

Paper Helicopters

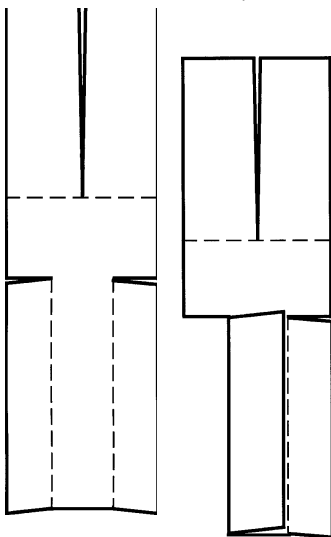
Outcome: Teams of students perform a controlled experiment, change one part of the experiment, hypothesize results, and then test the hypothesis. Folding and cutting paper is a physical change.

Supplies to find or create: copy of the helicopters, scissors, large paper clips

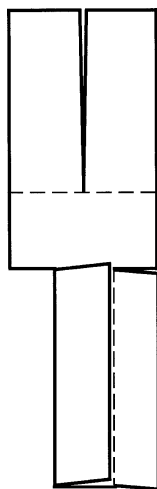
Optional Preparation: Cut off the outside edges of the helicopters to make disposal of scrap paper simpler.



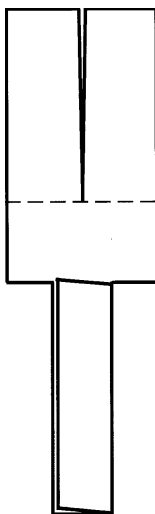
How to make a helicopter:



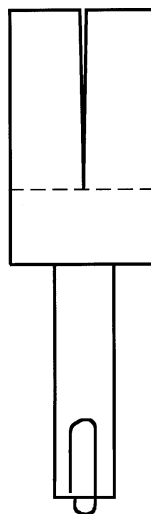
Step 1



Step 2



Step 3



Step 4

Procedure:

Demonstrate to students how to create a helicopter.

Step 1: Cut along all the solid lines.

Step 2: Fold tab "A" over tab "B" along the dashed lines.

Step 3: Fold tab "C" over tab "B". Paper clip in place.

Step 4: Fold the blades "E" and "F" away from each other.

Hold the helicopter as high as possible. Release and watch as the helicopter falls. It will begin to spin.

Ask students to guess how the behavior of the helicopter might change if the helicopter was changed. Explain it is difficult to time the descent of the helicopter. Creating two helicopters and using one as a control and the second as a variable would give students a chance to see how a change affected the descent of the helicopter.

Give each team two patterns for a paper helicopter. Review how to make the helicopter. An overhead transparency follows that shows the steps to make a helicopter.

Ask students to observe their first helicopter as it falls to the floor.

Suggest that they notice:

whether the helicopter spins clockwise or counterclockwise.

whether it spins at a consistent rate or changes rate as it falls.

Ask how students might change one feature of the helicopter and how that change might affect the behavior of the helicopter.

Students then decide on one change, create a second helicopter, and change it in that way.

(Following this lesson is a page of helicopters that are half size for students who choose to compare a helicopter to a smaller helicopter.)

Students drop the two helicopters side by side. Which reaches the floor first? Was it the one they predicted?

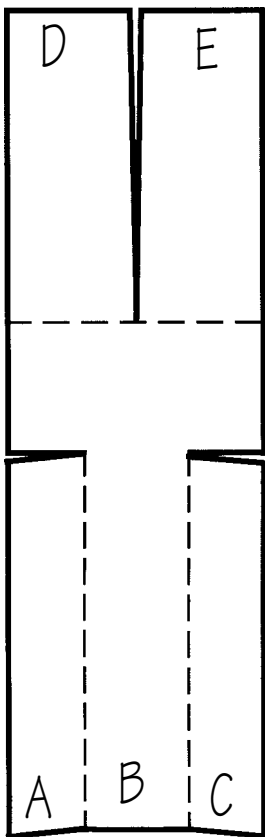
Inquiry Opportunity: Use stopwatches to make this activity an inquiry activity. Students drop a helicopter three times, time its descent, and then average the results. The helicopter is changed in one way after students have explained how they think the change will affect the behavior of the helicopter (hypothesis). The changed helicopter is dropped three times and its descent is timed. The results are averaged and compared with the original (control) helicopter. Students analyze results by comparing their data to their hypothesis.

Speaking Opportunity: Each student attempts the activity as an inquiry. The variable chosen is stated, expected results are explained, actual results are stated, and analyzed.

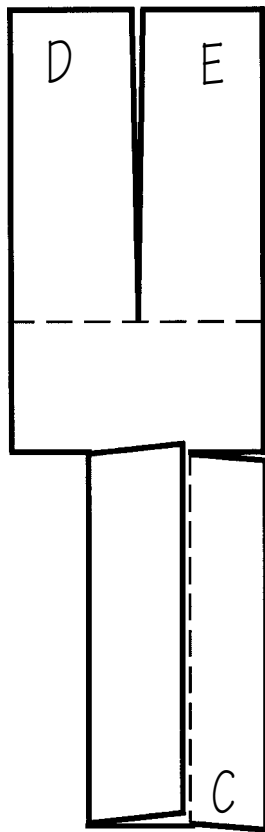
Vocabulary for this lesson: clockwise, counterclockwise, descent.



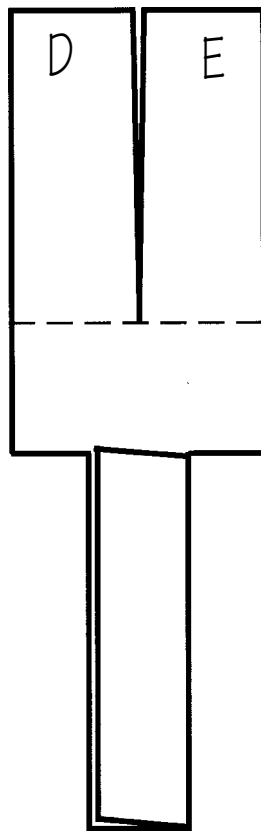
Make a Helicopter



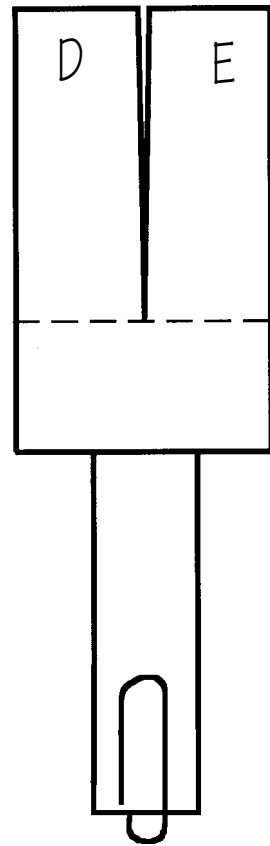
Cut along the solid lines.



Fold tab A over tab B

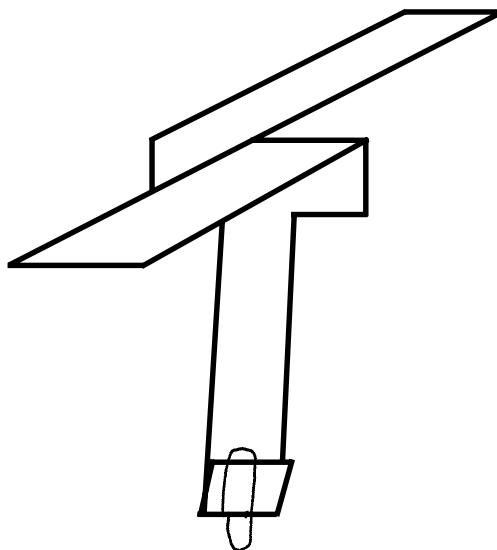


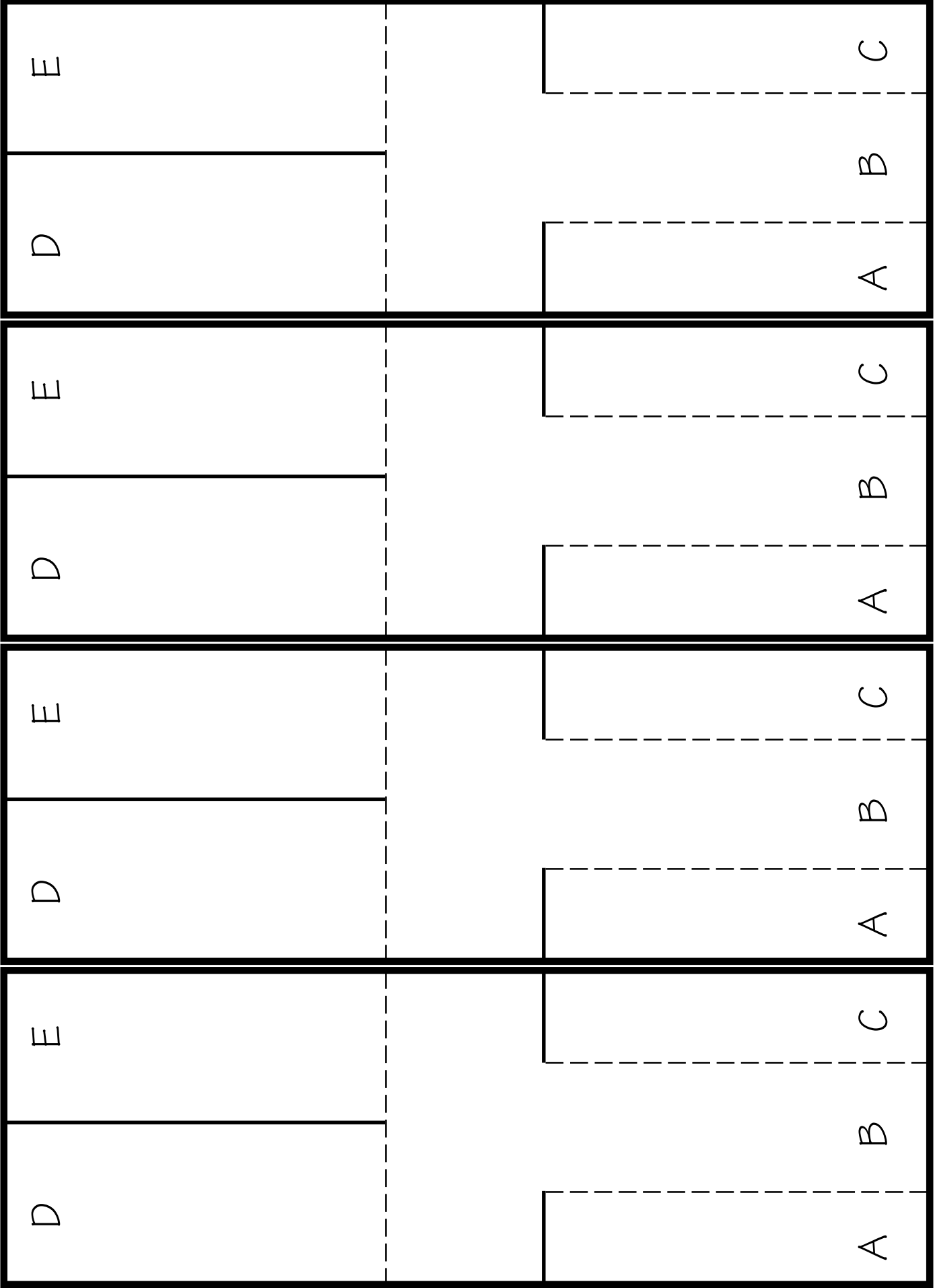
Fold tab C over tab B



Paper clip in place

Fold blades D and E away from each other to create a paper helicopter.





D	E	D	E	D	E	D	E	D	E		
A	B	C	A	B	C	A	B	C	A	B	C

D	E	D	E	D	E	D	E	D	E		
A	B	C	A	B	C	A	B	C	A	B	C