pressure. Airflow is _____ under the wing, creating a
higher pressure.
10. Flaps and slats increase the _____ of the wing to
generate more _____ at slower speeds.
11. Modern aircraft have five major structural components:
_____, _____,

_____, _____,
_____.

12. Wings have _____dihedral angles for stability.

13. _____ means how many times the speed of
_____ an aircraft is traveling.

14. Angle of _____: angle between the chord line and the
flight direction. As the angle _____, the lift increases
and moves forward.

15. _____ stability is when the aircraft attempts to return
to straight and _____ flight.

16. Center of pressure is _____ of the center of gravity for
_____ stability.

17. In a banked turn, more _____ is generated on the
outside (raised) wing.

18. More _____ molecules generate greater
_____ with less thrust.

19. _____ show Indicated Altitude. True Altitude is how high
you are above _____ level. Absolute altitude is how high
above the _____ you are.
_____ altitude is corrected for temperature.

20. Temperature is a speedometer for _____.

21. When the air is _____ than usual or
_____ during flight, the airplane is lower than the
altimeter indicates.

22. Wind is caused by _____ changes.

23. Relative humidity is the amount of _____ in the air
compared to what the air can hold at that temperature.

24. Great _____ Distance is the shortest distance between two points along the _____ of the Earth.

25. One _____ of latitude or longitude = $1/60^{\text{th}}$ of a degree.

26. 1 minute is one _____ mile.

27. Runways are aligned with _____ markings.

28. Using the International Phonetic Alphabet, how do you say/spell your name? (Refer to next page).

29. What I didn't know about aviation until class today was:

International Phonetic Alphabet:

A - Alpha (al - fah)	N - November (no - vem - ber)
B - Bravo (brah - voh)	O - Oscar (oss - car)
C - Charlie (char - lee)	P - Papa (pah - pah)
D - Delta (dell - tah)	Q - Quebec (keh - beck)
E - Echo (eck - oh)	R - Romeo (roh - me - oh)
F - Foxtrot (foks - trot)	S - Sierra (see - air - ah)
G - Golf (golf)	T - Tango (tang - go)
H - Hotel (hoh - tell)	U - Uniform (you - nee - form)
I - India (in - dee - ah)	V - Victor (vik - tor)
J - Juliet (jew - lee- ett)	W - Whiskey (wiss - key)
K - Kilo (key - loh)	X - X ray (ecks - ray)
L - Lima (lee - mah)	Y - Yankee (yang - key)
M - Mike (mike)	Z - Zulu (zoo - loo)

0 - (zee - ro)	5 - (five)
1 - (wun)	6 - (six)
2 - (too)	7 - (sev - en)
3 - (three)	8 - (ait)
4 - (fow - er)	9 - (ni - ner)

Answer Key:

1. Aviation is the practical side of aeronautics, including the design, production & operation of aircraft.
2. Airplanes are heavier than air, propelled by an engine, and use fixed surfaces (wings) to generate lift.
3. Aircraft are built for specific purposes.
4. The atmosphere is a layer of gases surrounding Earth held by gravity.
5. Pressure differences cause gases to move.
6. Higher pressure always pushes.
7. Four Aerodynamic Forces are: lift, weight, thrust and drag.
8. Faster moving air generates lower pressure on the bottom of the ball. Higher pressure on top of the ball keeps the ball in the funnel.
9. Airflow is faster over the top of the wing, creating a lower pressure. Airflow is slower under the wing, creating a higher pressure.
10. Flaps and slats increase the size of the wing to generate more lift at slower speeds.
11. Modern aircraft have five major structural components: wings, landing gear, powerplant, fuselage, empennage.
12. Wings have positive dihedral angles for stability.
13. Mach means how many times the speed of sound an aircraft is traveling.
14. Angle of attack: angle between the chord line and the flight direction. As the angle increases, the lift increases and moves forward.
15. Positive stability is when the aircraft attempts to return to straight and level flight.
16. Center of pressure is aft of the center of gravity for positive stability.
17. In a banked turn, more lift is generated on the outside (raised) wing.
18. More air molecules generate greater lift with less thrust.
19. Altimeters show Indicated Altitude. True Altitude is how high you are above sea level. Absolute altitude is how high above the ground you are. Density altitude is corrected for temperature.
20. Temperature is a speedometer for molecules.
21. When the air is colder than usual or decreases during flight, the airplane is lower than the altimeter indicates.
22. Wind is caused by temperature changes.
23. Relative humidity is the amount of moisture in the air compared to what the air can hold at that temperature.
24. Great Circle Distance is the shortest distance between two points along the surface of the Earth.
25. One minute of latitude or longitude = $1/60^{\text{th}}$ of a degree.
26. 1 minute is one nautical mile.
27. Runways are aligned with compass markings.