Baylor Aviation Sciences

Activity Booklet

www.Baylor.edu/aviation

What is STEM and why does it matter for young children? STEM is an acronym for Science, Technology, Engineering, and Mathematics.

Science - investigating the natural world and how it works

Technology - anything that is invented to meet a human need or want

Engineering - an approach to designing and creating the human-made world

Mathematics - study of number, quantity, and space

However, STEM education is much more than education in the four disciplines. STEM education is an approach that removes traditional barriers that separate the four disciplines to allow for real world, rigorous, and relevant experiences. Our children need the benefit of an integrated curriculum so that they may develop the knowledge and skills they need for the contemporary world.

Additionally, by engaging in STEM experiences, children have opportunities to develop habits and behaviors that will serve them well in academic achievement in all areas. Included in this booklet are activities to promote opportunities for young children to participate in STEM experiences. Most booklet activities have been designed by a team of STEM educators: five graduate students led by two STEM educator faculty members in Baylor University's School of Education. We hope that you and the young children who explore and experience these activities find delight in the wonders of STEM.

Dr. Sandi Cooper & Dr. Suzanne Nesmith
Activities were developed based on Texas Essentials Knowledge Skills (TEKS) for grades K –5.
Activity Authors: Courtney Cole, Rachel Moore, Analise Sandager, Kylie Terry, and Hannah Turney
Artistic Credit: Jack Stanley

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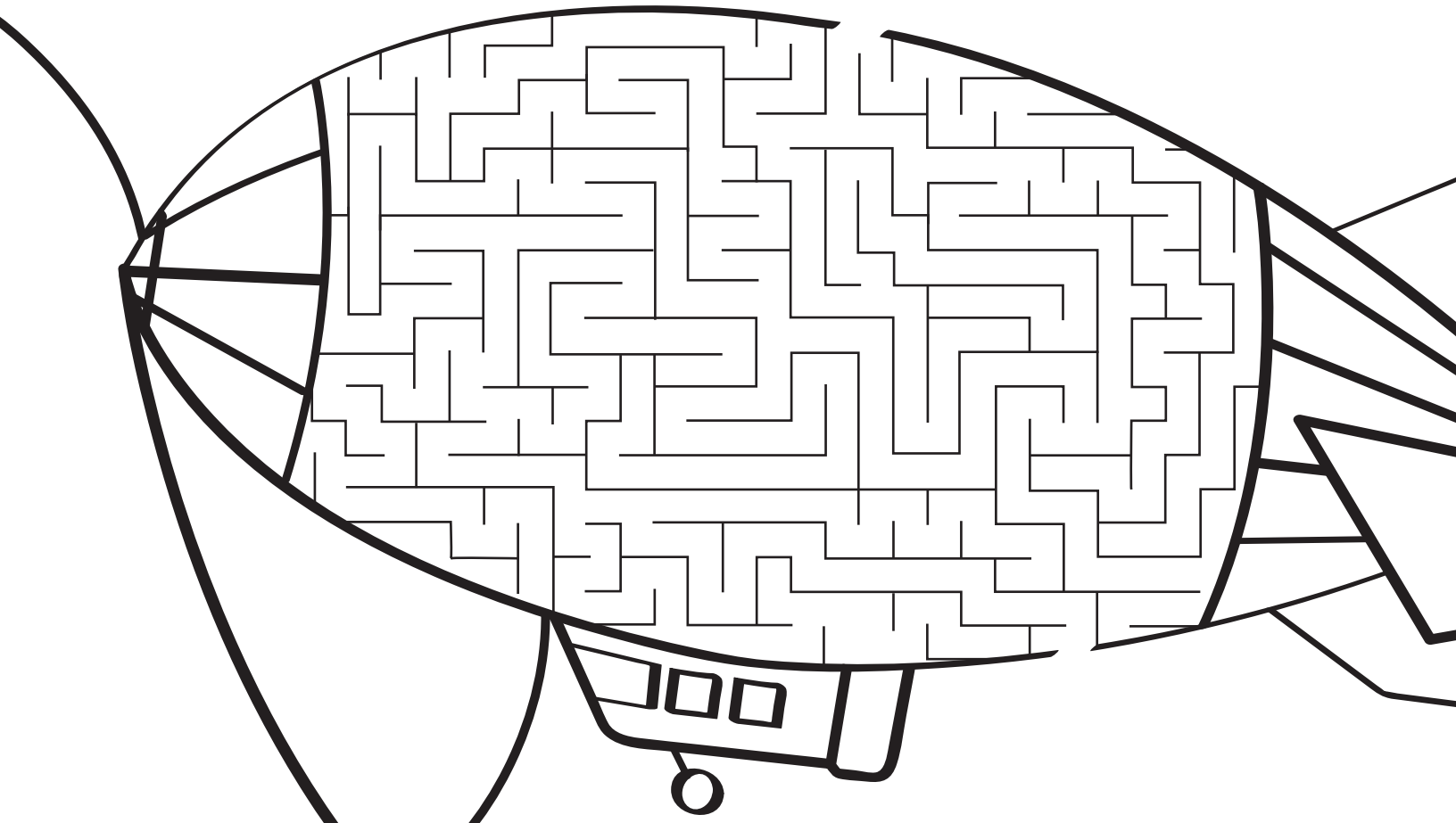
at Baylor University

Baylor University
COLLEGE OF ARTS & SCIENCES
Baylor Institute for Air Science

Blimp Maze

Find your way through the blimp.



400 B.C.
Kite invented by the Chinese.

ON THE FLY ACTIVITY:
Create Your Own Timeline

Use the included stickers to arrange objects in the order in which they happened. If you need help, check out the timeline that appears throughout the booklet.

1800

X
PLACE STICKER HERE

Did You Know?
A deflated hot air balloon weighs about 800 pounds, but once air is inside, it weighs about 2½ tons or 5,000 pounds!

X
PLACE STICKER HERE

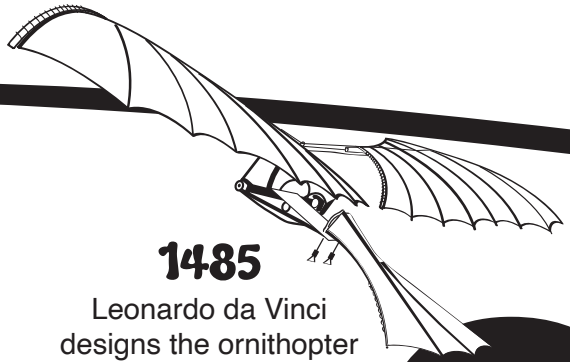
1400

1000 A.D.

400 B.C.

X
PLACE STICKER HERE

Did You Know?
No one knows for sure, but it is widely believed that the very first kite was made by Mo Di, a Chinese philosopher between 468-376 BC.



1485

Leonardo da Vinci designs the ornithopter which was never built or flown.

1783

Joseph and Étienne Montgolfier designed and launched the first manned hot air balloon flight.

Did You Know?

The hot air balloon is widely recognized as the oldest successful human carrying flight apparatus, but there are earlier reports of kites being used to lift and carry men during ancient battles for the purpose of spying and observing the enemy.

1700

X PLACE STICKER HERE

2000

X PLACE STICKER HERE

1939

1900

1981

X PLACE STICKER HERE

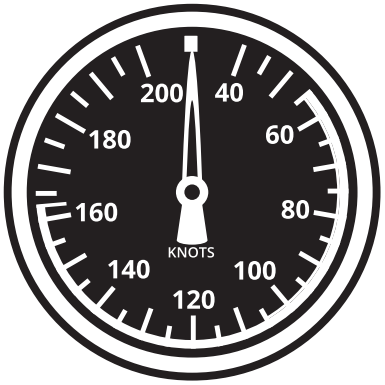
X PLACE STICKER HERE

1967

X PLACE STICKER HERE

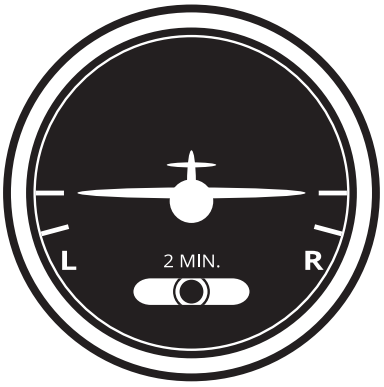
Flight Instruments

AIRSPEED



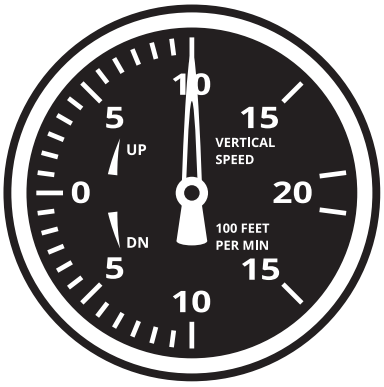
ATTITUDE

ALTIMETER



TURN COORDINATOR

HEADING



VERTICAL SPEED

AirSpeed Indicator - Displays the aircraft's speed in knots.

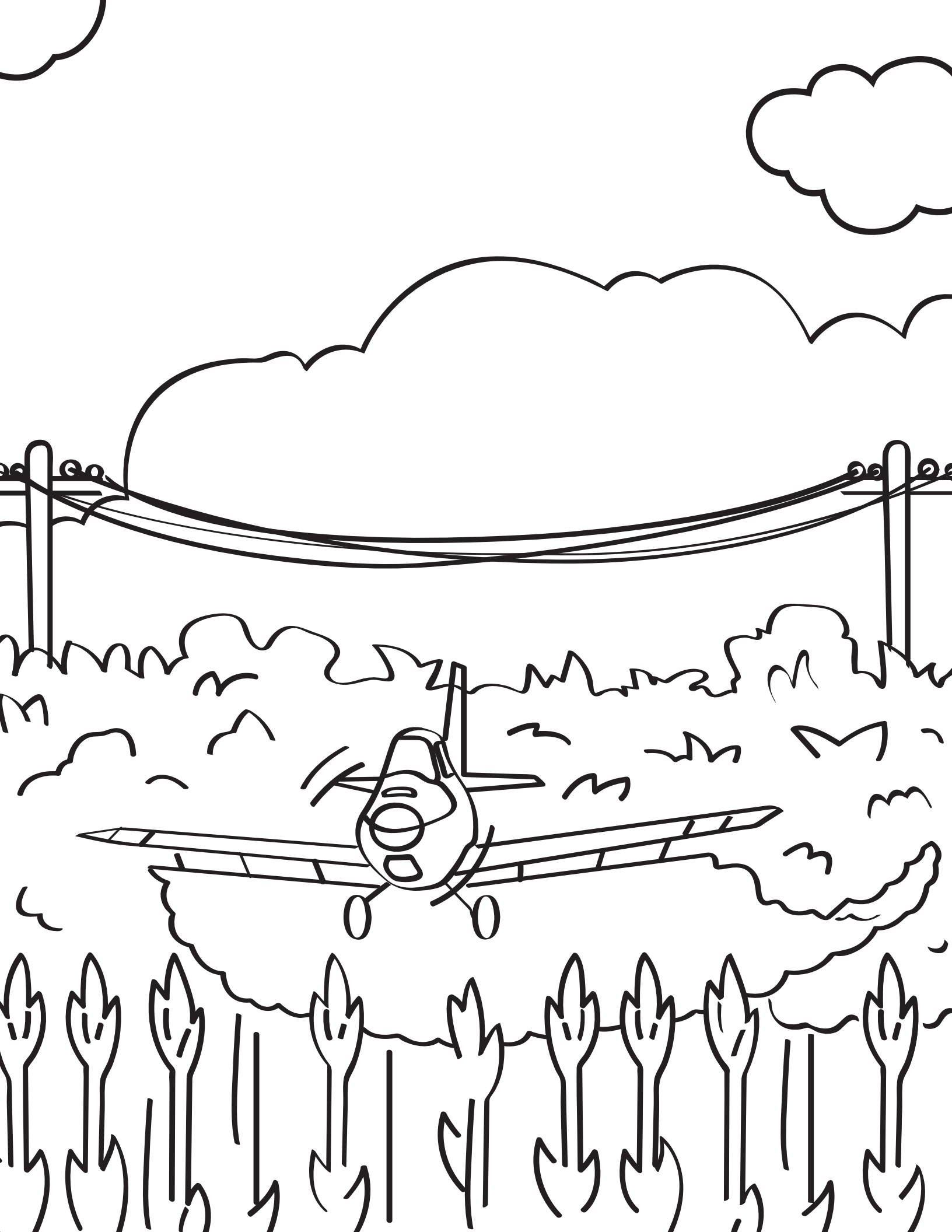
Attitude Indicator - Displays the aircraft's orientation pointed up, down or turning.

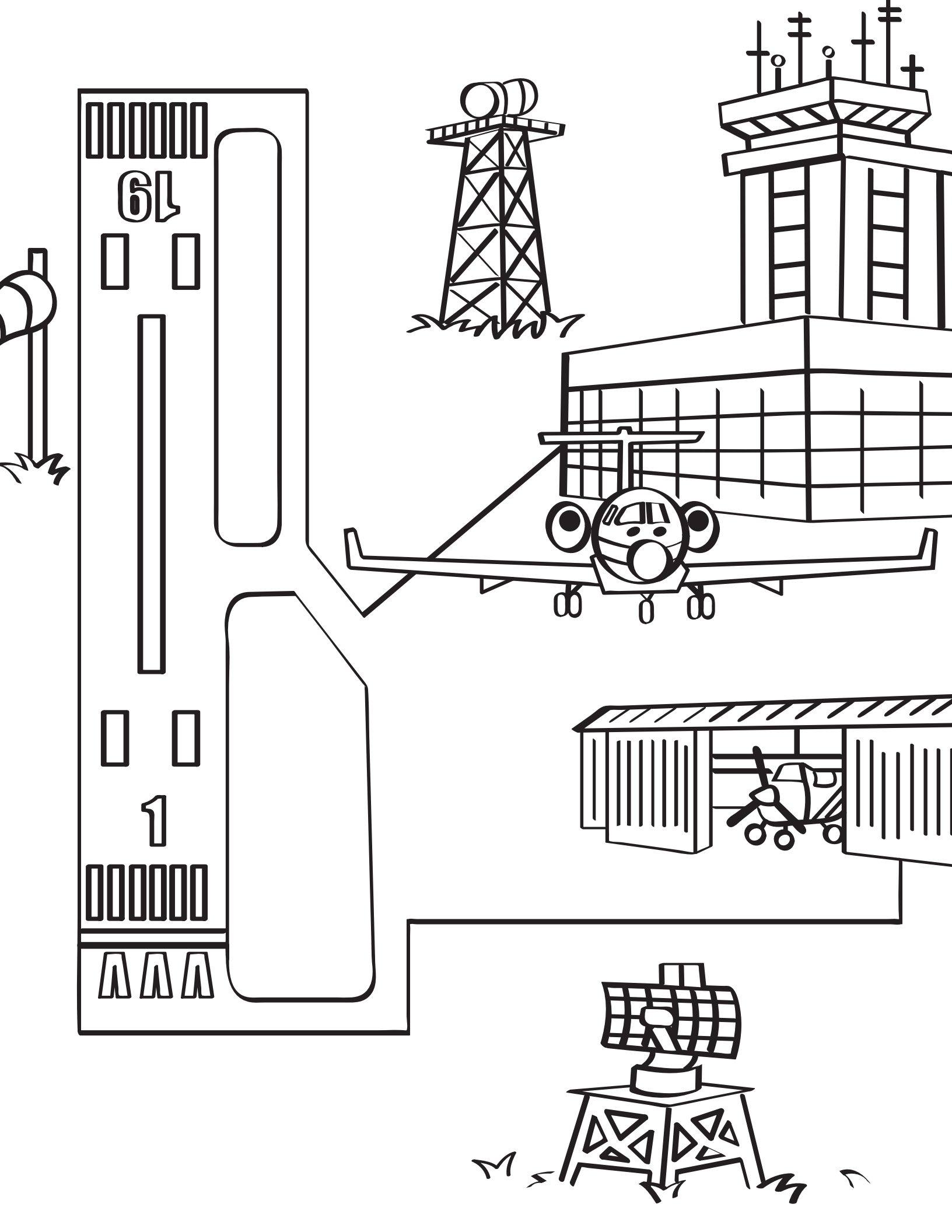
Altimeter - Displays the altitude above sea level in feet.

Turn Coordinator - Indicates how fast the aircraft is turning.

Heading Indicator - Displays the aircraft's direction.

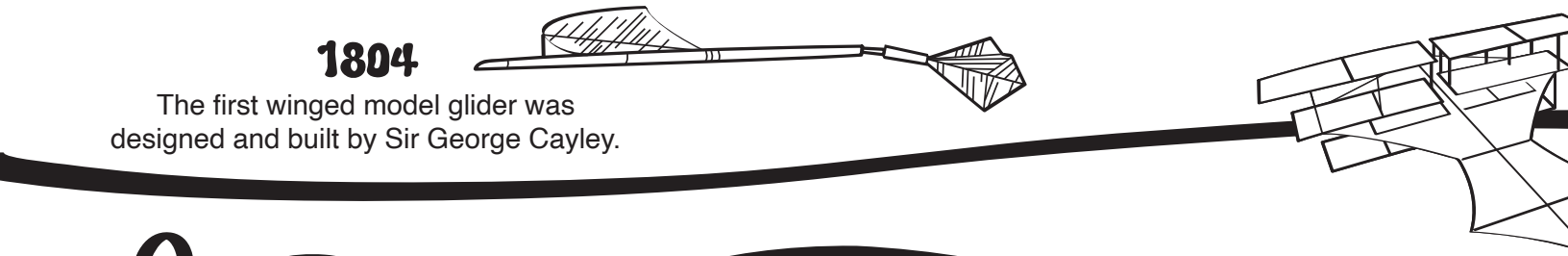
Vertical Speed Indicator - Indicates rate of climb or descent in feet.




19
1

1804

The first winged model glider was designed and built by Sir George Cayley.



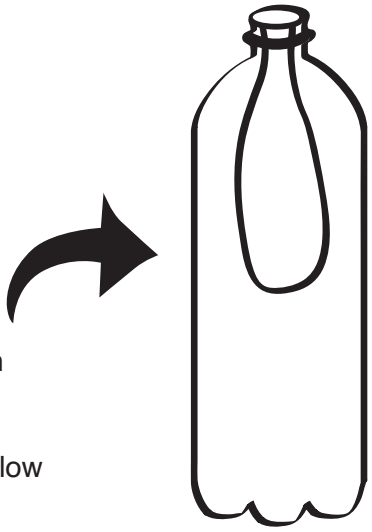
Science of Flight

by: Analise Sandager

ON THE FLY ACTIVITY:

The Impossible Balloon

Is air really nothing or is it actually **something**? If it is something, how does it affect and react to objects around it? **Let's explore!**



Take a balloon and put it inside a clean, 2-liter plastic bottle being careful not to drop it in the bottle. Hold on to the mouth of the balloon and pull it back over the mouth of the bottle so that it stays in place.

Before you do the next step, what do you predict will happen if you blow into the balloon inside the bottle?

Put your lips on the bottle and try to blow up the balloon. What happened? **Turn to the answer key for the solution.**

Did You Know?

The Wright brothers' first airplane was over 9 ft. tall, 21 ft. wide, and weighed over 600 pounds!

Did You Know?

The world record for highest flight in a hot air balloon is 68,986 feet.

1) SuperSonic Question:

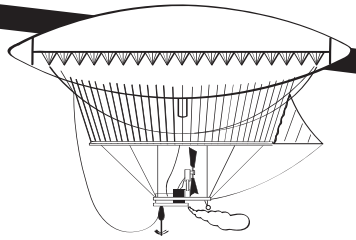
What do you think will happen if you did the same experiment, but there was a small hole in the bottle? Will you be able to blow up the balloon or not? What do you think will happen to the air in the bottle? **Turn to the answer key for the solution.**

2) SuperSonic Question:

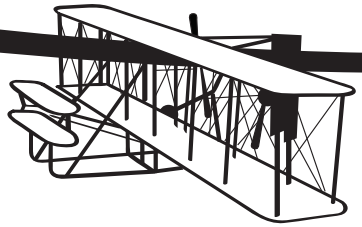
What do you predict will happen if you filled a balloon as full of air as possible and then pressed the balloon (and the air inside) by sitting on it? What is happening to the air inside as you sit on the balloon? **Turn to the answer key for the solution.**

1848
John Stringfellow constructed the first successful power-driven model airplane.

1852
Henri Giffard invented a steam powered airship.



1903
The Wright brothers created the first successful powered airplane.



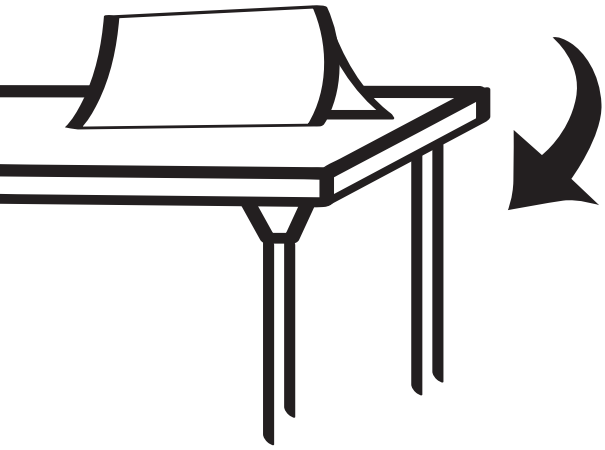
ON THE FLY ACTIVITY:
The Paper Tent and the Flying Sheet

A Swiss mathematician from the 18th century named Daniel Bernoulli discovered something interesting about how air moves and behaves. Do you want to learn what he discovered? **Do the following experiment to find out.**

Take 1 piece of 8.5 x 11 inch paper and fold it in half to make a paper tent. Place the "tent" on a table or other solid surface. What do you predict will happen to the paper tent if you blow through it? Why do you think that?

Let's find out if you're right! Blow into the tent. What happens? Try it again and see if you get the same results or not.

Did You Know?
An airship or dirigible is the predecessor of the modern day blimp.



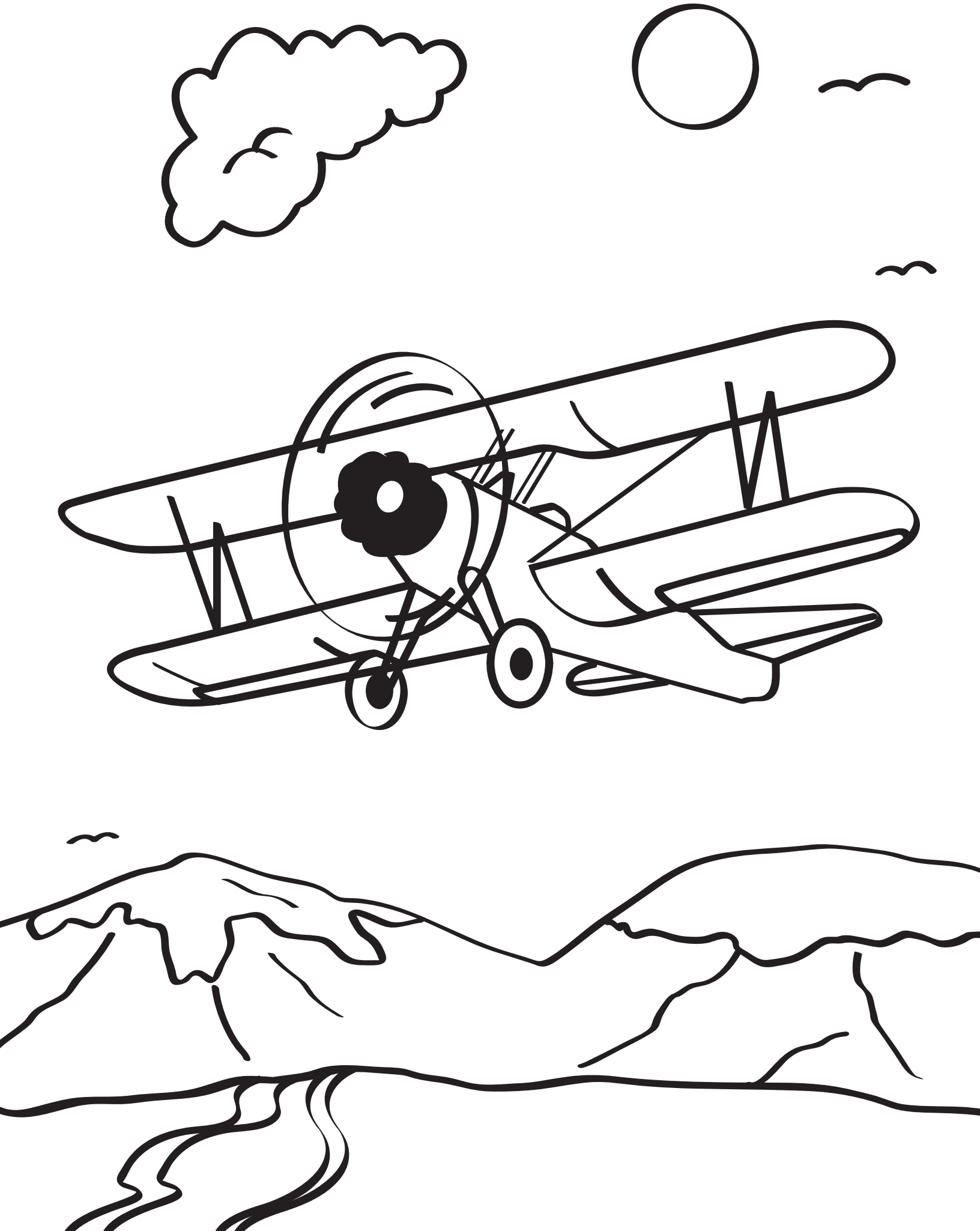
Did You Know?
John Stringfellow started learning about flight by studying how birds fly! If you want to know more about how planes are modeled after animals, check out this site!

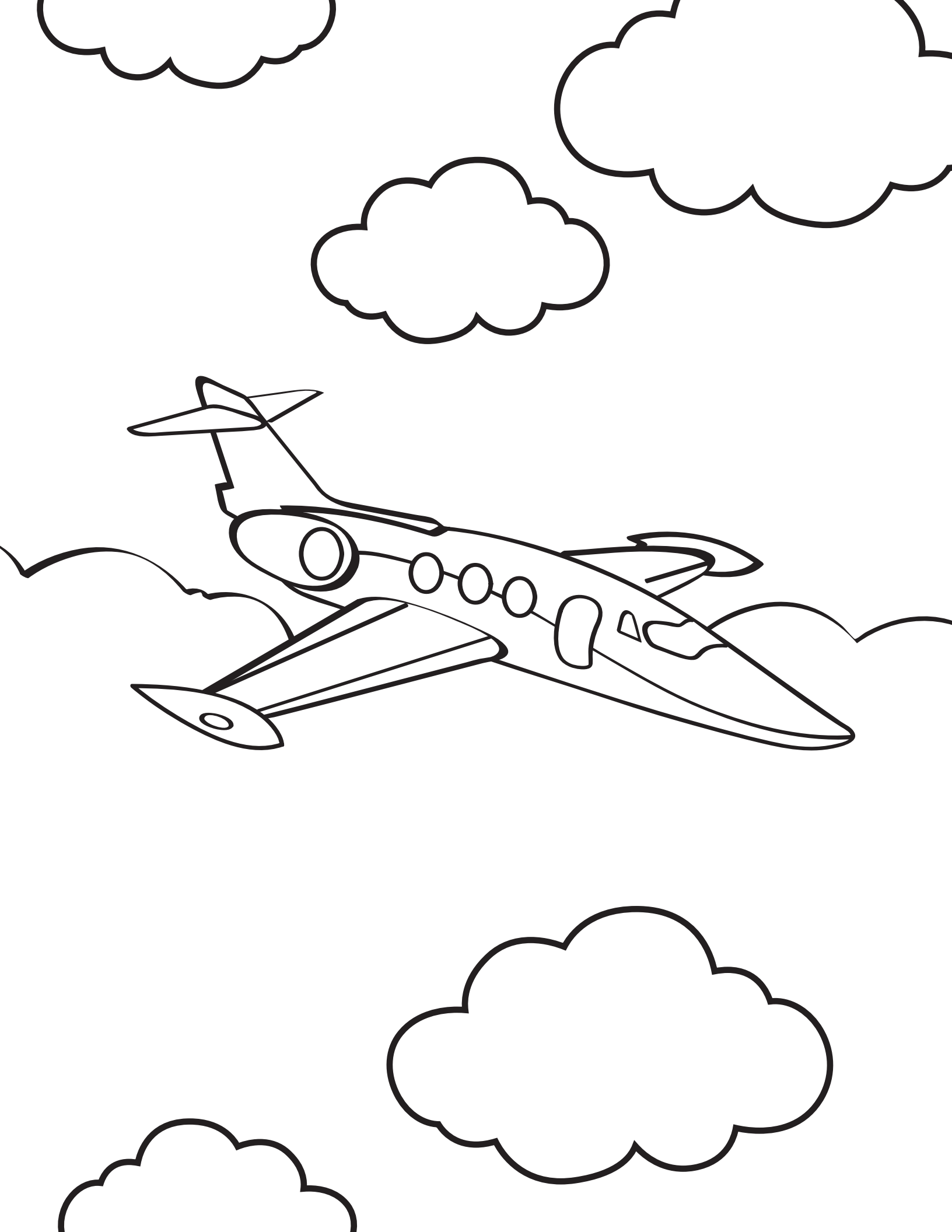
https://www.grc.nasa.gov/www/k-12/UEET/StudentSite/historyofflight.html

3) SuperSonic Question:

Planes use Bernoulli's Principle to fly. How? Using a sheet of paper, hold the paper just under your bottom lip. Hold the paper so that the edge you are pinching curves a little bit (like a plane wing) as the other end hangs down toward the ground. Using what you just learned about Bernoulli's Principle in the paper tent experiment, what do you think will happen to the piece of paper when you blow across the top of it? What will happen to the air on top of the paper and what will happen to the air underneath the paper? Blow and find out!

Turn to the answer key for the solution.





1908

Therese Peltier was the first woman to make a solo flight in an aircraft.

1911

Harriet Quimby became the first woman to earn a pilot certificate administered by the Aero Club of America.

IN THE HANGAR:
Hot & Cold Air – Another Way to Fly

After "The Impossible Balloon" experiment, you know that air takes up space and puts pressure on objects around it. You also know how Bernoulli's Principle helps an airplane fly, but did you know there are other ways to fly like with a hot air balloon? Did you ever wonder how hot air balloons are able to float through the air? **Do the following experiment and see how air is used to help a hot air balloon fly.**

First, fit a balloon over the mouth of a 2-liter plastic bottle. Then place the bottle in a bowl and have an adult help you fill the bowl with hot water. Notice the temperature of the bottle as you place it in the bowl. As you wait and observe the balloon for a few minutes, think about and answer these questions: What do you think will happen to the balloon? Why? What do you think is happening to the air inside the bottle and balloon? Hint: After a few minutes you should see a change in the balloon and the temperature of the bottle should feel different. If you touch it--be careful not to touch the hot water.

Now let's try something different. Ask an adult to help you pour out the hot water and then fill the bowl with ice. You can check the temperature of the bottle again by feeling it. Watch the balloon for a few minutes. What happened to the balloon? What does the bottle feel like now and what do you think happened to the air inside the bottle and balloon? Why? Draw or write about what happened. **Turn to the answer key for the solution.**

4) SuperSonic Question:

What do you think will happen if you filled a balloon as full as possible with air, tied it off, and then held it over a heater in the winter or put it in a hot car during the summer? Why do you think this? **Turn to the answer key for the solution.**

5) SuperSonic Question:

Using what you know about air (it takes up space, it can push objects around it, it expands when heated and contracts when cooled), how do you think that air could be used to help a hot air balloon fly? **Turn to the answer key for the solution.**

Did You Know?

Hot air balloons can't be used in the rain because the air gets so hot that rainwater will actually boil on contact, destroying the fabric.

1922

Bessie Coleman became the first African-American woman to receive a pilot's license.

1927

Charles Lindbergh made the first non-stop, solo transatlantic flight.

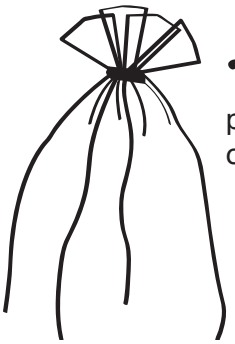
IN THE HANGAR:

Make Your Own Hot Air Balloon

Build your own mini hot air balloon! With the help of an adult, you will need a large plastic produce bag from the grocery store, 2 wooden sticks (balsa wood or chopsticks), scotch tape, 2 birthday candles, matches or a lighter.

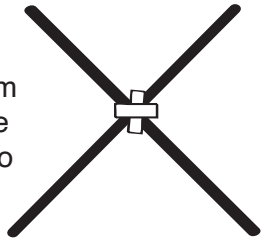
Did You Know?

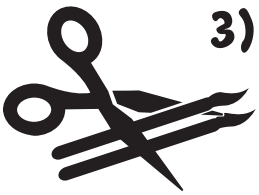
Flight schools in the United States denied Bessie Coleman entry because of her race and gender, so she learned French and moved to France earning her pilot's license in only 7 months!



1) Create an air tight bag with a large plastic bag. One end is tied and the other, leave open.

2) Cut to wood sticks of equal lengths (12") and form a letter "X." Wrap clear tape around the center of the two sticks to secure them.





3) Slice two candle sticks in half. Remove the wax to expose the wick.

4) Heat up one of the ends on the candle sticks. Apply melting wax to the other candles and then place them on the sticks. About two inches from the center of the "X" frame.

5) Secure all four corners of the "X" frame to the large plastic bag with tape.

6) Light the candles and watch the balloon float away.

Aviation Word Find

N R A J W S C H W E K B G E T
R O A I Q T O V N Z C R B G N
V Q I O L B N A K O L A X A T
I E B T S E L M M R E R N L Z
Q S U P A P R Y S R E B P E Q
Z H J J R I F O O S E Z L S A
G Z Y I E B V D N Z U N W U L
J I A R O L Y A B D T G F F L
S P E F S N R P I V D X L T O
I Q F P A U X U G C Y G I H E
D L E M D J J T N R P R G A K
T X I D L Y Q Q G V M A H T O
Q C E F T D A P A C Z O T U Y
S R E L L E P O R P G Q P A W
E L E V A T O R G P O R R X B

Aerodynamics
Aviation
Aileron
Airplane
Baylor
Elevator
Flight Fuselage
Propeller
Rudder
Soar
Yoke

1932

Amelia Earhart became the first woman to fly solo across the Atlantic.

1933

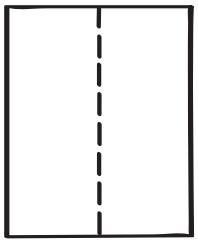
First solo flight around the world was made by Wiley Post.

IN THE HANGAR ACTIVITY:

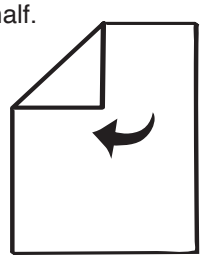
Airplane Experiment – Who Will Win?

Use the following instructions to build each paper airplane. Which do you predict will win a race? Now test your prediction by launching each plane to see which one goes the farthest.

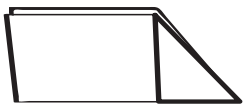
The Basic Airplane



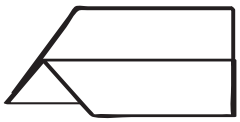
1. Fold the paper in half.



2. Unfold and then fold the corners into the center line.



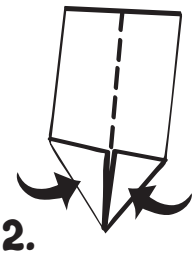
3. Again, fold the paper in half.



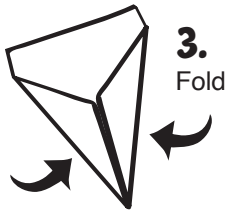
4. Finally, fold the edges down to meet the bottom of the body.

The Dart Airplane

1. Fold the paper in half.



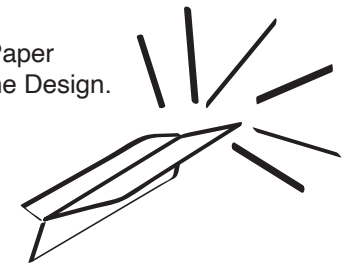
2. Unfold and then fold the corners into the center line.



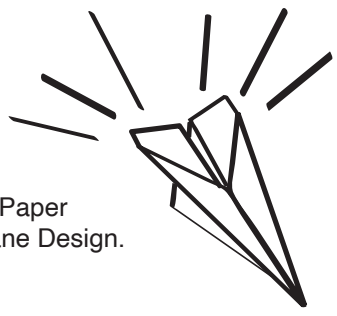
3. Fold the top edges to the center.

4. Fold the plane in half.

5. Fold the wings down to meet the bottom edge of the planes body.



5. Final Paper Airplane Design.



6. Final Paper Airplane Design.

Did You Know?

A Japanese engineer set a record in 2009 by flying a paper plane that he could stay in the air for 27.9 seconds. Incidentally this engineer is also the chairman of the Japanese Origami Airplane Association.

1939

The first operational helicopter, designed by Igor Sikorsky, makes its debut.

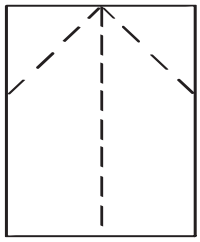
1938

Willa Brown became the first African-American woman in the US to earn a commercial pilot's license. She went on to be a part of many other "firsts" in history.

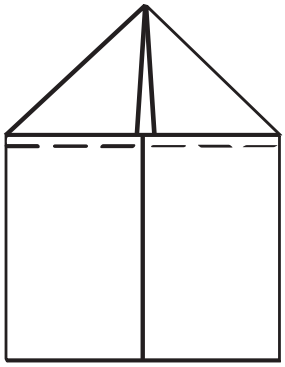
The Eagle

Airplane

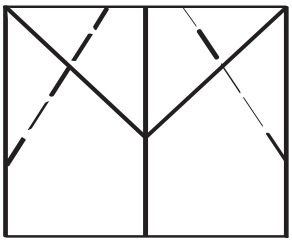
This is a very stable plane. It can fly straight with little adjustment. Curve the elevators up for loops.



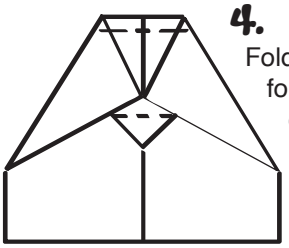
1.
Fold an 8.5x11 inch sheet of paper in half lengthwise and open back up. Fold the top corners down to the center.



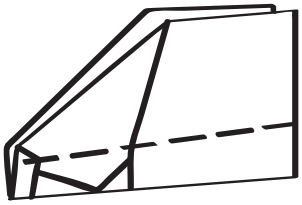
2.
Fold the top down.



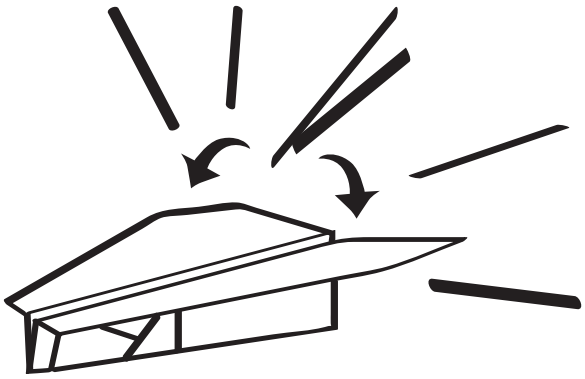
3.
Fold the corners in to the middle.



4.
Fold the little point up, fold the top 0.5 inch down, and fold the airplane in half away from you.



5.
Now fold the wings out at an angle as shown.



6.
Bend elevators up just slightly for better performance. Final Paper Airplane Design.

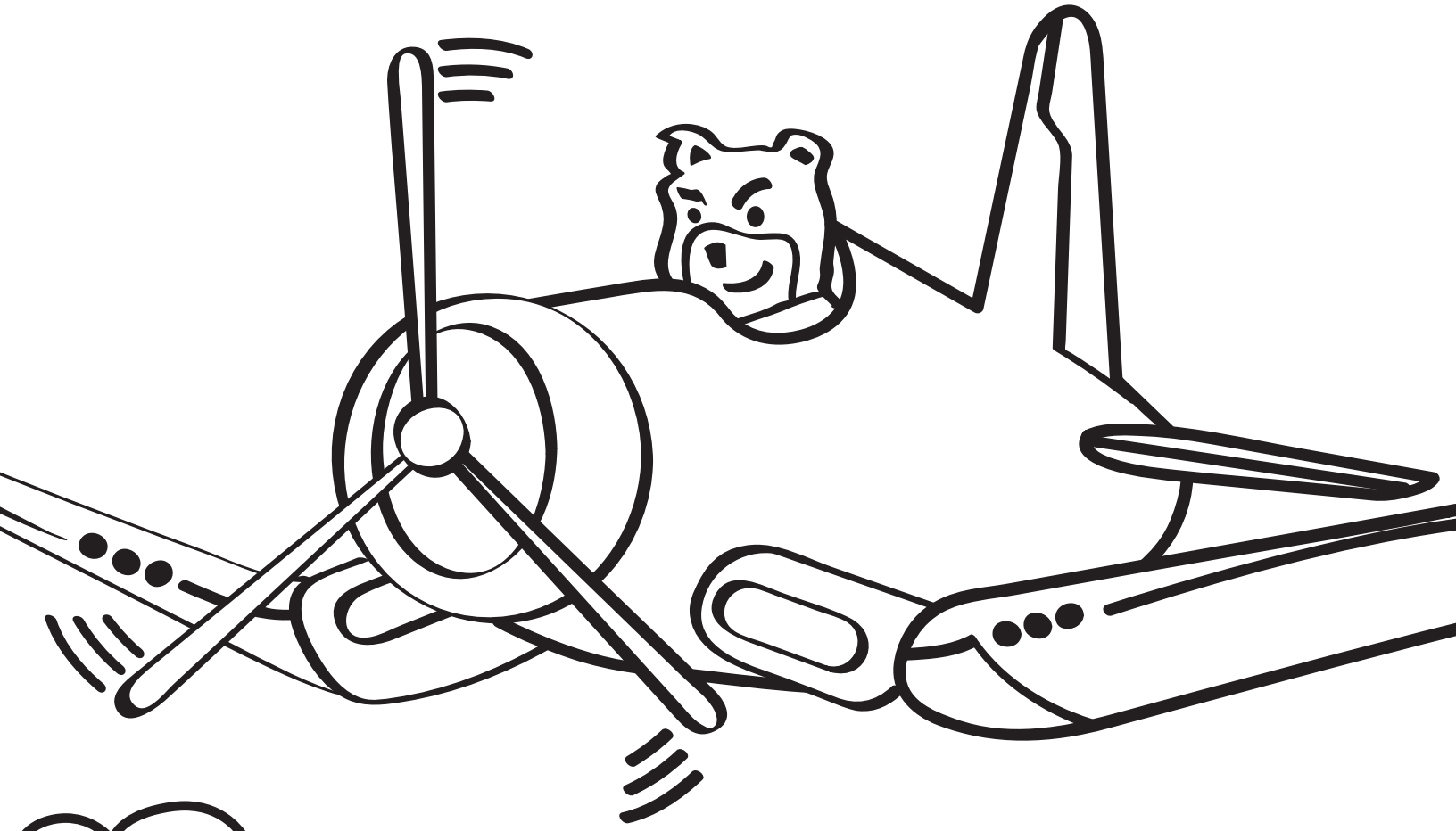
Did You Know?

Do you want to learn how to make more paper airplanes? Scan this QR code to "find out how!"

https://m.youtube.com/watch?v=7KPaxKUDj6I

Did You Know?

English is the international language of flight? All flight controllers and commercial pilots who fly on international flights are required to speak English.



Did You Know?

The world's largest passenger airliner, the Airbus A380 has about 4 million parts?

There are so many opportunities for aviation enthusiasts of all ages to observe different types of aircraft and support the aviation community at the same time. An air show is one such occasion.

Air shows are events where aviators can showcase their flying skills, maneuvers, and aircraft for the public to see. At an air show, you are likely to see demonstration teams, fighter jets, helicopters, experimental aircraft, and historical aircraft, both American and international. Some evenoffer rides!

You may have the chance to meet and talk with air bosses, pilots, parachutists, aerobatic performers from all backgrounds; civilian or military. Other places where you can explore assorted flying machines are museums, airports and even out and about in your own community!

Have you ever been on a plane or to an air show or museum? Search online or in the newspaper for places and events in your area.

ON THE FLY ACTIVITY:
FIND DIFFERENT FLYING OBJECTS!

How many different types of flying object have you been in or on or seen? Using the stickers in the back of the book, find some of the different types of flying objects you have seen for yourself and place them in the space below. You may also create a wish list of different types you'd like to see. Go to different air shows and museums and seek them out!

1941

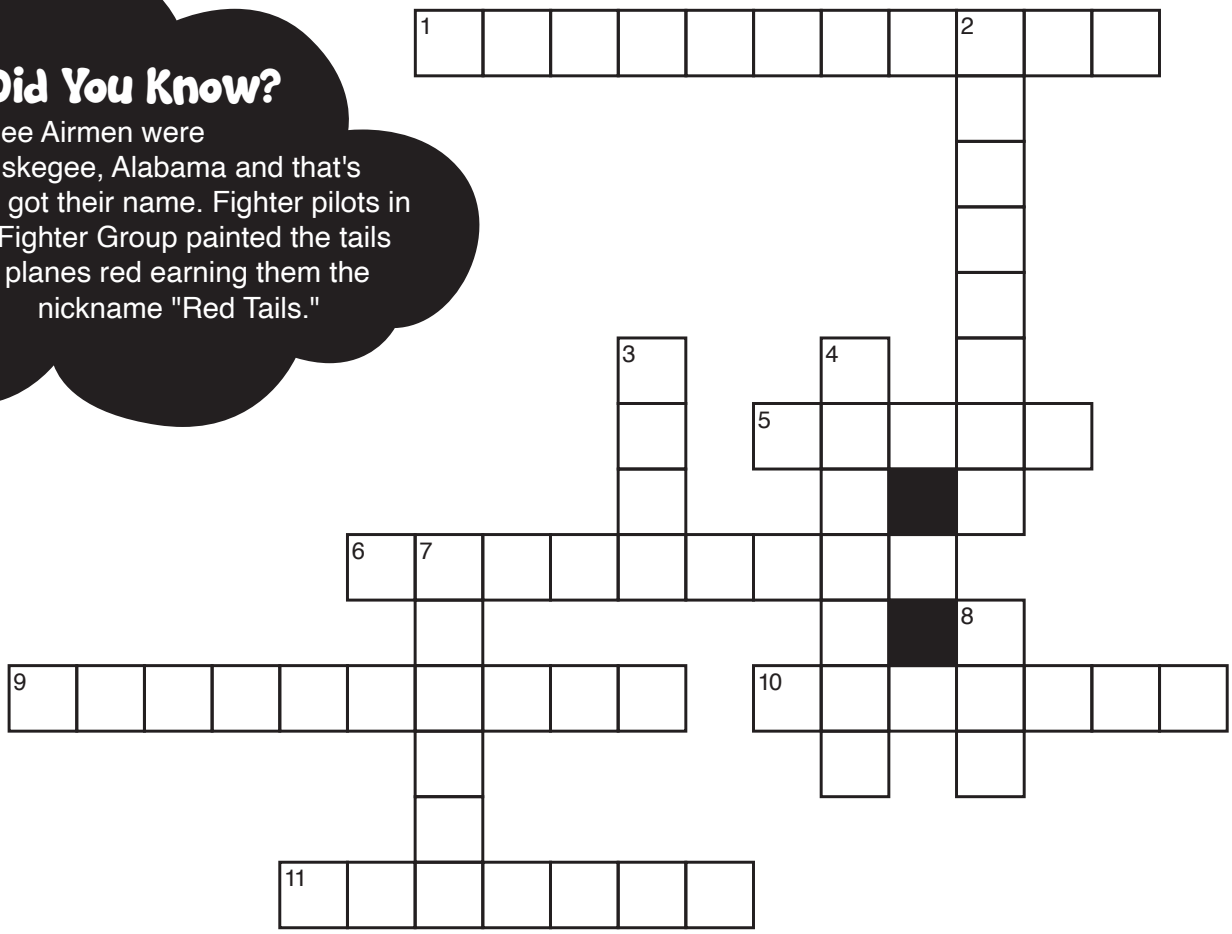
All African-American flight squadron known as the Tuskegee Airmen is established.

Airplane Parts

Now that you've read about different airplane parts, try to solve this crossword puzzle.

Did You Know?

The Tuskegee Airmen were based in Tuskegee, Alabama and that's how they got their name. Fighter pilots in the 332nd Fighter Group painted the tails of their planes red earning them the nickname "Red Tails."



Across

1. This supports the aircraft when it is not in the air (2 Words)
5. Person who operates the plane
6. Rotates and moves the aircraft through the air
9. Where the controls are (2 Words)
10. Tells the pilot direction
11. Type of engine on a jet plane

Down

2. Flap-like and controls pitch on an aircraft
3. Control wheel of an aircraft
4. Changes the roll of the aircraft
7. Part that controls yaw
8. Abbreviation for a type of satellite navigation system

1943

Women's Airforce Service Pilots (WASP), lead by Jackie Cochran, allowed women to fly military aircraft durning World War II.

1947

Major Charles Yeager of the U.S. Air Force became the first pilot to exceed the speed of sound in level flight.

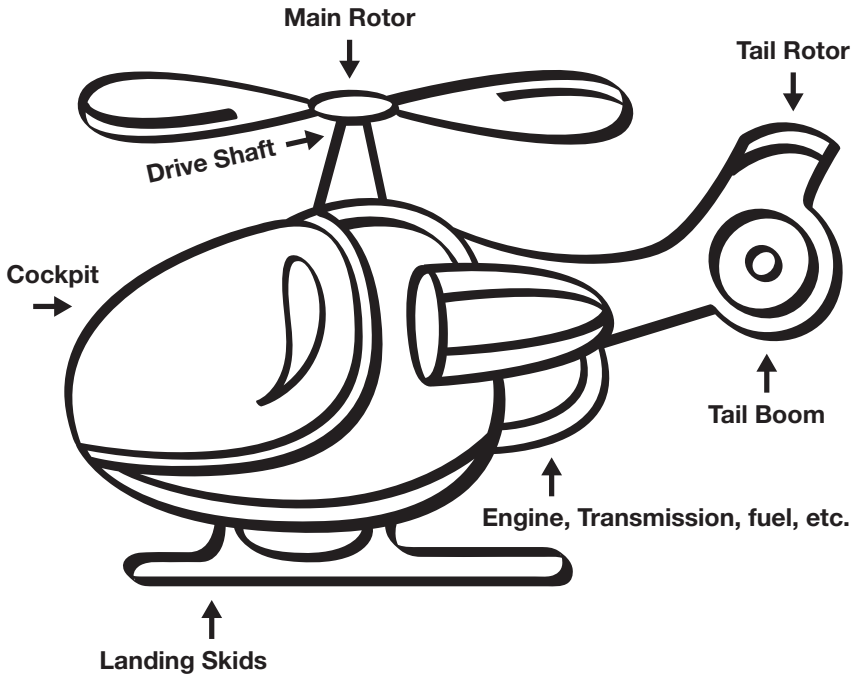
ON THE FLY ACTIVITY: Identify Parts of Planes!

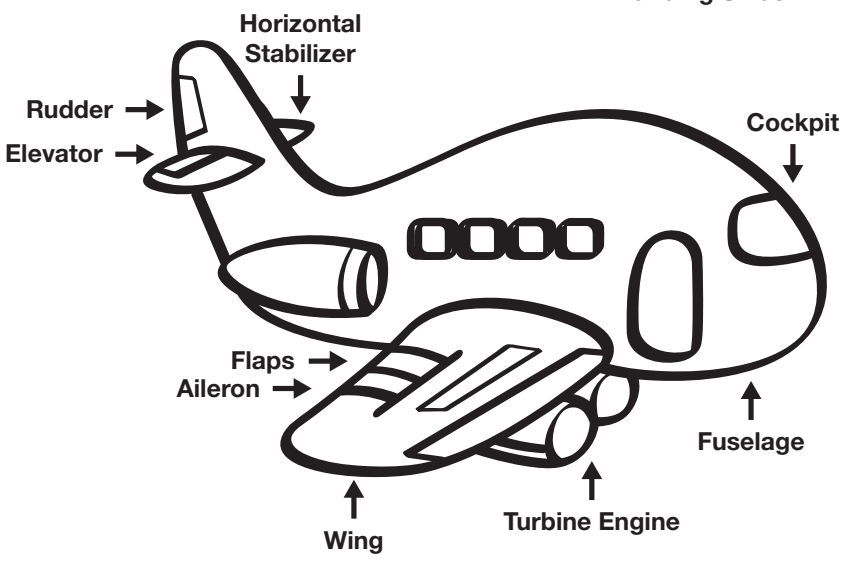
Using the labelled pictures below, see if you can identify the different parts on any aircrafts you see.

Scan this code

to read more about the historic people in aviation history featured on this timeline!

www.kidzworld.com/ article/ 1799-flights-of-inspiration



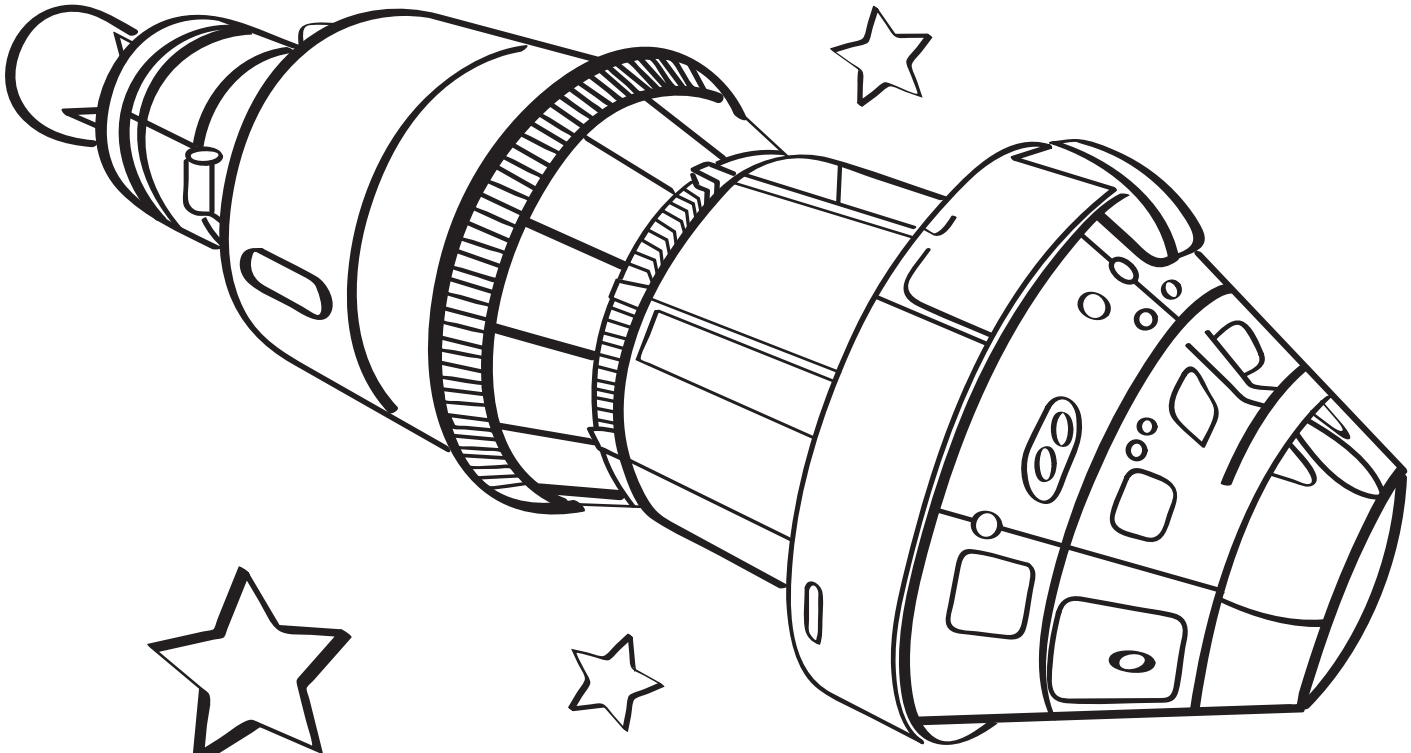


Go to

www.howthingsfly.si.edu or use your smart device to scan this code and learn the functions of the different parts of an aircraft.

Did You Know?

That the Orion is a spacecraft currently being built by NASA? It will carry crews in the future much farther than we've ever travelled before.



Orion

Did You Know?

If you want to explore outer space now that all of our space shuttles have been retired, you will need to get a ride in NASA's new Orion spacecraft!

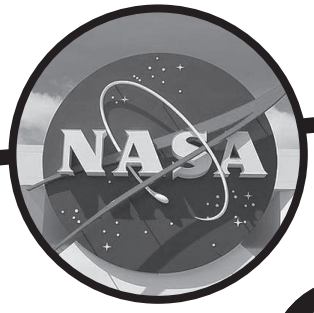
Did You Know?

If you went to another planet, your weight would change! This is all because of how gravity, the force that pulls us closer to the Earth, changes on each planet. Try to figure out how much you might weigh on these different places in space!

Places in Space	Your Weight on Earth	Multiply	Gravity	Equals	Weight
Earth		x	1	=	
Pluto		x	.08	=	
The Sun		x	28	=	
Mars		x	.38	=	

1958

The United States established the National Aeronautics and Space Administration (NASA).



Did You Know?

Mercury astronaut, Alan Shepard became the first American in space less than one month after Yuri Gagarin, but he never reached orbit.

ON THE FLY ACTIVITY:
Design Your Own Airplane

Using the stickers provided in the book, choose all your favorite aircraft components and decorations to make your own custom craft!!. When you have finished, you can use the customizing stickers to decorate it.

You are an engineer and a new junior aviator!

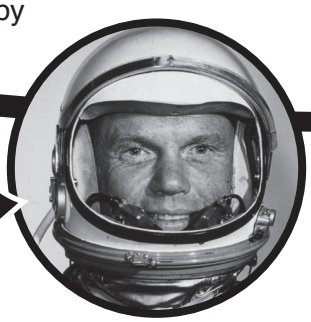
Find the wings sticker included in book.

1961

Yuri Gagarin became the first person to orbit the Earth in the Vostok I spacecraft.

1962

The U.S. launched its first manned orbital flight piloted by John H. Glenn, Jr.



Careers in Aerospace

ON THE FLY ACTIVITY: Observation

What do you think someone with a career in aerospace would do at work?

Directions: *Draw a picture of a person you have seen working in aerospace! Draw or write about what you saw them doing!*

Did You Know?

Aerospace is an industry that deals with all things related to Earth's atmosphere and the space beyond.

What was this person doing?

_____

_____

_____

_____

Did You Know?

Lift and thrust for helicopters is provided by spinning blades. The two rotors keep the helicopter from spinning in multiple directions or circles.


Spirit of St. Louis
Did You Know?
Young Charles Lindbergh was the first person to fly solo across the Atlantic Ocean in a non-stop flight from New York to Paris, May 21, 1927.

1963

Marlon Green became the first African-American pilot for a major U.S. passenger airline after a long anti-discrimination legal battle.

1964

Jerrie Mock became the first female to complete a solo flight around the world.

ON THE FLY ACTIVITY:
Interview

Do you wonder what it would be like to have a job in aerospace?

Directions: There are so many people that work in the aviation industry, such as mechanics, pilots, engineers, and air traffic controllers. Ask a person who works with aerospace questions about their job and write their answers below.

What is your name?_____

What is your job title?_____

What is one of your job responsibilities?_____

How do you use math in your job?_____

What kind of tools or equipment do you use in your job?_____

_____

How do you use science?_____

In what ways do you use technology?_____

What else did you learn in school that helps you in your job?_____

_____

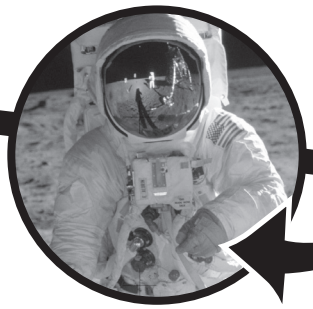
Do you like your job?_____

Did You Know?

If you work hard in school, do well in math and science, and enjoy learning and solving problems, you might be a perfect fit for a career in aerospace!

1967

The first supersonic transport prototype, the Concorde, is unveiled.



1969

Neil Armstrong and Buzz Aldrin become the first ever to land on the moon.

ON THE FLY ACTIVITY:
NASA Careers

The National Aeronautics and Space Administration, or NASA, is an agency devoted to space exploration and a better understanding of earth and space science. Do you wonder what people who work for NASA do?

Directions: Go to (nasa.gov/audience/forstudents/careers/index.html) and research three NASA careers. Select different career profiles to watch videos and read about the different jobs. Write about your findings below:

Did You Know?

If you want to learn how rockets launch into the air, scan this QR code with your smart device.

Job:

_____

What do they do?

_____

_____

What tools do they use?

_____

_____

What knowledge from school do they use?

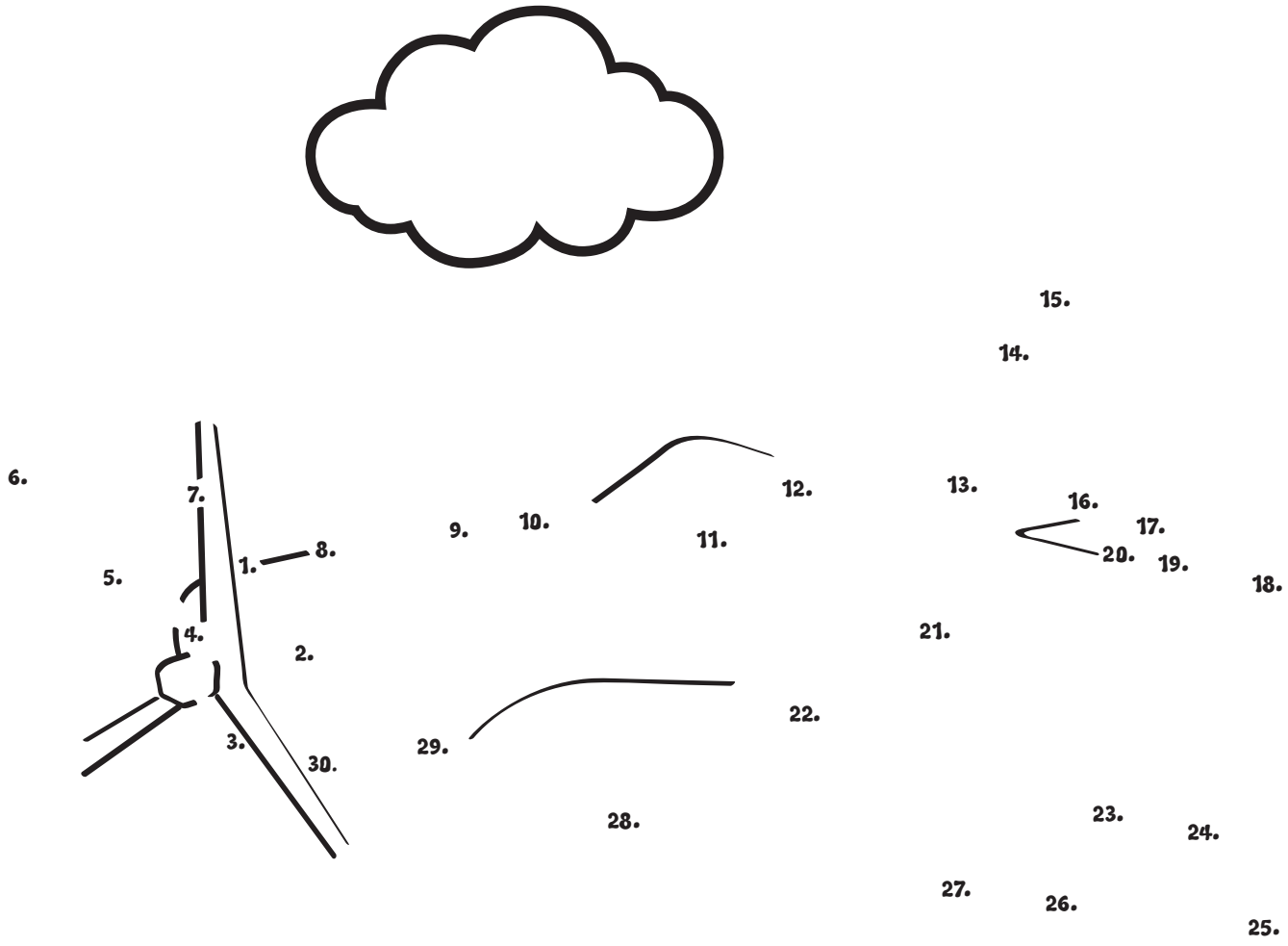
_____

_____

Aircraft Word Search

W T A I L D R A G G E R T H R
I E M G R E D I L G H B H O T
E J P B R O T S H E L R G T S
N S H M T E J E N I L R I A A
I S I R D N E A M D T A L I H
G E B O H A E P F I I I A R E
N N I T R L S L T R P R R B L
E I A O O P W A E I R S T A I
E S N R E O D N H G E H L L C
L U A T V R I E E I R I U L O
G B T L H Y T U R B O P R O P
N A N I A G B I P L A N E O T
I I R T M U L T I E N G I N E
S F L O A T P L A N E F L I R
G R A E G E L C Y C I R T H T

Airline Jet
Airship
Amphibian
Biplane
Blimp
Business Jet
Dirigible
Floatplane
Gyroplane
Hot Air Balloon
Helicopter
Multiengine
Seaplane
Single-Engine
Taildragger
Tiltrotor
Turboprop



Did You Know?

What would happen if you made an airplane out of glass? **Answer:** Check out the airplane of the future by scanning this OR code!

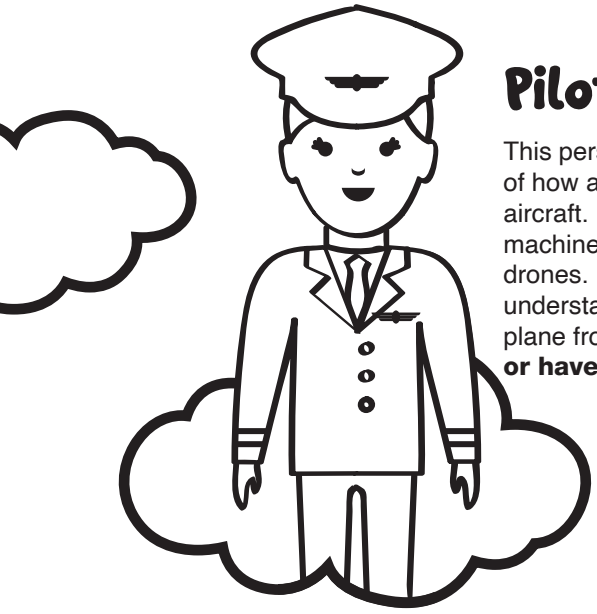
1981

The United States launches the space shuttle, which is the first reusable spacecraft.

1983

Sally Ride becomes the first U.S. female in space.

Career Connections



Pilot

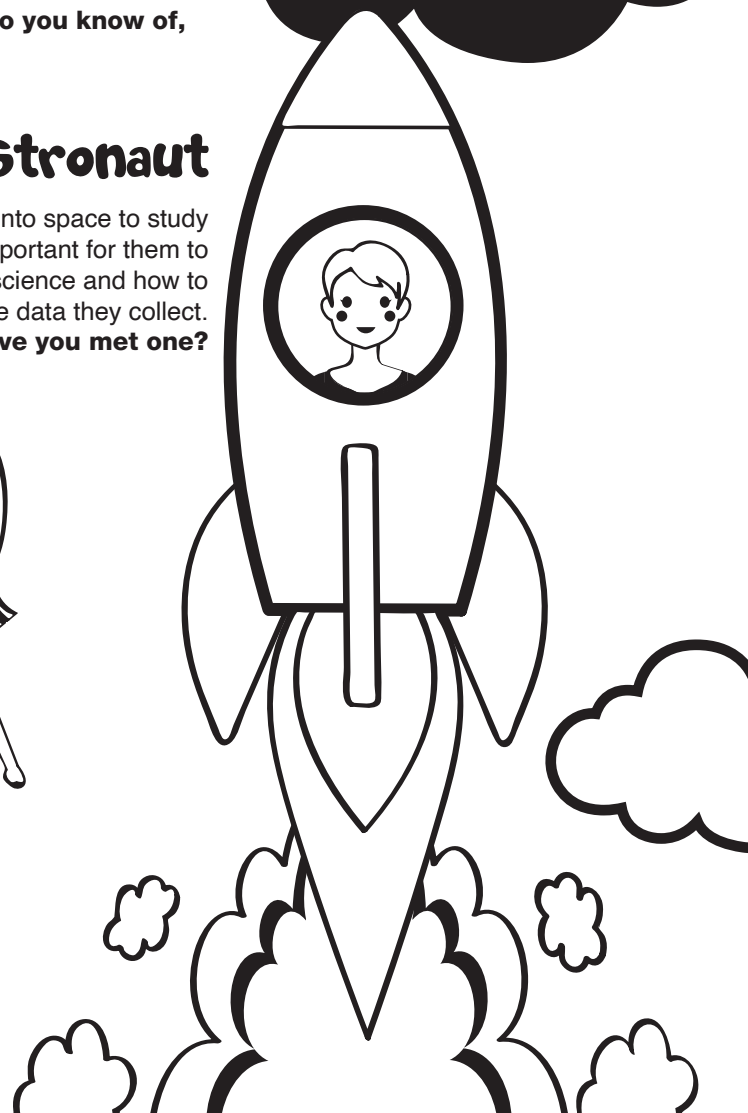
This person uses their understanding of how a machine works to control an aircraft. Pilots fly many different types of machines, like planes, helicopters and drones. It is important for them to understand the distance and height of their plane from their target location. **Do you know of, or have you met one?**

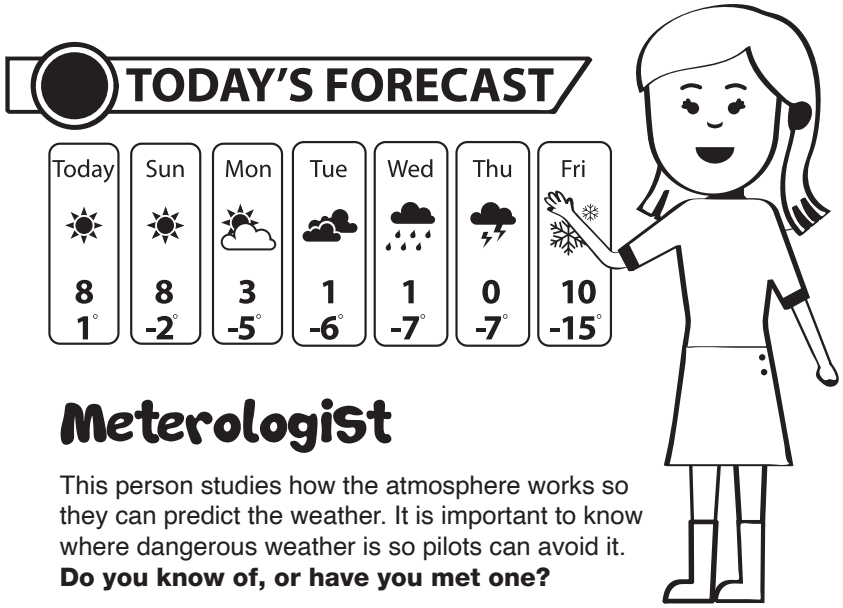
Did You Know?

Pilots must have a strong understanding of the weather because they are required to check for dangerous conditions before every flight.

Astronaut

This person travels into space to study science. It is important for them to understand space science and how to calculate the data they collect.
Do you know of, or have you met one?



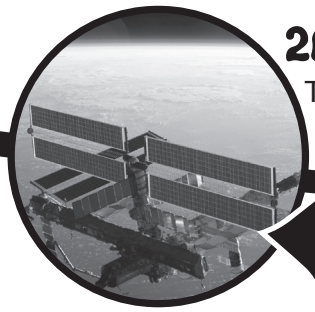


Meterologist

This person studies how the atmosphere works so they can predict the weather. It is important to know where dangerous weather is so pilots can avoid it.
Do you know of, or have you met one?

1998

The first two modules of the International Space Station are launched and joined together in orbit.



2000

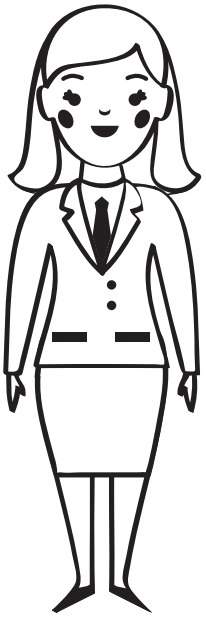
The first crew arrives at the International Space Station.

Physicist:

This person studies how things work, like flying things in nature, so that they can learn more about the world. It is important for them to understand how to observe their subjects and create graphs to interpret that data. **Do you know of, or have you met one?**

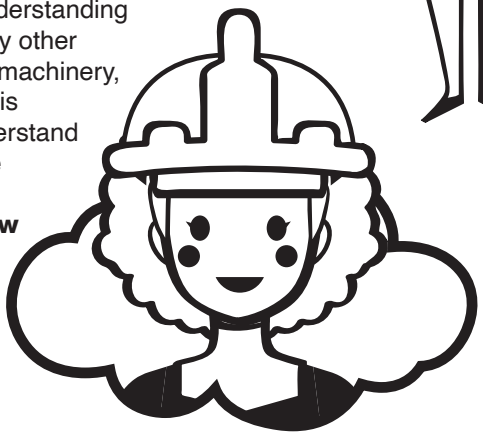
Aircraft Dispatcher:

This person is often called a pilot on the ground. They use their keen time management skills to ensure that there is an airplane available for every passenger who buys a ticket. They also make sure that every airplane has pilots, flight attendants, and a safe route in the sky to get to where thy are going. It is important for them to understand how to work as a team member. **Do you know of, or have you met one?**



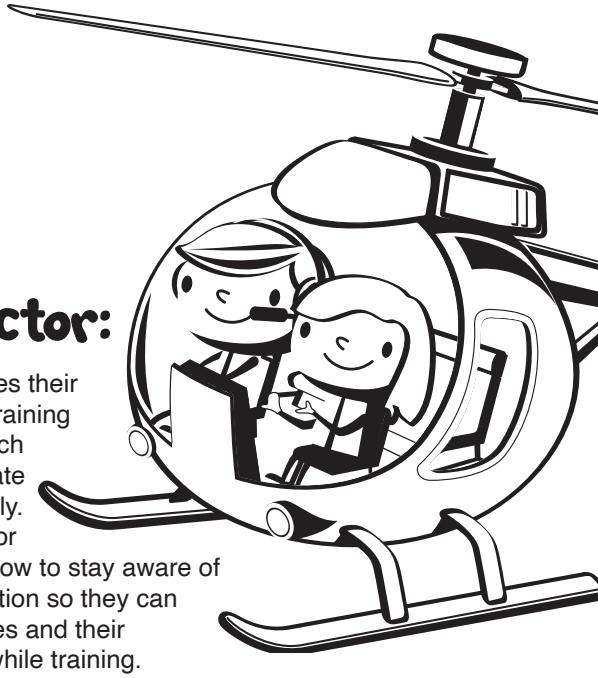
AeroSpace Engineer:

This person uses their understanding of how air works and many other factors to create different machinery, like planes, that can fly. It is important for them to understand how the many parts of the machine work together to create flight. **Do you know of, or have you met one?**



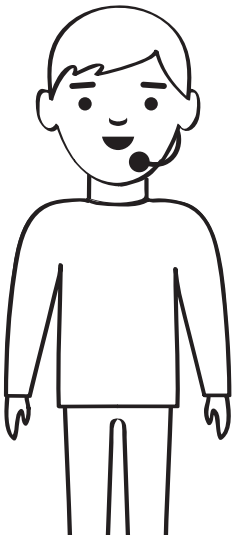
Drone Pilot:

This person flies unmanned aircraft from the ground. It is important for them to have qualifications similar to an airline pilot. **Do you know of, or have you met one?**



Air Traffic Controller

This person watches the many different aircrafts in an area and gives pilots instructions over the radio to make sure everyone is safe. It is important for them to understand how to calculate the rate of acceleration of each flying object. **Do you know of, or have you met one?**



Flight Instructor:

This person uses their pilot skills and training to train and teach people to operate an aiplane safely. It is important for them to know how to stay aware of their flight situation so they can keep themselves and their students safe while training. **Do you know of, or have you met one?**

IMPOSSIBLE BALLOON SOLUTION:

If you did everything correctly, you should have found that the balloon did not blow up very much at all. This is because the balloon sealed the air inside the bottle so that it could not escape. When you tried to blow the balloon up, the air got pressed against the sides of the bottle and the balloon. Normally, air molecules move around freely in all directions, but because the air was pressed and had no way to escape out of the bottle it could not move freely, so it pushed back on the balloon preventing it from getting any bigger. This shows that air takes up space and can put pressure on objects that press it.

1) SuperSonic Solution:

You should be able to blow the balloon up because the air will escape through the hole as you blow up the balloon making more space for the balloon.

2) SuperSonic Question:

The balloon will eventually pop because the pressure of the air trying to escape and push out on the walls of the balloon will be too great for the walls of the balloon.

The Paper Tent and the Flying Sheet Solution: You should have seen that the tent collapsed.

Why did this happen? Remember when you tried to blow up the balloon in the last experiment and you discovered that air takes up space and can put pressure on objects? When the tent was sitting on the table or solid surface, the air on the outside and inside of the tent were bouncing around, bumping into the tent walls, and causing about the same amount of pressure on both sides (this keeps the tent up). But then, you started blowing inside the tent and this changed what we call the air pressure, not because you blew all the air out (remember your breath IS air, so you were replacing the air that blew out with more air), but because you made most of the air start moving fast in one direction. This means there were not as many air molecules bumping into or putting pressure on the inside walls of the tent as there were on the outside of the tent. Basically, since there were more air molecules putting pressure on the outside of the tent than the inside, the tent collapsed inwards. This is Bernoulli's Principle, that the faster air travels, the less pressure it puts on objects around it.

3) SuperSonic Question:

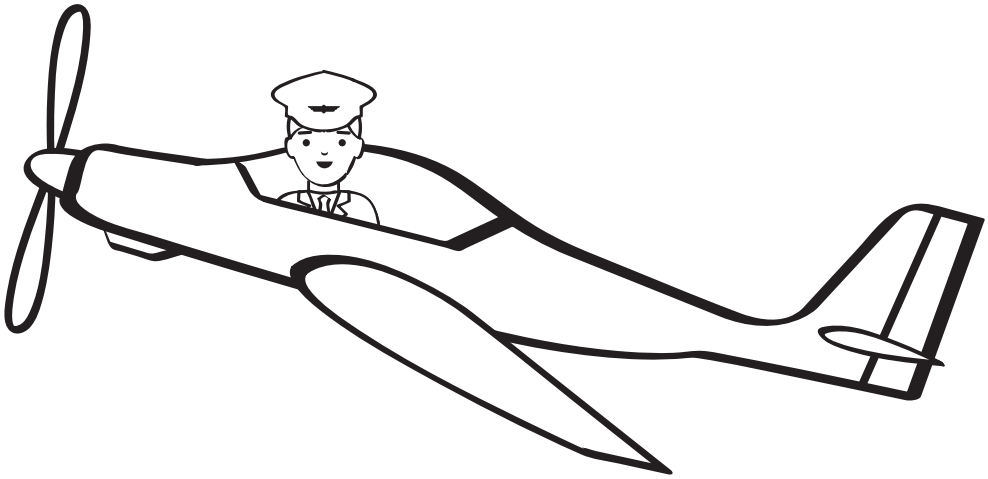
If you guessed that the paper would lift up because the air pressure would become lower on top--where you are blowing most molecules in one direction--while the air pressure underneath remained the same, you are correct!

CONNECTION TO AIRPLANES & FLIGHT:

How do you think Bernoulli's Principle helps planes fly?
(Hint: Think of the paper you just blew across as the front of the plane's wings as it flies through the sky.)

From a side view, plane wings are often curved on top and straight on the bottom like a sideways tear drop. This means the air on top of the wing has a greater distance to go (because it has to follow the curve) than the air on the bottom of the wing (which can just go straight). Therefore, the air flowing on top of the plane wing is moving faster than the air flowing under the plane wing which means that there is more air pressure underneath the wing than on top of the wing which causes the plane to be able to go up.

This is called lift. It is one of four critical forces that must be kept in balance for anything to fly. The other three forces are gravity (which works against lift to pull the plane back to the ground), thrust (which pushes the plane forward – this is usually the jet engine or the propeller on some planes that produces thrust), and drag (which works against thrust to keep the plane from moving forward).



HOT & COLD AIR – ANOTHER WAY TO FLY SOLUTION:

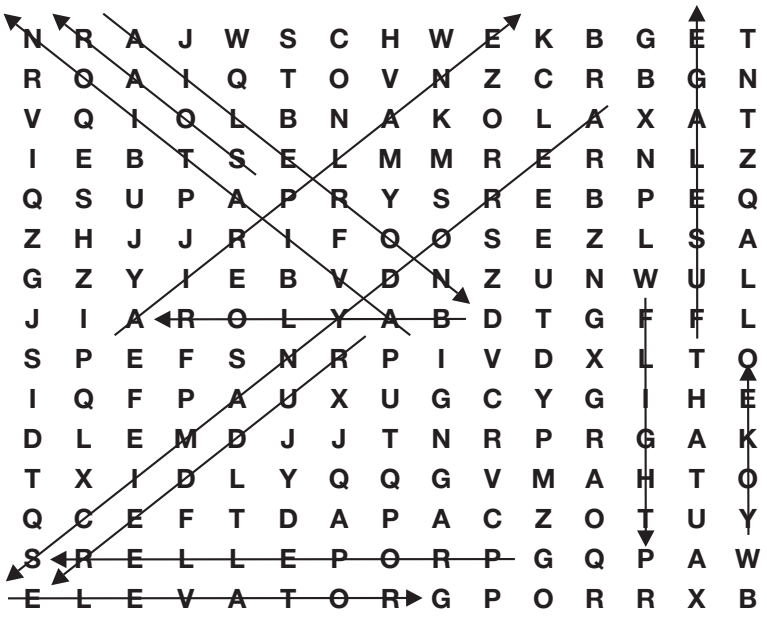
In the first part when you put the bottle and balloon in the hot water, the balloon should have inflated after a few minutes. Why? Because the air trapped inside the balloon got warmer which caused the air to expand or get bigger and inflate the balloon. In the second part of the experiment when the bottle and balloon were in ice, the air got colder causing it to contract or get smaller. Since the air contracted, the balloon also got smaller because the air was not pushing it out as much.

4) SuperSonic Solution:

The balloon would pop because the air would heat up causing it to expand to the point that it broke the balloon.

5) SuperSonic Question:

As hot air fills the balloon, the air expands and becomes less dense or less pressured than the air around it allowing the balloon to float up through the denser, cooler air outside the balloon.



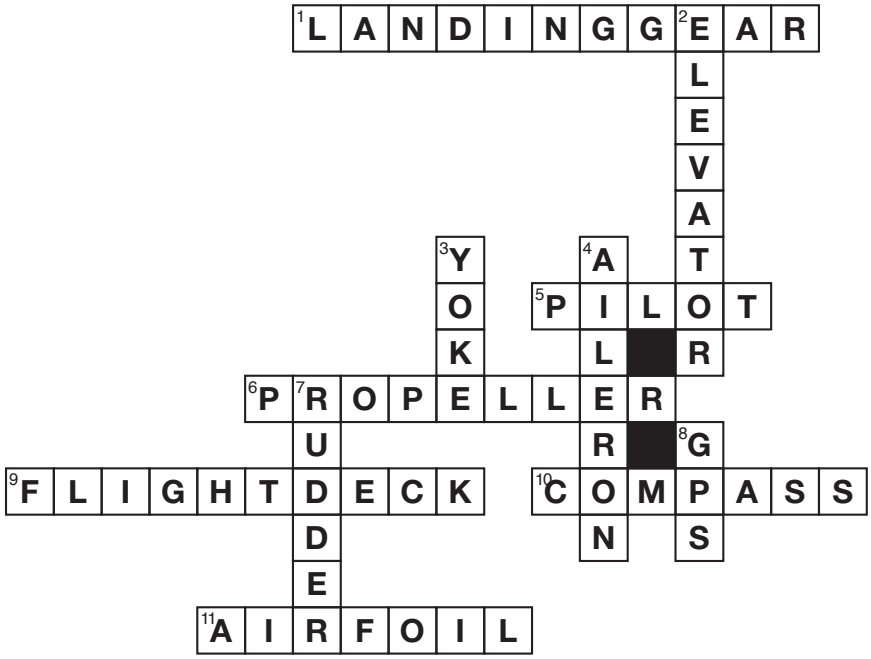
Aviation Word Find

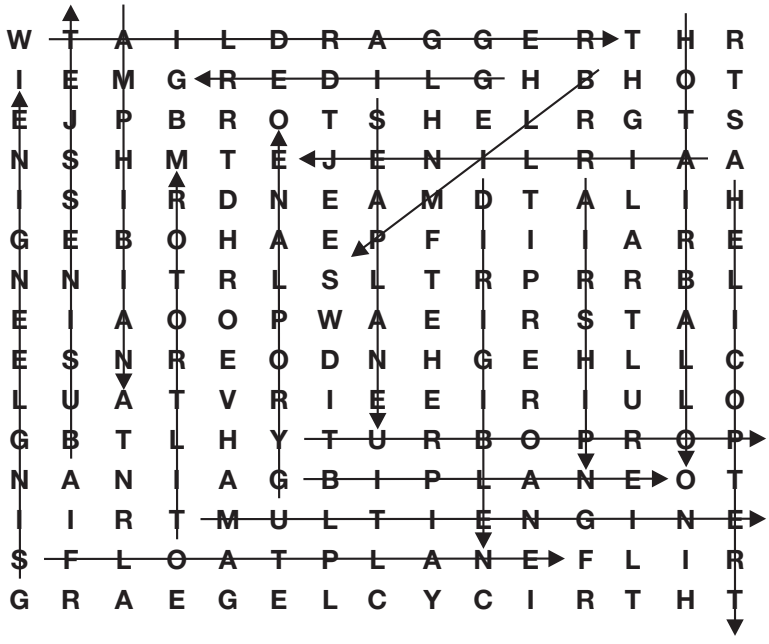
Aerodynamics
Aviation
Aileron
Airplane
Baylor
Elevator
Flight
Fuselage
Propeller
Rudder
Soar
Yoke

Airplane Parts Solution

ACROSS:
1. Landing Gear
5. Pilot
6. Propeller
9. Flight Deck
10. Compass
11. Airfoil

DOWN:
2. Elevator
3. Yoke
4. Aileron
7. Rudder
8. GPS





Aircraft Word Search

Airline Jet
Airship
Amphibian
Biplane
Blimp
Business Jet
Dirigible
Floatplane
Gyroplane
Hot Air Balloon
Helicopter
Multiengine
Seaplane
Single-Engine
Taildragger
Tiltrotor
Turboprop

BOOKS:

- Astronaut Handbook by Megan McCarthey
    - o ISBN0375844597
- Violet the Pilot by Steve Breen
    - o ISBN 0803731256
- 175 science experiments to amuse and amaze your friends: Experiments, tricks, things to make. BY: Brenda Walpole
    - o ISBN: 0-394-89991-1
- Air: Teacher's guide. BY: Delta Education
    - o ISBN: 0-87504-752-1
- Let's build airplanes & rockets! BY: Dr. Ben P. Millspaugh and Dr. Beverly Taylor
    - o ISBN: 0-07-042952-9
- Pressure & pushes & paper planes. BY: The Wild Goose Company
    - o ISBN: 0-88724-804-7
- What makes it go? What makes it work? What makes it fly? What makes it float? BY: Joe Kaufman
    - o ISBN: 0-307-15767-9
- Rosie Revere, Engineer by: Andrea Beaty
    - o ISBN: 978-1419708459
- Hot Air: The (Mostly) True Story of the First Hot Air Balloon Ride by: Marjorie Priceman
    - o ISBN: 978-0689826429
- Who Was Amelia Earhart? By: Kate Boehm Jerome and Nancy Harrison
    - o ISBN: 978-0448428567
- Who Was Neil Armstrong? By: Roberta Edwards and Nancy Harrison
    - o ISBN: 978-0448449074
- Airplanes: Soaring! Diving! Turning! By: Patricia Hubbell
    - o ISBN: 978-0761459835
- Air Show! By: Treat Williams
    - o ISBN: 1423111850

WEBSITES:

- o http://www.nasa.gov/audience/forstudents/careers/index.html
- o http://teacher.scholastic.com/activities/flight/timeline.htm
- o https://www.grc.nasa.gov/www/k-12/UEET/StudentSite/historyofflight.html
- o NASA Kids Club link: http://www.nasa.gov/audience/forkids/kidsclub/flash/index.html#.V4vvII-cHIU
- o http://www.foldnfly.com/#/1-1-1-1-1-1-1-1-2 has multiple paper airplane designs with easy to follow

BAYLOR
AVIATION SCIENCES

www.baylor.edu/aviation

This book was created under the direction of the Baylor Institute for Air Science and is distributed with the primary mission of educating young people about basic aviation related sciences.