

**Feb. 5-7, 2021 • Hudson, WI**



## **Educational Booklet**

**Join us in Hudson, Wisconsin for winter family fun!  
February 5-7, 2021**

Greetings students, children of all ages and fellow hot air enthusiasts. For the 32nd Annual Hudson Hot Air Affair, we selected the theme: *Bringing Fun to 2021*.

Join us in Hudson for the annual winter festival and hot air balloon rally. The Hot Air Affair will offer family fun activities for children of all ages. This year due to COVID-19 health concerns, the Hot Air Affair will be a hybrid event with virtual coverage of some of the activities and some in-person activities.

Our school program has been converted to a digital format. While we are not able to bring the pilots and balloons into the schools, we are offering a fun new video *Rivers in the Air... Just Add Wind*. Kids can tune in for FUN viewing and activities with local artist and educator Liz Malanaphy. Watch and learn about the wind and why hot air balloons rely on it to fly in the sky.

There are several activities on the Hot Air Affair schedule for families to enjoy, including: The Phipps Family Day Activity; Angel's Online Pet Costume Contest; the Hot Air Affair Virtual 5k Run/Walk; Pop Up Balloon Launches; the Drive-Thru Balloon & Candlestick Glow Event and more. We are partnering with River Channel Hudson/North Hudson Community Access Television to produce several Hot Air Affair videos. Find the video links on our website, on Facebook and on YouTube River Channel.

### **OUR HISTORY**

The Hot Air Affair was conceived back in 1990 as an idea to fuel public pride in Hudson and the St. Croix Valley by drawing local, state and national attention to our area while at the same time providing a mid-winter economic boost to our local businesses. The Hudson Hot Air Affair was incorporated in 1997 and is operated as an all-volunteer, non-profit community organization. Proceeds from the event go to supporting the Hot Air Affair, as well as several activities that raise funds for local charitable organizations. We hope you enjoy this year's event *Bringing Fun to 2021* with your family and friends.

See a complete schedule and event details at [HudsonHotAirAffair.com](http://HudsonHotAirAffair.com)



## "WEATHER" TO FLY OR NOT - THAT IS THE QUESTION?

Before a hot air balloon can lift off, the pilot must ALWAYS first check the weather. Hot air balloons depend on different weather factors, including wind speeds, visibility and more.

### ***How do pilots steer balloons?***

Generally speaking, they don't. A balloon drifts in the same direction and at the same speed as the wind. The skill is for the pilot to pick the altitude that has the most desired wind direction. Surface winds many times blow in a different speed or direction than the winds aloft.



### ***What are winds aloft?***

The winds on the ground may not even have a hint of a breeze, but balloon flights may be canceled due to wind. How come? Pilots look at winds at the surface (the wind you can feel) and the winds at 1 to 9,000 feet. The balloons are not going to 9,000 feet, but it tells the pilot if they might encounter issues such as wind shear, turbulence, or strong surface winds later on. Even if there are no winds at the surface, the winds aloft may drive the decision not to fly. Winds aloft of 18-20 knots or 20 miles per hour can be sufficient to cancel a flight.

### ***Can it be too windy to fly?***

Balloons fly best in light and stable winds of 4-6 miles per hour. Maximum safe winds are 8-10 mph. Wind affects every phase of a flight. Here are the reasons wind is such an issue:

During inflation the balloon envelope is filled with cold air using a fan. The balloon fabric is like a giant sail, and winds approaching 10 mph make it almost impossible to fill the balloon, caving in the side and rolling the balloon around, sometimes violently.

High winds can carry a balloon into areas that are unsuitable for a landing—such as metropolitan areas, forests, restricted airspace or large bodies of water.

Very low winds can strand you over unsuitable landing areas.

And then there is the landing. High wind speeds mean that the pilot needs a larger area in which to land. A balloon relies on the friction of the basket dragging along the ground to come to a stop as balloons do not have brakes.

### ***Can balloons fly in cold temperatures?***

The temperature difference between inside and outside the balloon envelope determines the lift of a balloon, so balloons can fly well in cold weather. However, if the liquid propane in the fuel tanks is too cold, it may become too cold for the propane to work well. But the tanks can be warmed before the flight.

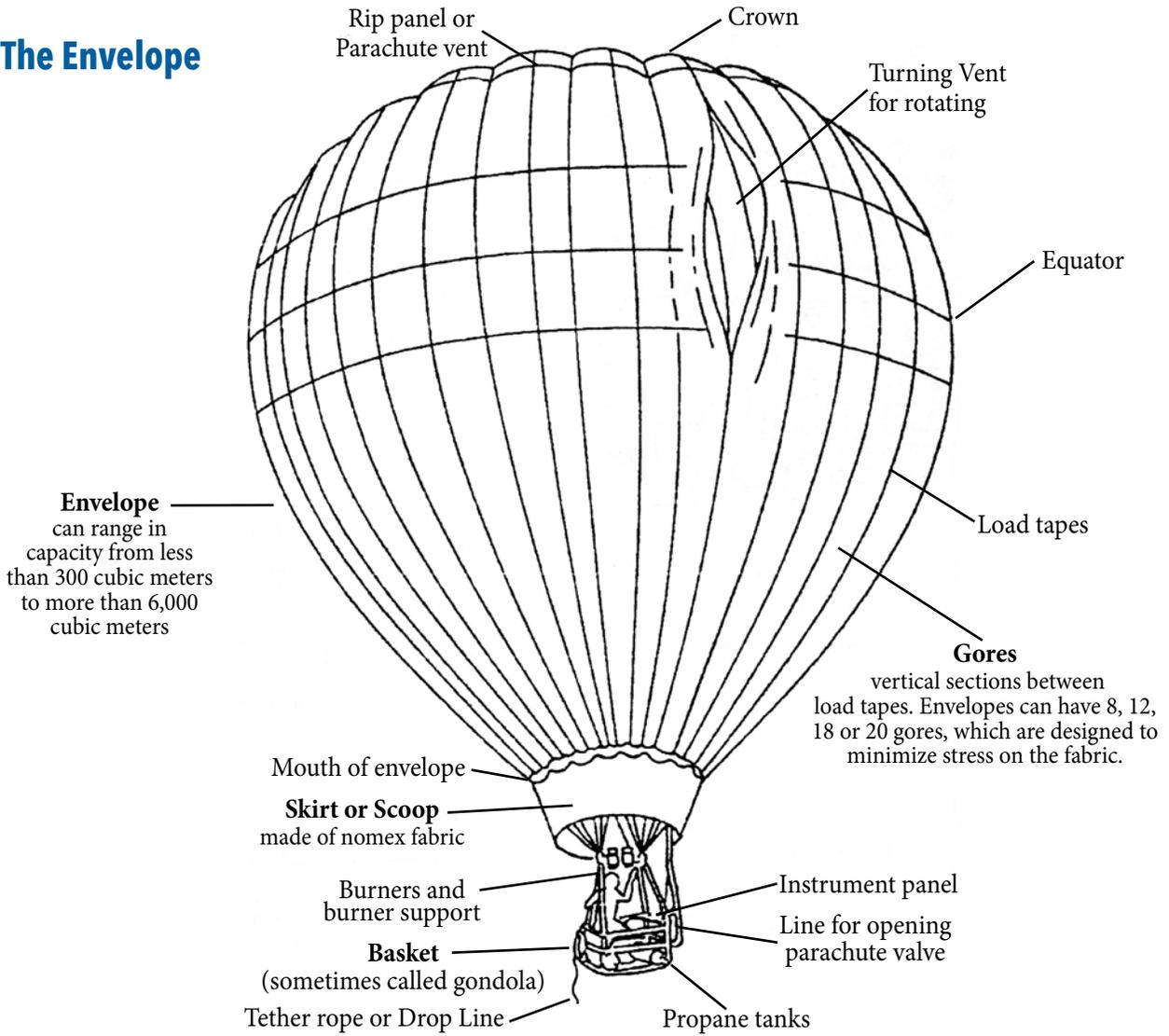


### ***When is the best time to fly?***

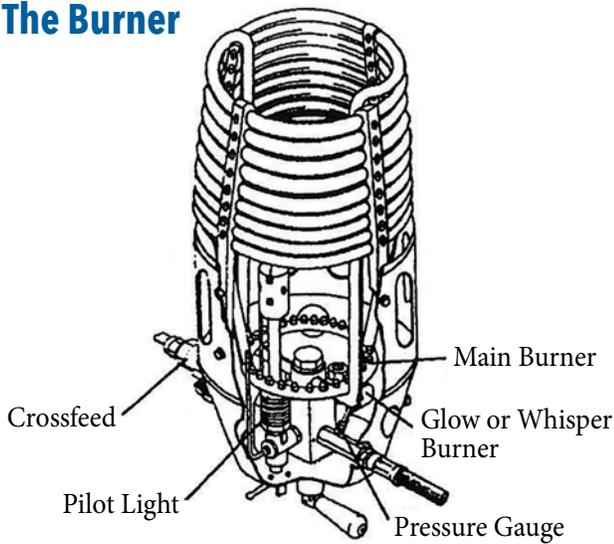
Hot air ballooning is a year-round sport. Weather conditions for ballooning are best just after sunrise and 2-3 hours before sunset. Good winds (2-8 mph) often occur during these times. During the day, when the sun is high, thermals (large bubbles of hot air that rise from the sun-heated earth) make ballooning hazardous.

# PARTS OF A HOT AIR BALLOON

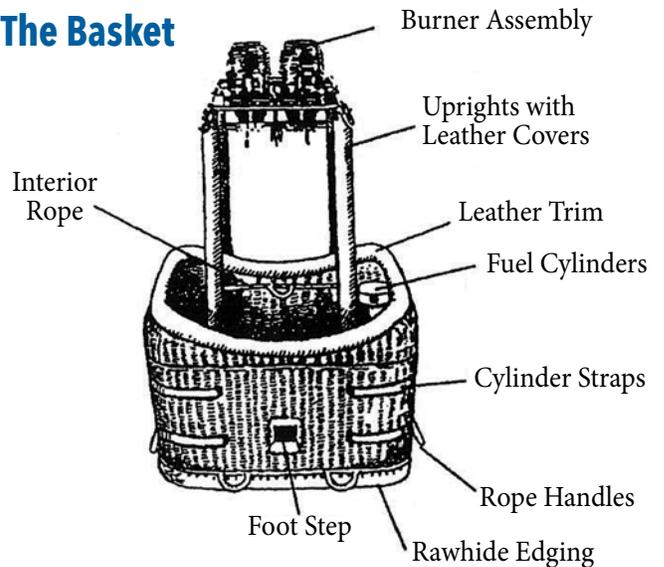
## The Envelope



## The Burner



## The Basket



## FACTS ABOUT HOT AIR BALLOONS

### ***Of what are balloons made?***

The bag or envelope, as it's more properly called, is made from a light weight ripstop nylon or polyester fabric much like parachute fabric. Balloon fabric is coated with polyurethane or silicone to help stop air leaking through. The bottom of the balloon is usually made from a fire resistant fabric called "Nomex." This is the same material as fire suits. Nomex is used because it protects the balloon from accidental burn damage. The Nomex is also used to make a 'scoop' or 'skirt' which helps to direct heat from the burners' flame up into the balloon. The scoop has some added advantages when the balloon is on the ground.

### ***Why are most balloons shaped like a teardrop?***

The shape of a typical hot air balloon is derived from a set of mathematical equations which reduce the stress on the fabric. The resulting shape, sometimes referred to as the natural shape, minimizes the horizontal stress on the fabric. Vertical stresses are carried by webbing tapes, which run from the top to the bottom of the balloon. Computer design software can now engineer balloons in almost any shape.



### ***How are the baskets made?***

The baskets are made from rattan or wicker. Each one is individually woven by hand.

### ***How big are hot air balloons?***

Typical sport balloons range in size from 65,000 to 105,000 cubic feet in volume and stand about 70 ft. tall. This is about the same as a 7-story building. The most popular sport balloon is approximately 55 feet wide (diameter) and carry 3 to 4 people. A typical 77,550 cubic foot balloon has 1,750 sq. yards of nylon fabric in its envelope (or one-fifth of an acre in surface area). It also includes more than 3 miles of thread and almost one-half mile of nylon webbing used for reinforcing. It displaces almost 3 tons of air. These sport balloons carry 3 to 4 people.

### ***Where does the balloon land?***

The balloon lands on the ground. Since the balloon travels with the wind, it is difficult to predict the exact landing site prior to the launch. However, a pilot is able to determine the general flight direction and landing area by studying the winds.

### ***How do you get the balloon back?***

Your chase crew driving a van or pickup truck helps get the balloon back. This chase crew follows the flight of the balloon (as well as the existing roads allow) and should be on hand to make the recovery when the balloon touches down.

### ***Do you need a license to pilot a balloon?***

Yes. The Federal Aviation Administration issues a Balloon Pilot Certificate. You must pass an FAA written examination, obtain a prescribed number of hours in a balloon, make a solo flight and a flight to altitude, pass a flight test and submit a medical statement.

### ***Are you afraid of heights?***

Because there is very little sense of motion in a balloon, many people are able to overcome their fear of height. Rather than looking down, the natural reaction is to look "out" at the horizon and, because the balloon is moving relatively slowly, you probably won't react the same way you would in an airplane (or even on a shaky stepstool!). It's always an option to sit down in the basket, which seems to solve any uneasiness for most people after just a few moments.

### ***How much does a balloon cost?***

New 4-passenger sport balloons cost around \$40,000. Of course, the exact price can vary considerably depending on the options that you want. A special shape balloon costs much more, usually \$150,000+.

### ***How long does a balloon last?***

A hot air balloon will usually last for 500-600 flying hours depending on how regularly it is flown and how well it is maintained. Balloons deteriorate rapidly if they are packed wet or if they aren't aired regularly. A typical sport balloon pilot flies about 50 hours per year so a new balloon should last 8 - 10 years. Commercial pilots fly 150 - 200 hours per year so their balloons tend to last about 3 years.

### ***What is the difference between a gas balloon and a hot air balloon?***

A gas balloon is completely enclosed and is filled with helium, hydrogen, ammonia, or coal gas. A hot air balloon gets its lift from heating the air within it. Gas ballooning is almost completely silent whereas, the propane flame shooting out of the burners of a hot air balloon makes a loud "whoosh" sound.

### ***How long does it take to set up a balloon?***

It usually takes 3 or 4 people about 20 minutes to get a sport size balloon ready for flight. This includes unloading the basket and envelope from the trailer, rigging and checking the system and the cold and hot inflation. Larger and special shaped balloons can take up to an hour to ready for flight.

### ***How fast does a balloon go?***

As fast as the wind; or as slow. Since the balloon has no forward propulsion system, its speed is determined entirely by the speed of the wind. That's why balloon races are events of accuracy not speed.

### ***What fuel does a balloon use?***

Hot air balloons use propane, kept in pressurized tanks on the floor of the basket. The balloon carries 30-40 gallons of liquid propane. It is carried under pressure and passes to the burners through flexible hoses. When the valves are opened, the propane atomizes and is ignited by a pilot light in the burners. The flame may shoot out as much as ten or twenty feet, making a loud "whoosh."

### ***Is ballooning SAFE?***

Statistics have shown ballooning to be the safest segment of general aviation. The two most significant hazards are poor pilot decisions, and contact with power lines. Providing that the aircraft is properly maintained, and that the pilot is prudent in his/her decision-making process and proficient in piloting skills, the risk is minimal. You are probably safer in a balloon than in your own car on an interstate!

### ***How high do balloons fly?***

Most balloon flights occur between 500 and 1,000 feet above the ground, but balloons can fly at treetop level or go much higher.

### ***Can you fly in the winter?***

Yes indeed! As long as you are properly dressed (as you would if, for example, you'd be attending an outdoor football game), winter flying can be incredibly beautiful. The air is frequently clearer, and visibility much improved (25-50 mile visibility is often possible). Because trees are bare, it is also easier to spot wildlife. The only concern may be that access to landing sites may be more difficult if there is significant snow cover.

### ***How long can a balloon stay up?***

It depends. Normally, the balloon carries enough fuel to remain aloft for up to 2 hours, but factors such as outside air temperature, weight being carried in the basket, and weather determine the duration of the flight.

## LET'S HAVE SOME FUN!

Here are some suggested hot air balloon activities you can enjoy at home.

### GOOD READS:

***Flight for Freedom: The Wetzel Family's Daring Escape from East Germany***, by Kristen Fulton

This is an inspiring true story about one family's escape from behind the Berlin Wall!

View a reading of this book on [YouTube](#) or check availability at your local library.

***The World Needs Who You Were Made to Be***, Joanna Gaines

This book celebrates how creativity and acceptance can come together in a bright and beautiful adventure.

View a reading of this book on [YouTube](#) or check availability at your local library.

***Little Polar Bear and the Big Balloon***, by Hans de Beer

A little polar bear helps a puffin who is unable to fly find another way to fly home, which involves a hot air balloon. View a reading of this book on [YouTube](#) or check availability at your local library.

### VIDEOS TO WATCH:

Don't miss the Hot Air Affair video ***Rivers in the Air... Just Add Wind***. Kids can tune in for FUN viewing with local artist and educator Liz Malanaphy. Watch and learn about the wind and why hot air balloons rely on it to fly in the sky. Visit the Hot Air Affair website for a [link to the video](#).

If you liked the ***Just Add Wind*** video, you may want to the ***Just Add Water*** video. Liz is back, with familiar guests and a toilet paper tube craft, in a special video. View the video on [The Phipps website](#).

SciShow Kids video: ***How Do Hot Air Balloons Work?***

Hot Air Balloons! They're those big, beautiful balloons people can float up to the sky in—but how do they get up there?! Watch on [YouTube](#).

Thinking Captain video: ***How Do Hot Air Balloons Work?*** from Best Learning Videos For Kids.

The Thinking Captain shows how a hot air balloon works. Watch on [YouTube](#).

X-Stream Science video: ***The Montgolfier Brothers First Flight***

Parents will enjoy this video too. Learn about the Montgolfier Brothers and early hot air ballooning. Watch on [YouTube](#).

### FUN EXPERIMENTS:

***National Geographic Kids: Racing Rocket Balloons***.

This experiment is fun to do with a few other people so you can race your balloons.

Step by step instructions on the [National Geographic Kids website](#).

***Learning 4 Kids: Hot Air Cold Air Science Activity***

This is a great experiment to watch the effects of hot air and cold air on a balloon. This activity is a great opportunity for kids to talk about what they can see and why it is happening. Kids will absolutely love this activity and will see, first hand, what effects hot and cold air has on a balloon.

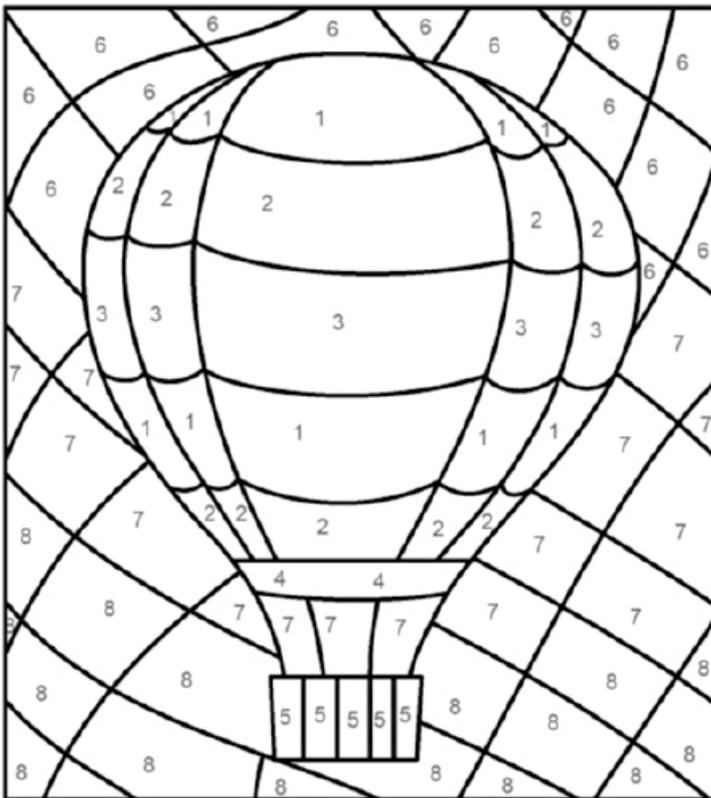
Step by step instructions on [Learning 4 Kids website](#).

# HOT AIR BALLOON WORD SEARCH

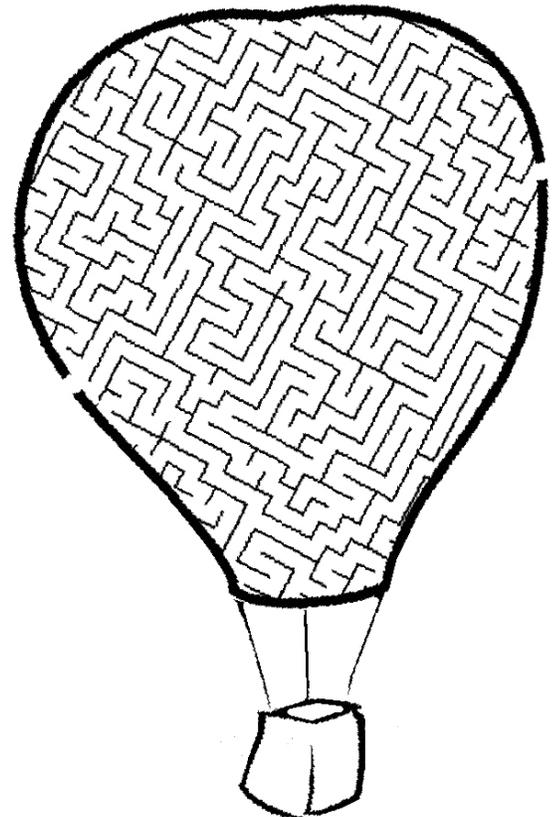
T A Y K M A B B E K B J H L E R M  
 O E V F O N L S J U Z D H U J J E  
 N R R I N S S T F G F L R M H X G  
 O O E H T W L U I L T I R O H M I  
 O N N M G V G N P T L E F I U D H  
 L A R Q O S E Y W C U L K V S G H  
 L U U Q L Y G N C B Y D T S Q B Y  
 A G B X F J I I T C E N E I A X F  
 B H L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



- blast
- valve
- burner
- altitude
- vent
- crew
- aeronaut
- basket
- envelope
- fly
- montgolfier
- hotairballoon



- 1 RED
- 2 BLUE
- 3 YELLOW
- 4 GREEN
- 5 BROWN
- 6 LIGHT BLUE
- 7 PINK
- 8 ORANGE



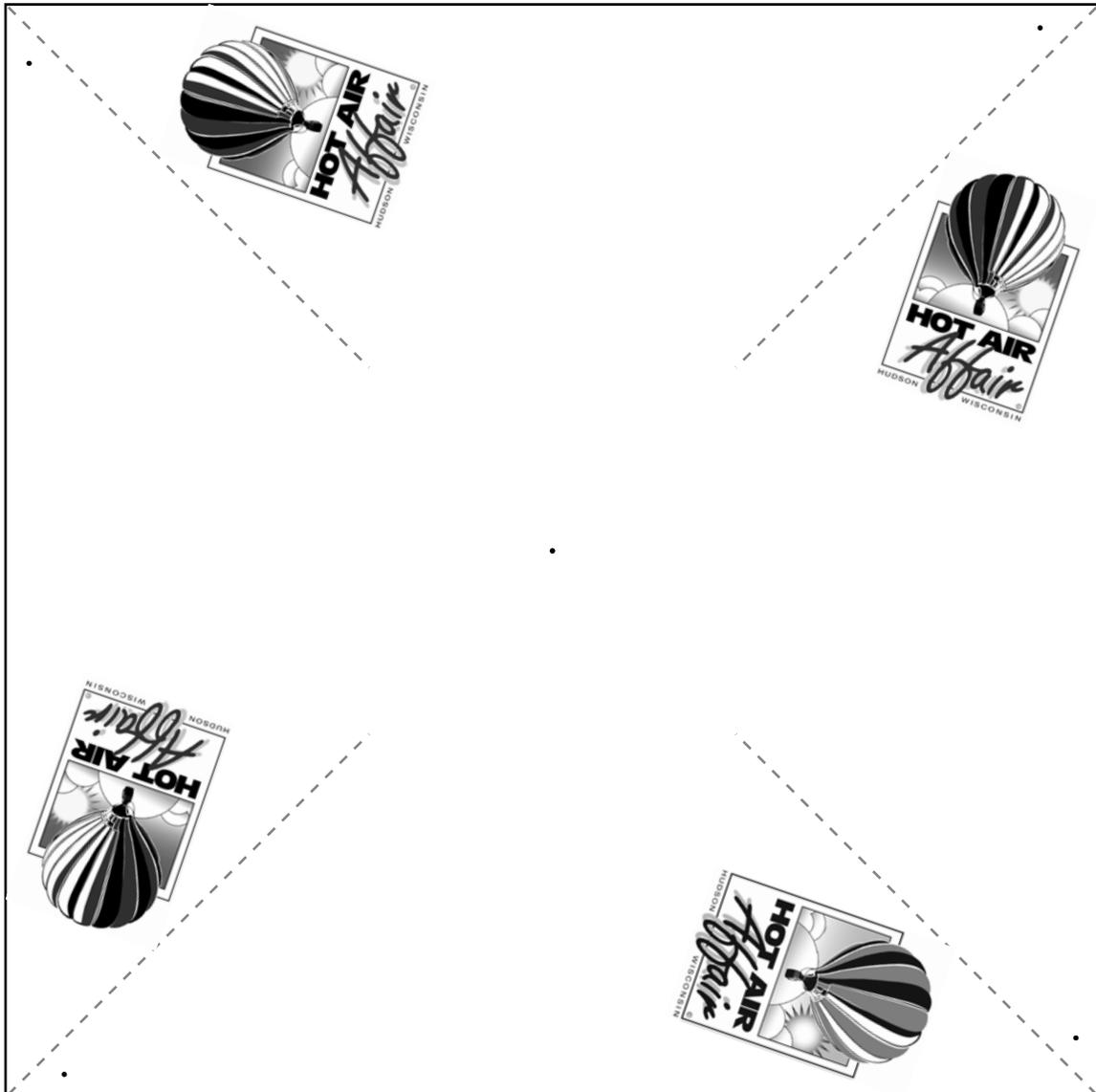


The French brothers Joseph & Jacques Montgolfier were concerned about the effects of flight on living creatures. This led to the hot air balloon ascent of the *Aerostat Réveillon* on September 19, 1783 with the first living beings in a basket attached to the balloon: a sheep, called *Montauciel* (Climb-to-the-sky), a duck and a rooster.



## Pinwheel

1. Cut out the square and color the front and back.
2. Cut along the dotted lines towards the middle.
3. Use a push-pin to poke holes in the dots in the center and corners.
4. Bend the corners with the dots/holes towards the middle, lining up the holes, insert push-pin through the holes (corners first and then the center hole). Stick the push-pin into the side of the pencil eraser.
5. Your pinwheel is ready to blow in the wind.





## THE BALLOONIST'S PRAYER

*The Winds have welcomed you with softness.  
The Sun has blessed you with his warm hands.  
You have flown so high and so well  
That God has joined you in your laughter  
And set you gently back again  
Into the loving arms of Mother Earth.*

**Thank you to our Corporate Sponsor:**



Also, a special thanks to the following for  
sponsoring the printing of this educational booklet:

**The UPS Store**



### **The UPS Store**

808 Carmichael Road • Hudson, WI 54016  
715.386.2222 • theupsstore.com



### **Family Fresh Market**

303 S Main Street • River Falls, WI 54022  
715.425.7277 • familyfreshmarket.com



### **Smiles in Motion Pediatric Dentistry**

201 Carmichael Road Ste 200 • Hudson, WI 54016  
715.723.2000 • sim4kids.com

#### Sources:

- [adventureballoons.co.uk/about/balloon-weather](http://adventureballoons.co.uk/about/balloon-weather)
- [thephipps.org/event/just-add-water-videos](http://thephipps.org/event/just-add-water-videos)
- [youtube.com/user/scishowkids](http://youtube.com/user/scishowkids)
- [youtube.com/thinkingcaptain](http://youtube.com/thinkingcaptain)
- [learning4kids.net](http://learning4kids.net)
- [kids.nationalgeographic.com](http://kids.nationalgeographic.com)
- [navalaviationmuseum.org/x-stream-science](http://navalaviationmuseum.org/x-stream-science)