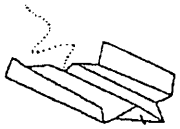
Investigation 7.1 Designer Planes



Materials

- Paper
- Scissors
- Tape
- Paper clips
- Safety goggles

Safety

- Wear goggles.
- Do not throw planes at fellow students.
- Handle sharp objects safety.

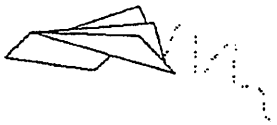
Procedure

Part I

1. Make a paper airplane. Write your name on it.
2. Follow your teacher's directions for flying the plane.
3. Observe the plane's flight.

Part II

4. Use the materials to modify your plane.
5. Make a **hypothesis** about the effect of the change.
6. Follow your teacher's directions for flying the plane.
7. Observe the plane's flight.

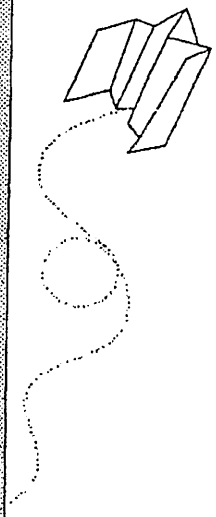


Thought Questions

1. How did you **act** upon your plane?
2. What did you **purposefully change** about your plane?
3. How did you determine your plane's **response**?
4. What **remained the same** about your plane?

Class Data Table

Question 1 **Action**	Question 2 **Purposeful change**	Question 3 **Response to change**	Question 4 **Remained the same**



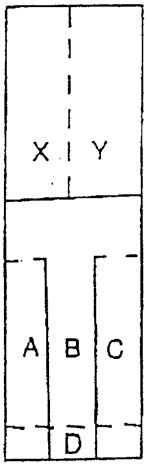


Diagram 1

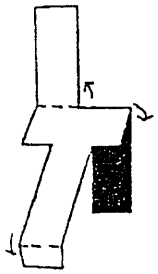


Diagram 2

Family Activity 14.1

Experimenting with Helicopters

Cutting the Strip

The attached sheet can be cut into three strips that can then be folded to form individual helicopters. Cut the sheet so you have three strips that look like *Diagram 1.*

Cutting and Folding Each Strip:

Cut along the dotted lines and then fold along the solid lines beginning with the line between sections A and B.

1. **Fold the section labeled A behind section B.**
2. **Fold section C behind section B.**
3. **Fold section D behind section B as well.**

Complete the helicopter by folding blade X in one direction and blade Y in the opposite direction (*See Diagram 2*).

Activity Directions

Hold your helicopter up high and drop it. Do this several times and observe the results.

- **Do all helicopters behave the same?**
- **Do they all spin in the same direction?**
- **Does it make any difference which direction the helicopter blades are folded?**
- **What happens if you refold the blades in the opposite direction?**

In this experiment, what was the independent variable? What was the dependent variable?

Try Another Experiment:

What do you think will happen to the helicopter, if you increase its weight by adding a paper clip? Try it several times, and describe how the helicopter behaved.

Repeat the experiment, increasing the number of paper clips (e.g., 2, 3, 4, 5 paper clips). What happens as you increase the weight?

- **What is your independent variable?**
- **What is your dependent variable?**
- **Describe your control for this experiment.**
- **What factors were held constant in this experiment?**

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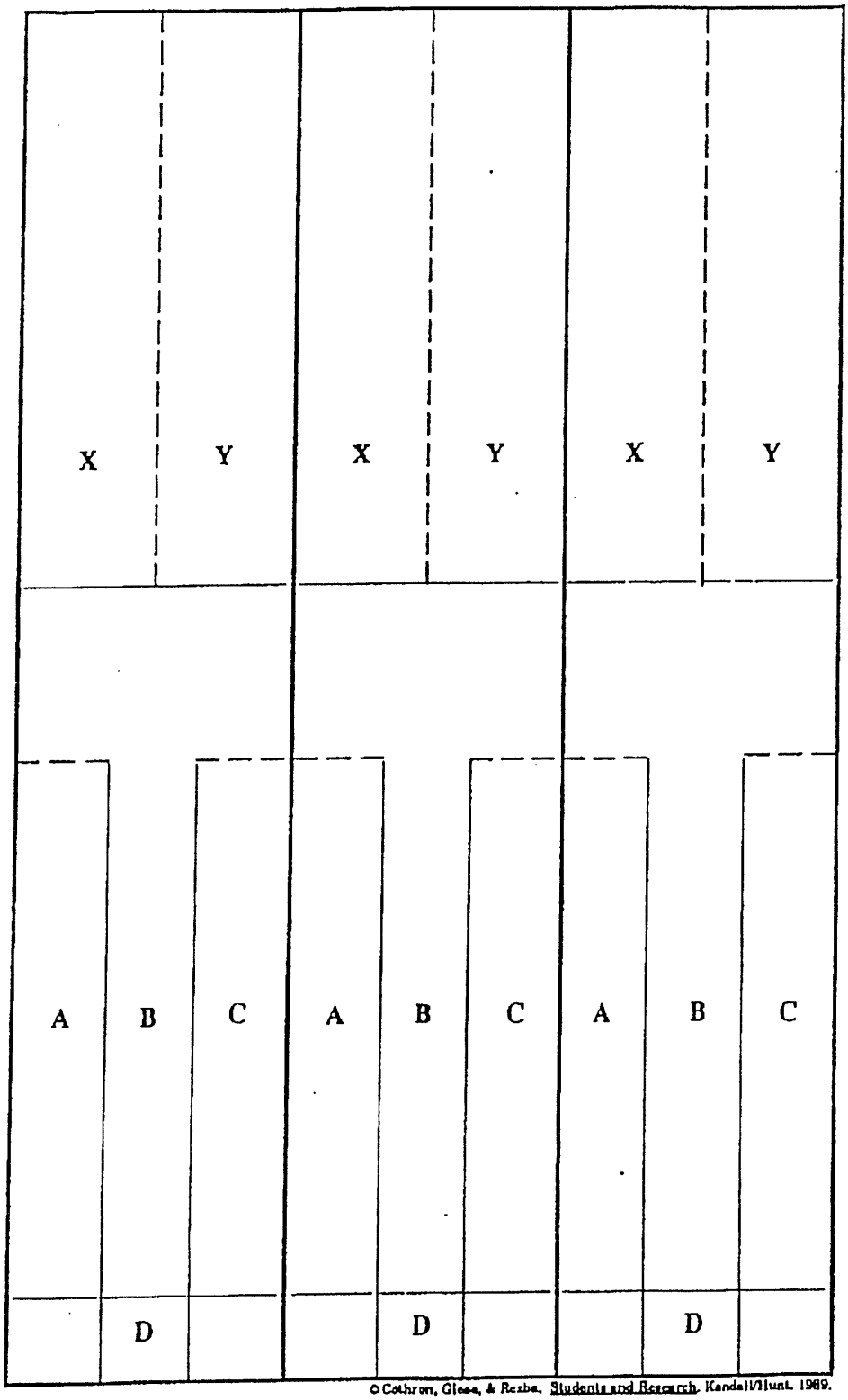
Helicopter Master



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