# SLED KITE

**Objectives**

The students will:
Construct and fly a simple sled kite.
Demonstrate how to make the kite fly at varying heights.

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**Standards and Skills**

**Science**
Science as Inquiry
Unifying Concepts and Processes

**Science Process Skills**
Observing
Measuring
Predicting
Controlling Variables

**Mathematics**
Connections
Estimation
Measurement

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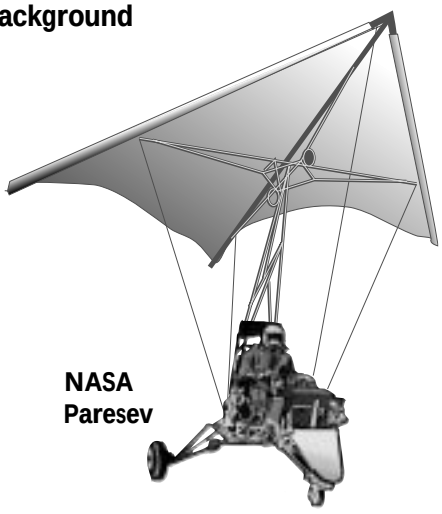
**Background**



**NASA**
**Paresev**

The sled kite in this activity is a model of a type of airfoil called a parawing. Like any wing, the parawing depends upon the movement of air over its shape to generate a lifting force. Similar lift-generating devices are parasails, parafoils, and paragliders.

The NASA Paraglider Research Vehicle (Paresev) was the first flight vehicle to use the Francis Regallo-designed parawing. The little glider was built and flown by NASA during the early 1960's to evaluate the parawing concept, and to determine its suitability to replace the parachute landing system on the Gemini spacecraft. Although the parawing was never used on a spacecraft, it revolutionized the sport of hang gliding. Hang gliders use a parawing to glide from cliffs or mountain tops.

There are kites of all shapes, sizes, and colors. The sled kite in this activity is made from a piece of cloth or paper and two drinking straws. The straws are attached parallel to each other on opposite sides of the cloth or paper. This arrangement shapes the kite like a sled when it catches the air. The string attachment points are placed toward one end of the kite, which causes the opposite end to hang downward, and stabilizes the kite in flight.

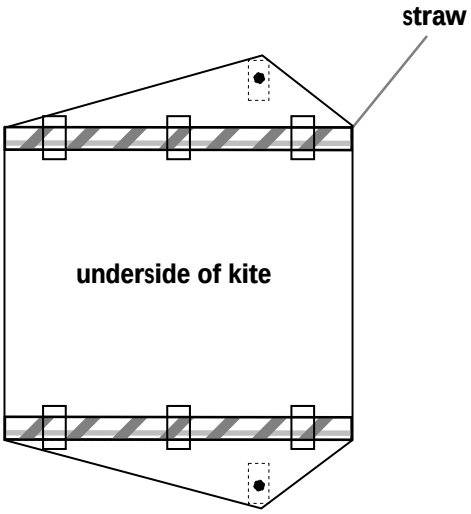
**Materials (per kite)**

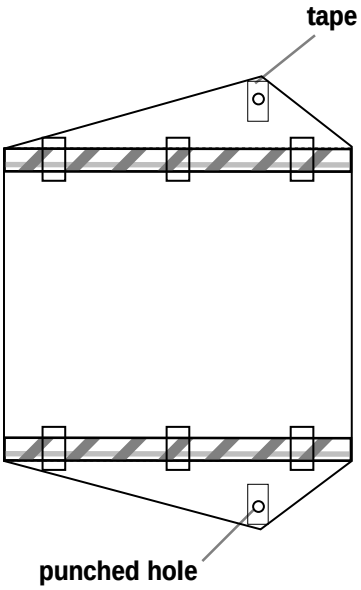
Sled Kite Template
Two drinking straws
Cellophane tape
Scissors
Two 45 cm lengths of string
One 1 m length of string
Metric ruler
Single-hole paper puncher
One paper clip
Markers, crayons, pencils
Selection of paper (crepe, tissue, newspaper)

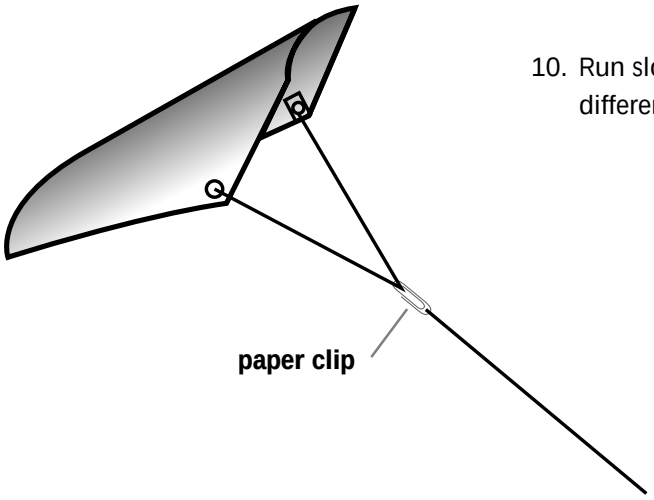
**Management**

Approximately 30 minutes are needed to build the sled kite. Additional time is needed to allow the students to fly and evaluate their sled kites outside.

## Activity




1. Make a copy of the Sled Kite Template. Carefully cut out the sled kite.
2. Decorate the top of the sled kite using crayons, markers, or other media.
3. Trim the length of the two drinking straws so they will fit in the area marked for the straws. Tape them in place.
4. Place two or three pieces of tape in the marked areas covering the black circles.
5. Using a single-hole paper puncher, carefully punch the two holes marked by the black circles.
6. Cut two pieces of kite string 45 cm each. Tie a string through each hole. Tie them tight enough so you do not tear the paper.
7. Tie the opposite end of both strings to a paper clip.
8. Pick up the 1 m long piece of string. Tie one end of this string to the other end of the paper clip. Your sled kite is ready to fly!
9. Outside in a clear area, hold the 1 m length of string and run with the kite to make it fly.
10. Run slow and run fast, and observe how the kite flies at different towing speeds.

## Discussion

1. Can kites be used to lift objects? *Yes, a popular beach activity uses a large kite (parasail) towed by a speed boat to lift a person high into the air.*

2. Why are kites made of lightweight material? *Lightweight materials insure the kite will weigh less than the "lift" produced by the kite.*

## Assessment

1. Have students explain how their kite was built.

2. Have students demonstrate ways to make the kite fly higher, and to fly lower.

## Extensions

1. Have the students decorate their kite using a minimum of three colors.

2. Record the length of time for each flight.

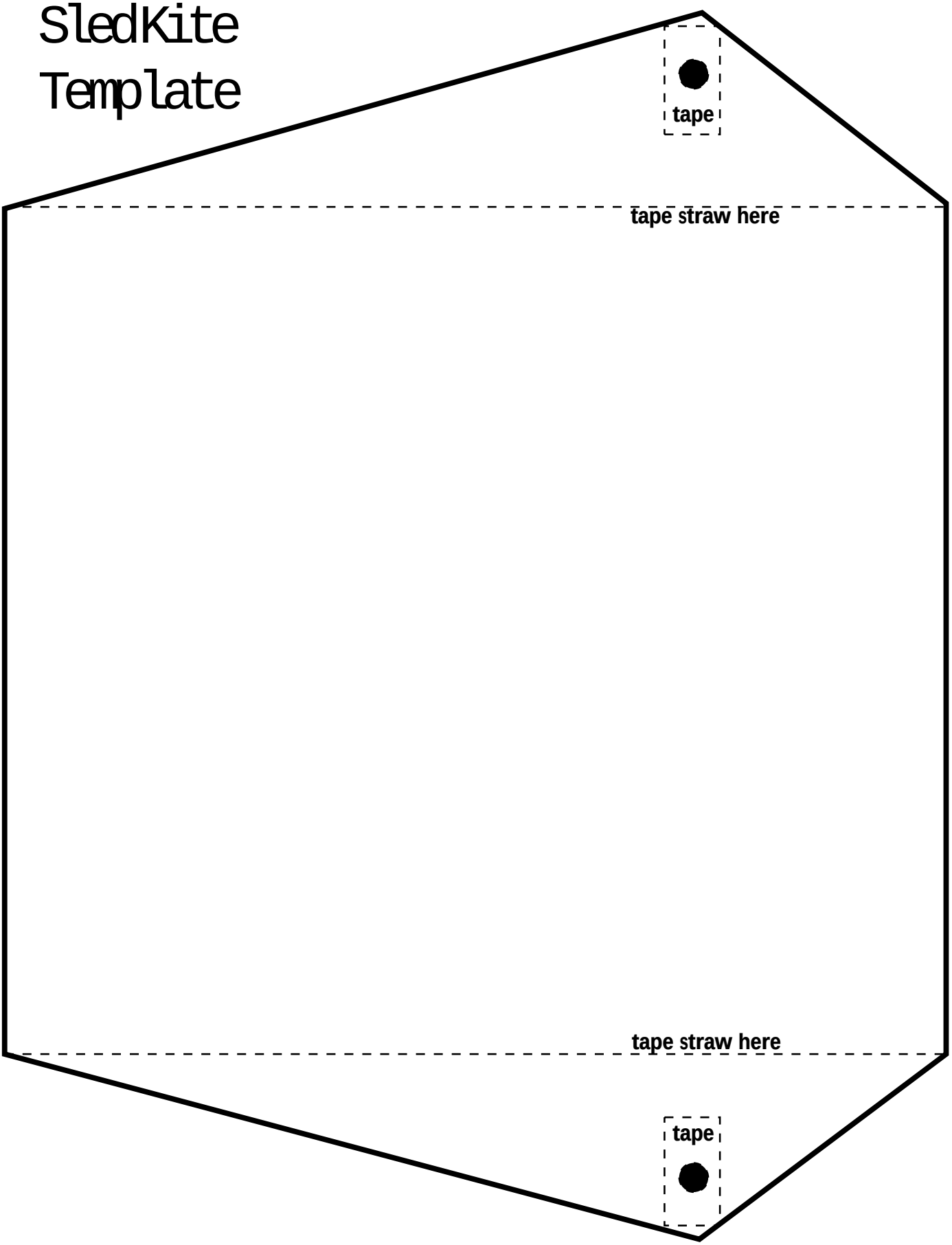
3. Have the students run a relay with a kite as a means to sustain its flight.

4. Design a kite and write the directions on how to build it.

5. Add a tail to the sled kite using crepe paper, strips of newspaper, tissue paper, or garbage bags. Have students predict what, if any, changes will occur in the kite's flight characteristics. Conduct flights to test the predictions.

6. Research the history of kites.

# SledKite Template



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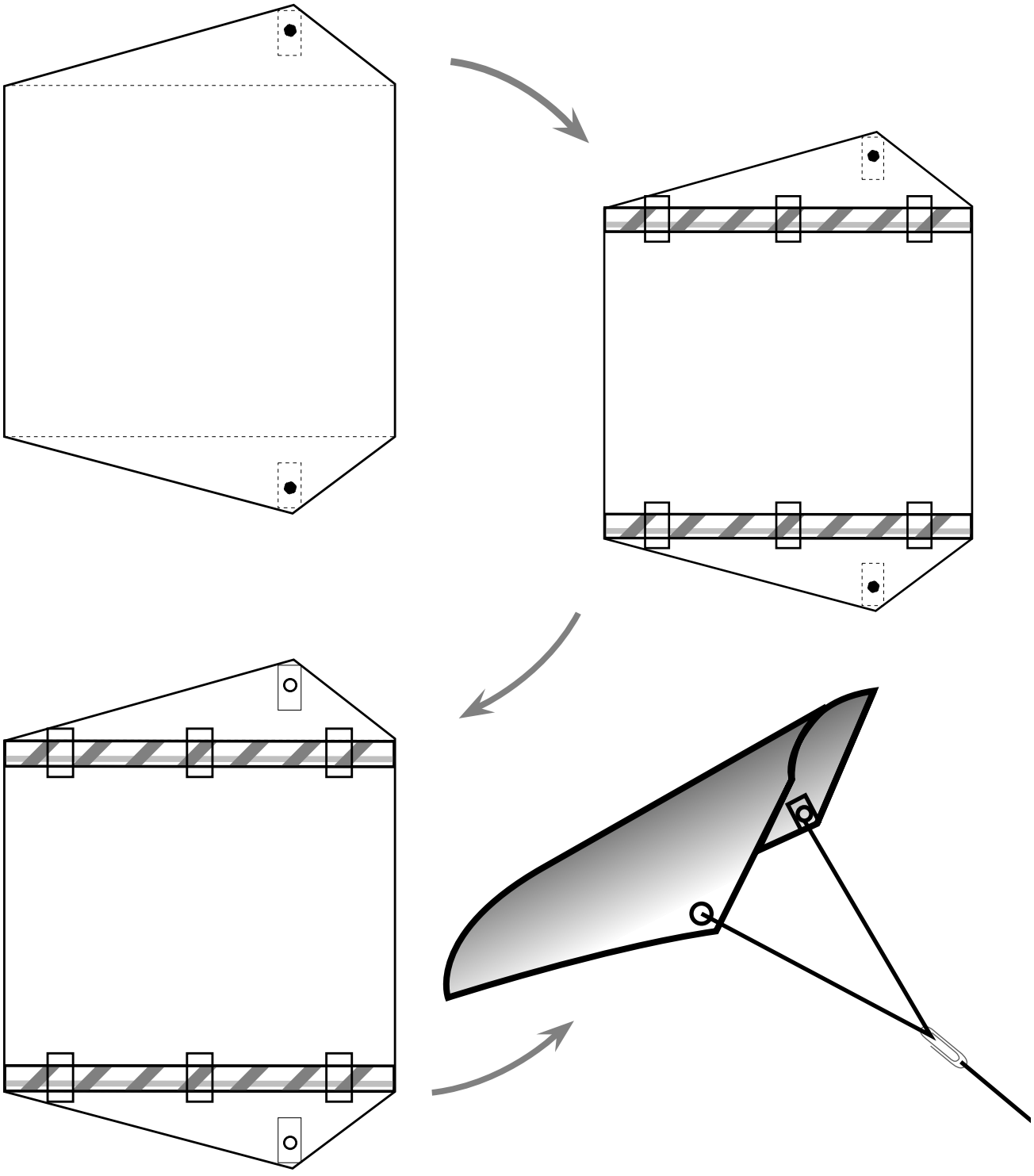

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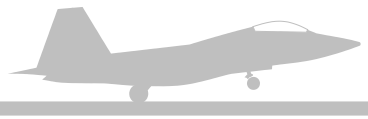

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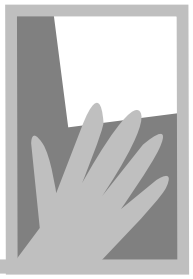

## Sled kite flying journal

Date _____ Student name _____

Weather _____

**SledKite Flight**
**What happened when I...**

1 When I walked with my sled kite, my sled kite:

_____

2 When I ran with my sled kite, my sled kite:

_____

**SledKite Tail, What if...**

What if I add a tail to my sled kite? I think a tail will make my sled kite fly like this:

_____

After I added a tail to my sled kite, it flew like this:

_____

What if I shorten the tail, I think it will make my sled kite fly like this

_____

What if I lengthen the tail, I think it will make my sled kite fly like this:

_____

**Conclusions**

If the tail is shortened, then the sled kite will fly like this:

_____

If the tail is lengthened, then the sled kite will fly like this:

_____