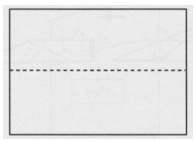
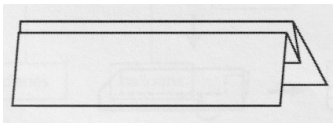
Design – Make – Test

Science & Technology based problem solving
& creative thinking

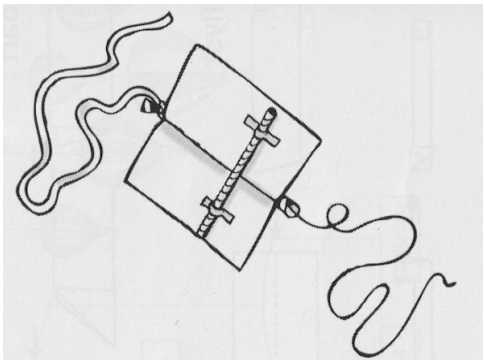
A kidcyber book
by Shirley Sydenham & Ron Thomas

MAKE a simple kite from 1 sheet of paper
You need a sheet of A4 paper, 2 drinking straws, thin string
Cut a thin strip of paper from the long edge of the paper. It's the tail.

1. Fold the rest of the paper in half lengthways.
2. Fold each side parallel to the centre fold and about 2/3 f the way down to the centre fold.

1.  2. 

Thread string through a straw and glue the straw firmly in the fold of the paper, pinching the tail end of it.
Tape the second straw across the top of the paper as shown in the diagram. Attach the strip of paper to the other end of the paper to make the tail.

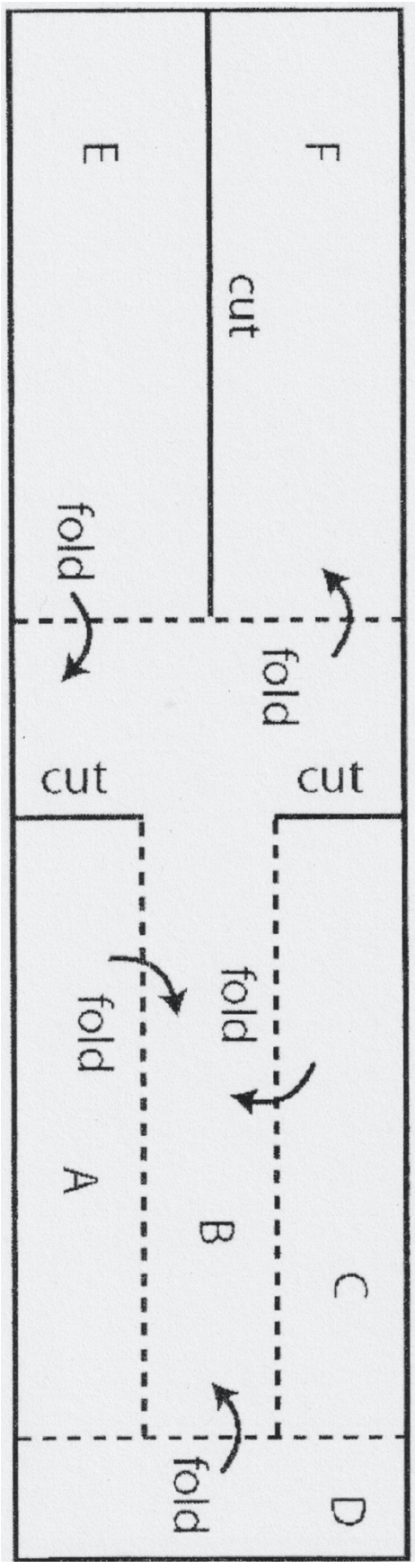


TEST the kite
How did it perform? Was it easy to get it to fly?
How can you solve any problems that occurred?

EXPERIMENT
How does it fly if you make the tail longer? Or remove it?
Try making the kite with different kinds of paper, such as stiffer, bigger, differently shaped. Does different string make a difference?

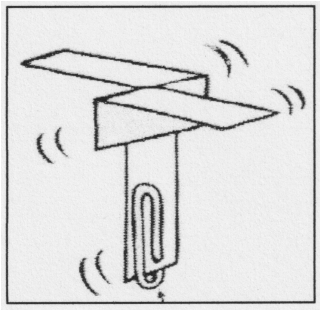
DESIGN your own version of a simple kite, using elements you discovered in your experiments.

MAKE a paper rotocopter



You need scissors, a paperclip, felt tip pens, coloured pencils

1. Cut out the rotocopter pattern on the outside lines.
2. Decorate it if you wish.
3. Cut along the solid lines at the top of sections A & C.
4. Fold up section D and fold A & C over B.
5. Place a paperclip at the bottom.
6. Cut along the solid line between E & F.
7. Fold section E forward and section F back.



Test by standing on a chair safely and dropping the rotocopter. Write about what happens.
Why is the paperclip needed? Write reasons.

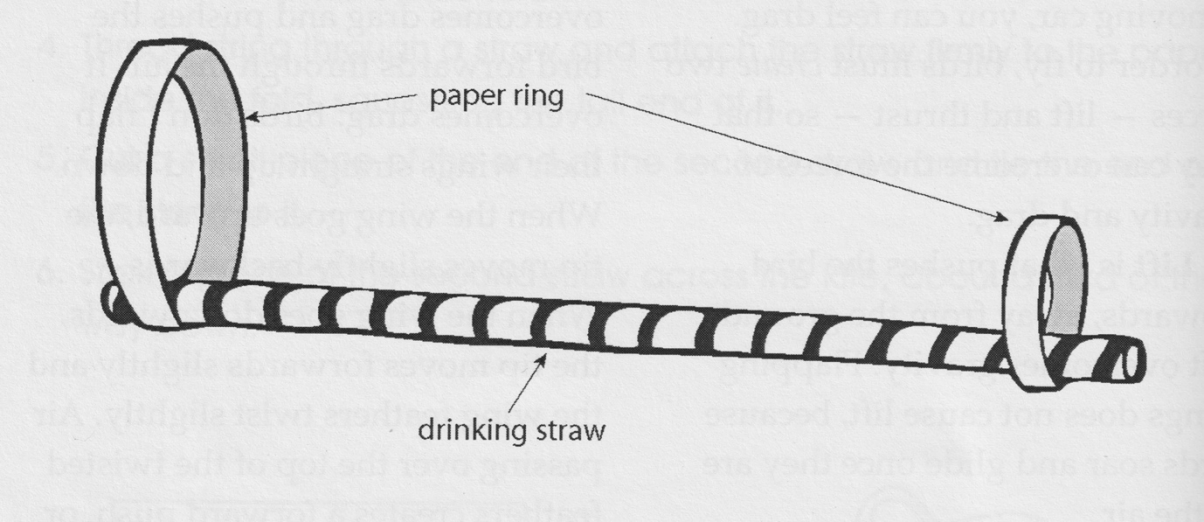
Experiment:
Try adding more weight to the rotocopter. Write what you think will happen, the test your prediction. Write what happens.

Try other experiments, such as using different kinds of paper, or changing the size of the wings. Write what you think will happen, test and write what happens.

MAKE a gyrocopter (or spinning glider)

You need paper, drinking straws, sticky tape

1. Cut 2 strips of paper: 18 cm long, 2 cm wide & 13 cm long, 2 cm wide.
2. Tape the ends to make two rings, one smaller than the other.
3. Attach a paper ring to each end of a drinking straw.



TEST: You will throw the gyrocopter as you would a paper plane, but first guess how far it will go. Measure and record the length of its flight.
Make some notes about its flight and action,

EXPERIMENT:
Make gyrocopters with different variations such as:

- Paper rings of different sizes and widths
- The number of rings
- The position of rings on the straw
- Paper of different weights or thickness

RECORD your experiments:
Take photos or make drawings of each gyrocopter.

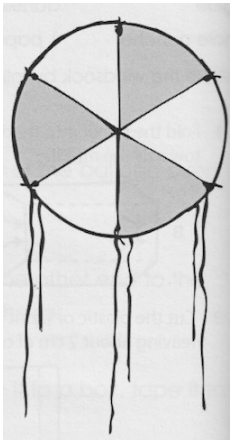
Test your different gyrocopters and make notes about the length, steadiness and actions of each flight.

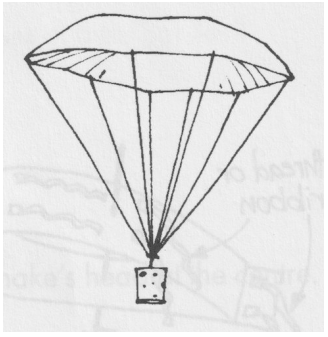
Write about your experiments and your conclusions.

MAKE a parachute

You need plastic bags, ruler, felt tip marker, hole punch, thin string, small toy (or piece of play dough) to represent the parachutist.

1. Cut a circle with a 12 cm diameter from the plastic bag.
2. Divide the circle into 6 equal parts and make a small hole on each line near the edge of the circle.
3. Cut 6 pieces of string , each 18cm long
4. Carefully tie a string to each hole.
5. Tie the other ends to your toy.



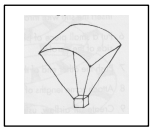


TEST your parachute by throwing it into the air or by dropping it from the top of some stairs or by standing on a chair. Safely please. Time how long it takes to reach the ground.

EXPERIMENT by making changes and testing them.
Use the same parachutist each time for a more scientific comparison.

For example, try:

- Different size circles
- Different kinds of plastic
- Thin cloth
- Changing the kind of string or lengths
- Making a small hole in the centre
- Try making a square parachute to compare



RECORD how the different versions compare by making notes about performances and times of each.

FIND OUT about why and how a parachute works:
https://www.youtube.com/watch?v=vZYwsAvHgVw

MAKE a balloon-powered rocket

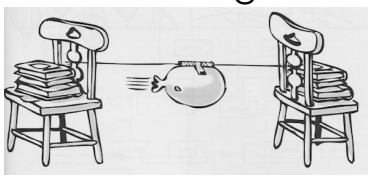
You will need balloons, drinking straws, clothes peg, sticky tape, thin string.

1. Tie one end of the string to something (such as a dining room chair, or the handle of a drawer), stretch it some distance to where you can tie it to something of about the same height. Thread the other end of the string through a straw and tie the string so it is stretched taut.
2. Blow up a balloon, twist the end and hold it closed with a clothes peg.
3. Attach the balloon to the straw with two strips of tape.
4. Release the peg and watch the jet race along the string.

EXPERIMENT:

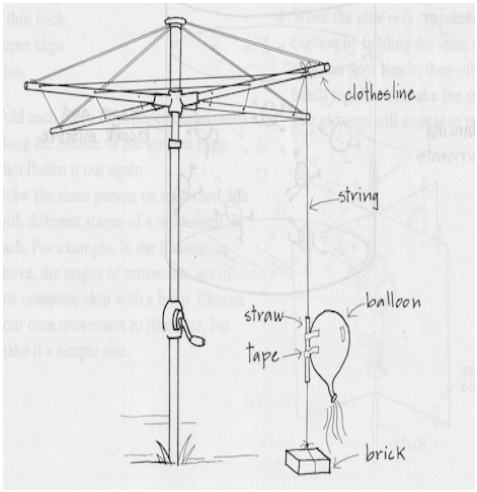
Blow 4 puffs into the balloon and let it go
Blow 8 puffs into the balloon and let it go
Blow 10 puffs into the balloon and let it go

Measure how far it travelled each time and in what time.
RECORD these details and any observations you noted.
What makes the balloon move along the string?



TEST:

Does it go upwards?



PREDICT first:
Will it go **up** the string?
How far? Will the speed be the same?

RECORD the differences in performance when you fly it up the string.

MAKE a balloon-powered jet
You will need: sausage-shaped balloons, thin string, drinking straws, clothes peg, sticky tape, cardboard

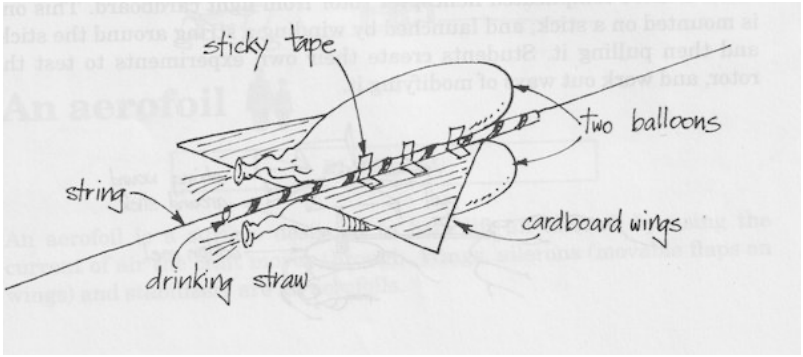
Thread string through a straw.
Stretch the string some distance, attaching it at each end.
Inflate the balloon,pegging the opening so no air gets out.
Cut out two cardboard wings and attach them to the balloon.
Tape the balloon to the straw.
Release the peg.

RECORD
Measure the time and distance travelled and make notes of anything you noticed.

EXPERIMENT by adding different wings.

RECORD:
Which wings worked best?
Why do you think so?

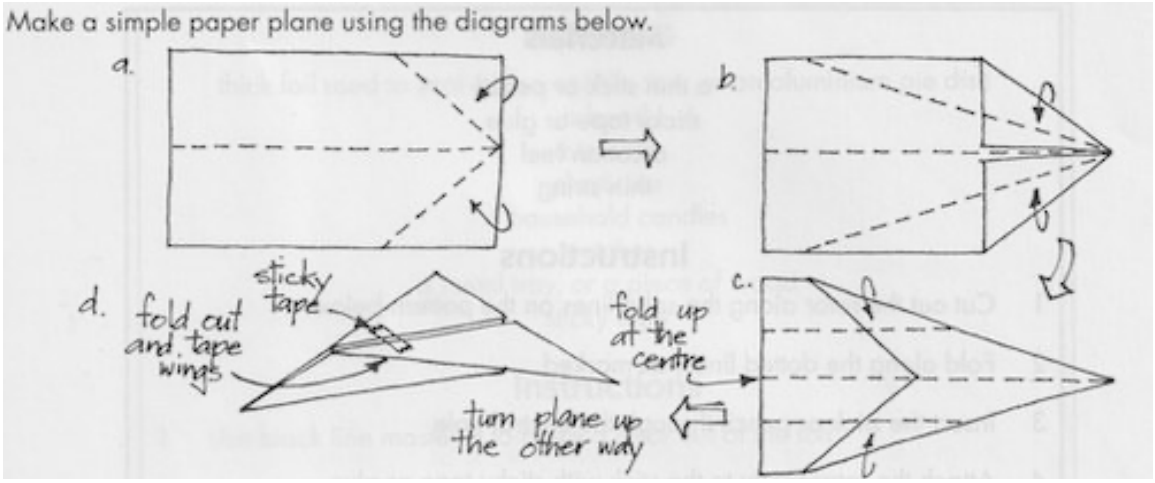
EXPERIMENT
Attach a second balloon to the top of the straw.
Release both balloons at the same time.



RECORD your assessment and conclusion.
Did it perform better with two balloons?
Which balloon jet worked best of all?
Why do you think that is?

MAKE a simple paper plane
You will need A4 size paper, sticky tape

Follow the diagrams to make a simple paper plane.

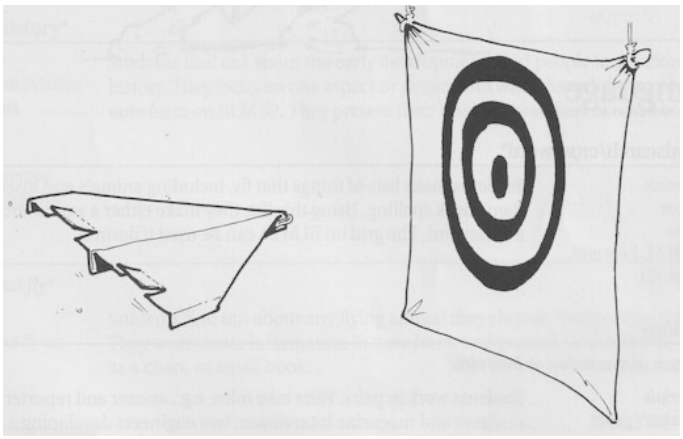


Throw the plane. Measure how far it flew and **RECORD** notes about how it flew.

Set up a target and throw your dart five times from the same position. **RECORD** how many times it hit the target, and how many times the bull's eye.

EXPERIMENT
Make changes to the plane design and TEST each to see how far and how well they fly.

RECORD the changes and performances.



DESIGN and MAKE gliders
You need ... your own choice of materials!
Some ideas: balsa wood sticks, thin dowel, cardboard, paper.

1. **DESIGN** a glider. Draw it out on paper.
2. **MAKE** your glider.
3. **TEST** it: Measure out a distance over which to fly your glider. Throw your glider five times from the same starting point.

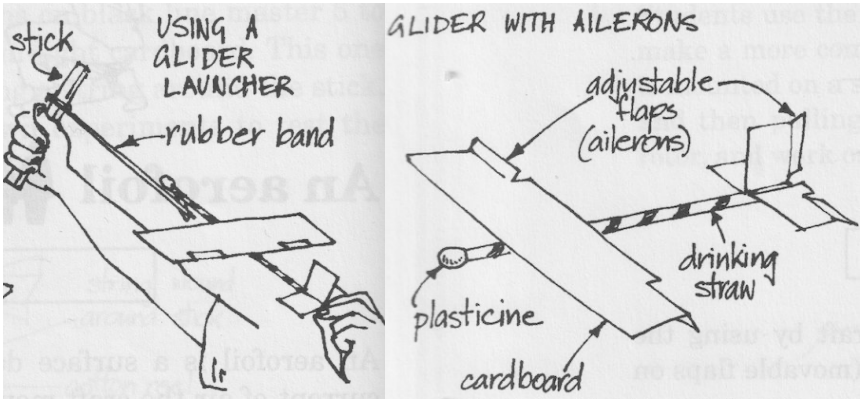
THINK: In what ways did it perform as you hoped? In what ways did it not? Think about what you'd like to improve and how you could do it.

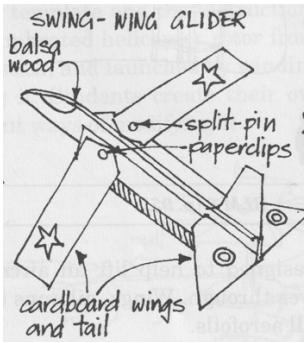
MODIFY your design in some way or, if it disappointed you a lot, you can do a completely new design.

MAKE and **TEST** it.

RECORD what you made, and how they performed .
Compare your two designs: which performed better?
In what ways?

Here are a few ideas to get you thinking!





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