



Paper Planes

This record-breaking challenge is really taking off - how many home-made paper aircraft can you throw into a target area in three minutes? Be warned: time flies when you're against the clock.

THE RECORD: Most times to hit a target with paper aircraft in three minutes

THE CHALLENGE: Fold one or more paper planes - the design is up to you, as long as it conforms to GWR guidelines - and then start that stopwatch. You've got three minutes to lob as many of them into a target zone as you can.

GUIDELINES

- The planes you use must be a classic paper aircraft design with recognizable wings and made from A4 paper (210 x 297 mm) or US Letter paper (8.5 x 11 in).
- The target range must consist of a circle with a diameter of no less than 6 m (19 ft 8 in). A bucket with a maximum diameter of no greater than 30 cm (11.8 in) must be placed in the middle of this circle to ensure that the distance between the outer circle and the bucket is 3 m (10 ft) from all points along the circle.
- Any planes that bounce out of the target bucket will be discounted from the total.

HOW DOES IT WORK?

As with regular big, metal planes, paper aircraft are affected by a number of forces as they fly:

Thrust: This is the energy you apply when you throw the plane, giving it its power.

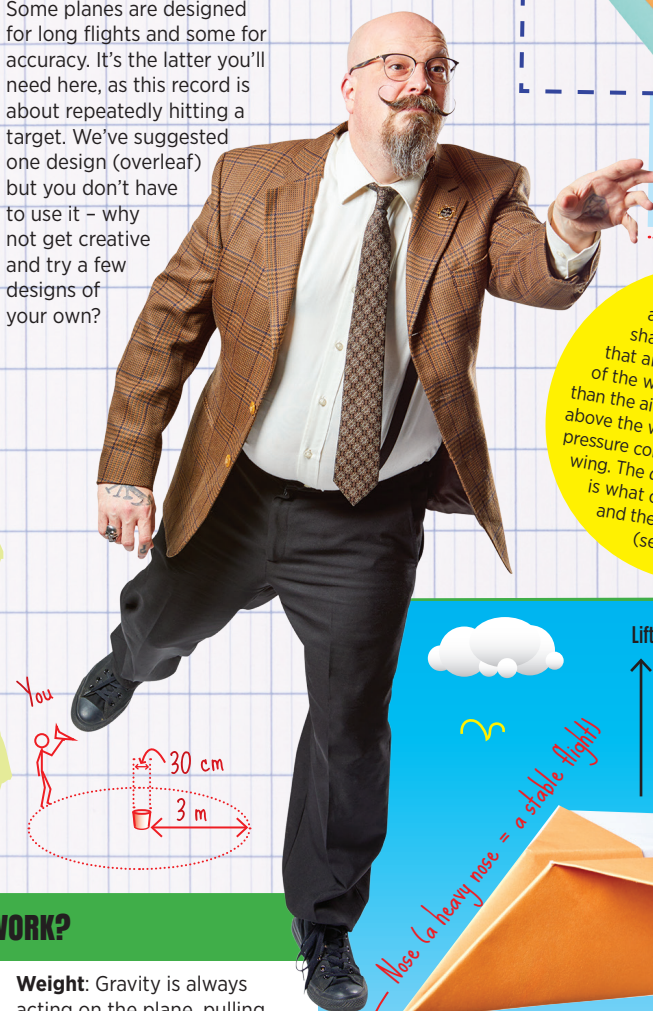
Lift: What the flying plane experiences as air moves over and under the wings, keeping it aloft.

Weight: Gravity is always acting on the plane, pulling it towards the ground.

Drag: Friction with the air slows your plane's forward momentum.

Experiment with the size and shape of your plane's various elements - a heavier nose, longer wings or sleeker body will affect its flight.

Paper planes - the bane of school teachers everywhere - are actually a good way to learn about aerodynamics. Some planes are designed for long flights and some for accuracy. It's the latter you'll need here, as this record is about repeatedly hitting a target. We've suggested one design (overleaf) but you don't have to use it - why not get creative and try a few designs of your own?

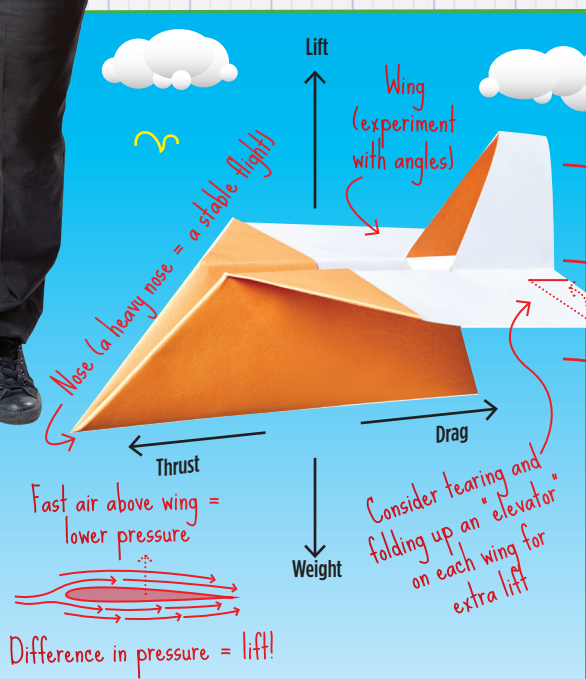


SHOPPING LIST



YOU MUST USE:
- PAPER: A4 (210 x 297 mm) or 8.5 x 11 in

With normal aircraft, wings are shaped in such a way that air travels over the top of the wing at a higher speed than the air beneath. The faster air above the wing results in a drop in pressure compared with below the wing. The difference in pressure is what causes the wing - and the aircraft - to lift (see below).



FOR THE RECORD



Multiple record-breaker Ashrita Furman (left) of New York, USA, holds a paper plane record... in his mouth! Ashrita and his friend Bipin Larkin (USA) broke their own record for the **most paper aircraft caught in the mouth in one minute**, with 17 - or one every 3.5 sec! Bipin did the throwing, while Ashrita did the catching, improving on their record for the second time. They first achieved 14 planes back in 2011, then 16 in 2012. Can you beat the unflappable Ashrita?!

Engineering students often use paper aeroplanes to learn the principles of flight and aerodynamics. That's why students and employees of the Braunschweig Institute of Technology in Germany built the **largest paper plane** in 2013. It had a wing-span of 18.21 m (59 ft 9 in) - as long as a bowling alley!

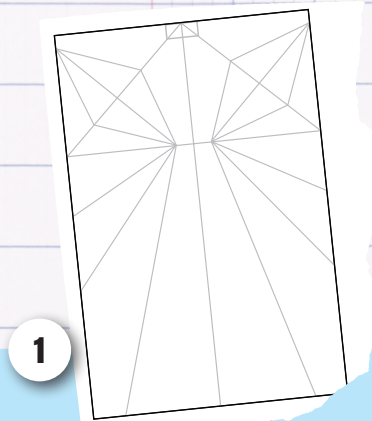
TILL TODAY I LEARNED

Throwing paper planes is an extreme sport! Since 2006, x-sports fanatics Red Bull have hosted the Red Bull Paper Wings world paper plane championships. Three disciplines are contested: distance, hangtime and aerobatics. Could you be the next champ?

Planes must hit the bucket - NOT your lab assistant!



Paper Planes (continued)



1

You can only use one sheet of paper per plane, and you're not allowed any glue or sticky tape. You can use the same design or as many different designs as you want (other ideas pictured below). Here's one that we've used to get your attempt off the ground (1). To make it, start by folding the sheet in half along its length (2), then unfold (3).



2



3



4

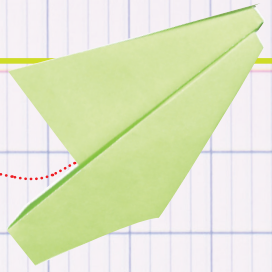


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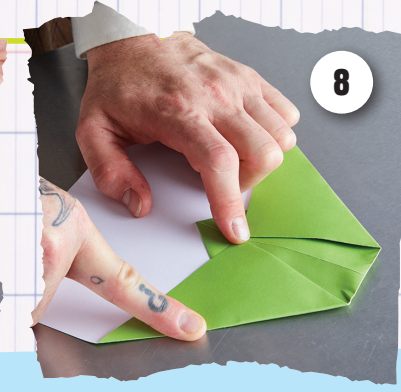


6

Take the top-right corner and fold it down to the centre fold to form a triangle (4). Repeat with the top-left corner (5). Then fold this newly formed triangle down, giving you a square (6).



7



8



9

Fold the top-left corner over so that the corner touches the centre fold (7). Repeat with the top-right corner (8). You should be left with a small triangular point, which can be folded back (9).



10



11



12

Flip the plane over and bring the two halves together along the centre fold (10). Next, fold the right-hand wing down until it aligns with the centre fold (11) and repeat for the left wing (12).



13

Finally, open out the wings and you're ready to launch. Chocks away!

Bone folder

Paper artists use a "bone folder" to keep their folds as sharp and as neat as possible. You probably don't have a bone folder, but you can use a ruler or a credit card instead. (Or use the credit card to buy a bone folder! Ask permission first, of course!)



3141 5926 5358 9793
Prof Orban



Bird of Prey



Glider



Delta



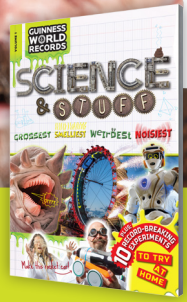
Dragster



Dart

Here's a selection of other aeroplane designs. You'll find some more folding guides on our website: guinnessworldrecords.com/science. You can use multiple copies of the same plane or a selection of designs.

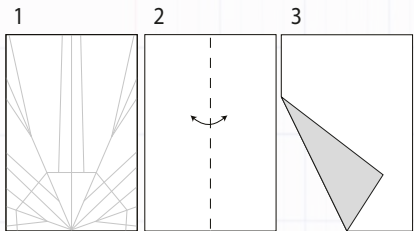
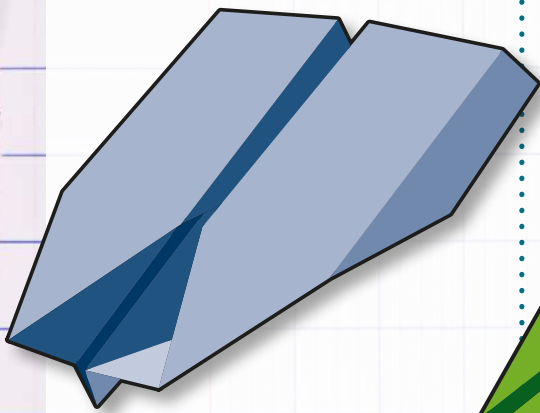
Experiment with the launch angle - throwing the plane up as well as forward might help with your accuracy



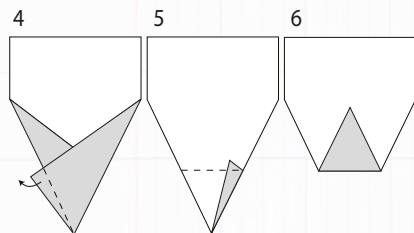
SCIENCE & STUFF

Try making these three planes, then use them to attempt the Guinness World Records titles. If you want to be a true inventor, you could even make your own plane design using regular paper (no more than 100 gsm in weight).

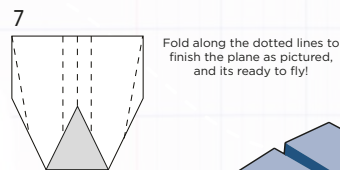
DURATION FLYER



1 Start with the sheet this way up
2 Fold in half lengthways
3 Fold down a flap as shown, then repeat on the opposite side of the sheet

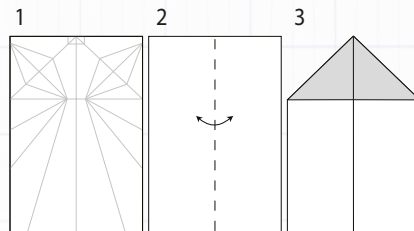
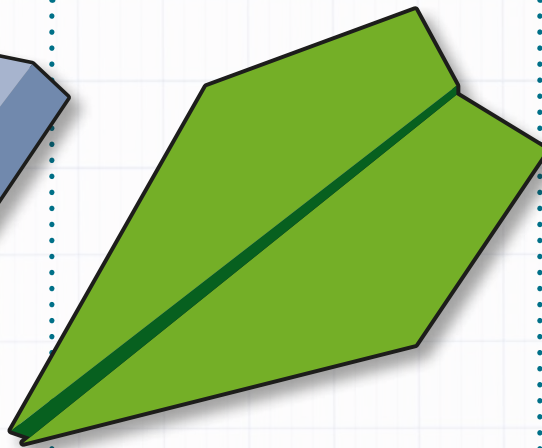


4 Fold over the overhanging flap
5 Turn the plane over and fold the tip to form a triangle
6

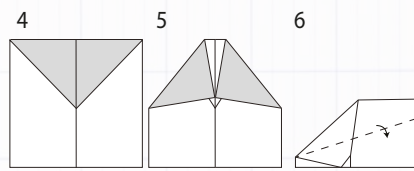


7 Fold along the dotted lines to finish the plane as pictured, and it's ready to fly!

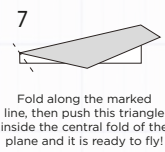
LONG-DISTANCE FLYER



1 Start with the sheet this way up
2 Fold in half lengthways
3 Fold the top corners down

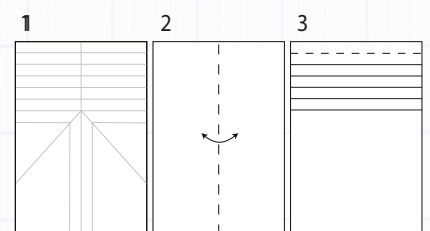
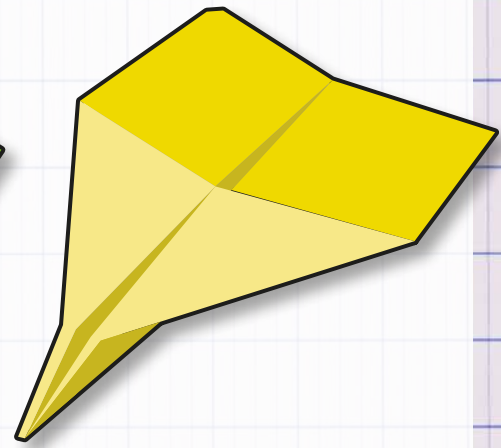


4 Fold the top triangle down
5 Fold the corners towards the centre line of the sheet, leaving a small gap at the central line, as shown above. Then fold the paper in half lengthways
6 Fold the plane along the marked line

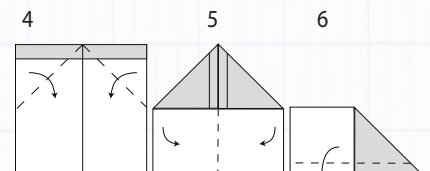


7 Fold along the marked line, then push this triangle inside the central fold of the plane and it is ready to fly!

PRECISION FLYER



1 Start with the sheet this way up
2 Fold in half lengthways
3 Fold the top section down, then continue to fold the flap over and over until the final line



4 Fold the top corners down
5 Fold in half
6 Fold the wings down, and it is ready to fly!

The **MOST CONSECUTIVE TIMES TO HIT A TARGET WITH A PAPER PLANE** is 13 by Fumihiro Uno (JPN) on 6 Jan 2010. The distance between Fumihiro and the target - a bucket - was 3 m (9 ft 10 in).

The **LONGEST FLIGHT DURATION** for a regular paper aircraft is 29.2 sec by Takuo Toda (JPN) at Fukuyama City in Hiroshima, Japan, on 19 Dec 2010. He beat his own record by 1.3 sec.