

Falling for Gravity

Paper Airplanes Versus Gravity: An Exploration

The Science:

A paper airplane works very similar to a real jet plane propelling through the sky just using some different elements. Both require a force to push them forward. For jet planes, this force comes from the engine thrust which also ensures it continues to fly until it gets to its destination. For paper airplanes, the force comes from throwing it. Both have wings. These wings are very thin to slice through the air in a similar way to how a knife slices through butter. The thinness of the wings causes some of the air to go over the top of them and some to go under them. If more air is pushed over the top of the wings, the force of the air will push the plane down towards the ground. If more air goes under the wings, the force of the air will push the plane upwards into the sky. Through all this though, gravity is always pulling the plane toward the ground. Because the force from your arm stops when you let go, the paper airplane will come down eventually as there is no engine to provide continual force and push against gravity.

The Exploration:

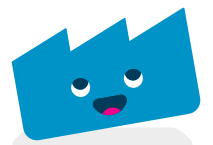
- Fold the 3 airplanes using the directions provided. Try to be as accurate as possible and press your folds as flat as you can for the best aerodynamics.
- Find an area that would be a good “runway” for your paper airplane test course like a hallway or large room. To keep the tests even, do this in an area where there is no wind either from outside or from a fan.

Before flying questions:

- Which airplane do you think will defy gravity the longest (stay up longer)?
- Which airplane do you think will travel the farthest?
- How do you think the design will affect the airflow around the airplane?
- Choose a starting point and mark it with tape or something else to stand behind. Throw each airplane using the same amount of force and at the same angle, and mark as close to where they hit the ground as possible and where they stopped after landing.

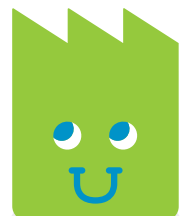
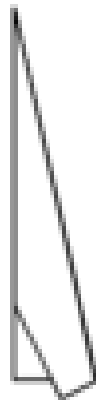
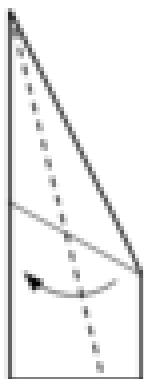
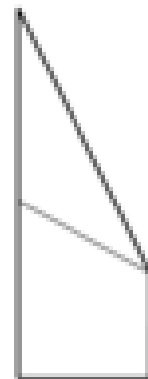
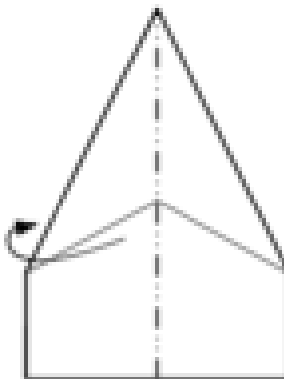
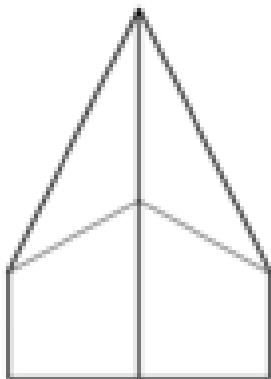
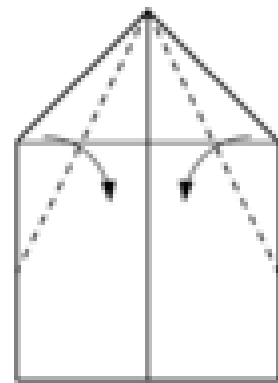
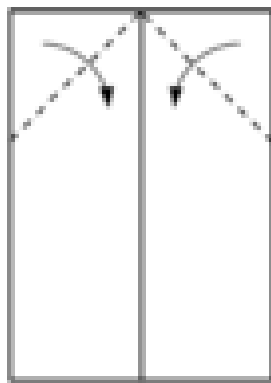
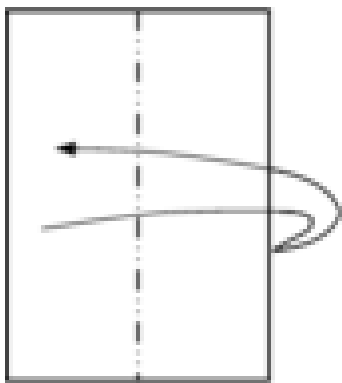
After flying questions:

- Which plane defied gravity the longest? Was your guess right? What do you think made that one stay in the air longer than the others?
- Which plane travelled the farthest? Was your guess right? What do you think made that one travel farther?
- Try flying them again, launching them at different speeds or angles. Does it change how long it defies gravity or how far it travels?
- Can you think of another design, either from online or one you create yourself? Do the same tests including the new airplane(s). Did it do better, worse, or score in the middle of the rest?



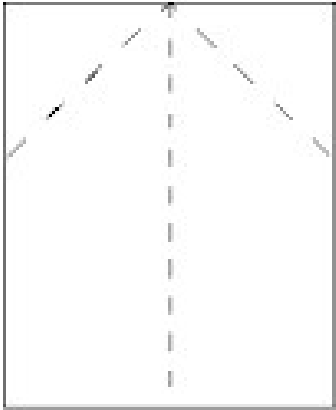
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Paper Airplane #1 Traditional



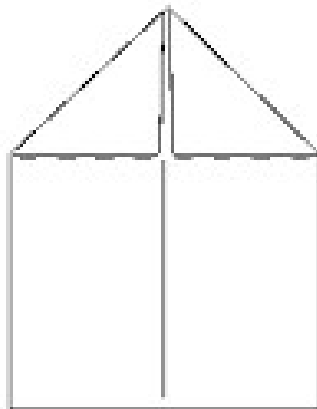
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Paper Airplane #2 The Eagle

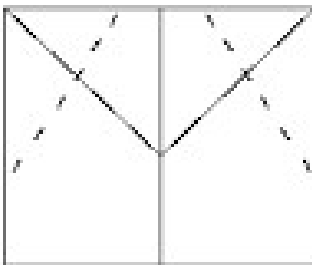
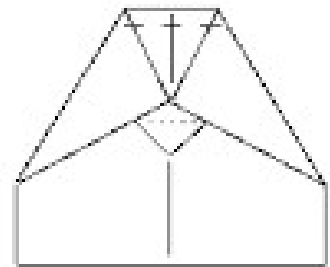


Fold an 8.5 x 11 inch sheet of paper in half lengthwise and open back up. Fold the top corners down to the center.

Fold the top down.



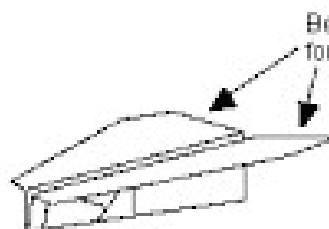
Fold the little point up, fold the top 0.5 inch down, and fold the airplane in half away from you.



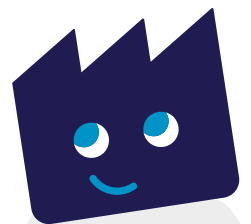
Fold the corners in to the middle.



Now fold the wings out at an angle as shown.



Bend elevators up just slightly for better performance.



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Paper Airplane #3 Power-up

