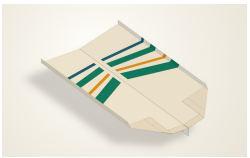
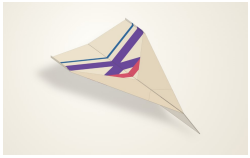
Flight Book

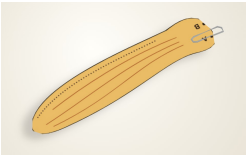
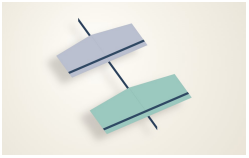


Monarch · K2





Choose a wing. Make it together. See where it lands.

Before you fly

1

Print at actual size

Match the printer paper to this book. Select Actual size or 100%, turn off Fit to page and print on one side. Print this page first and measure the line below with a ruler.

2

Pick a model and get ready

For butterflies, gather scissors and the clips listed on the pattern. For K2, score the folds with a ruler and an empty ballpoint pen. Ask a grown-up to help cut. Fold a plain airplane sheet whole. For a printed airplane with a thick border, cut along the border first.

3

Predict, launch and compare

Point to where you think it will land. Launch away from people and mark where it first touches down. Change one thing and try five launches from the same spot.

This line should measure 50 mm (1.97 in).



Your fleet

Find your model, gather its tools and turn to its numbered sheets.

			Sheets
	**Monarch** Folded front edge · Easy · 10–15 min · Scissors, two 33 mm clips	●○○	6–7
	**Boeing 747** Cut border · Medium · 15–20 min · Paper, scissors	●●○	8–11
	**Douglas DC-3** Cut border · Medium · 15–20 min · Paper, scissors	●●○	12–15
	**Blue morpho** Folded front edge · Medium · 15–20 min · Scissors, two 33 mm clips	●●○	16–17
	**Ilyushin Il-62** Cut border · Medium · 15–20 min · Paper, scissors	●●○	18–21
	**Old World swallowtail** Folded front edge · Challenging · 20–25 min · Scissors, two 33 mm clips	●●●	22–23
	**Tupolev Tu-144** Cut border · Easy · 10–15 min · Paper, scissors	●○○	24–27

Build times are estimates.

Flight atlas · 28–34

Ring glider 35

Maple spinner 36

Williams tandem glider 37

Flight log

Make a prediction. Try five launches from the same spot. Change one thing, then try five more.

Model

Date

Where might it land?

What will you change?

Where did it first touch down?

Launch	First setup	One change
1		
2		
3		
4		
5		

What did you notice?

Try lifting one rear tab or wingtip slightly. Keep the model and launch height the same.

Keep this page for your next flight.



Pilot certificate

For building a paper flyer, testing a prediction and recording a landing.

Pilot

Date

Signature

Scan to reopen this edition

openflight.design/book

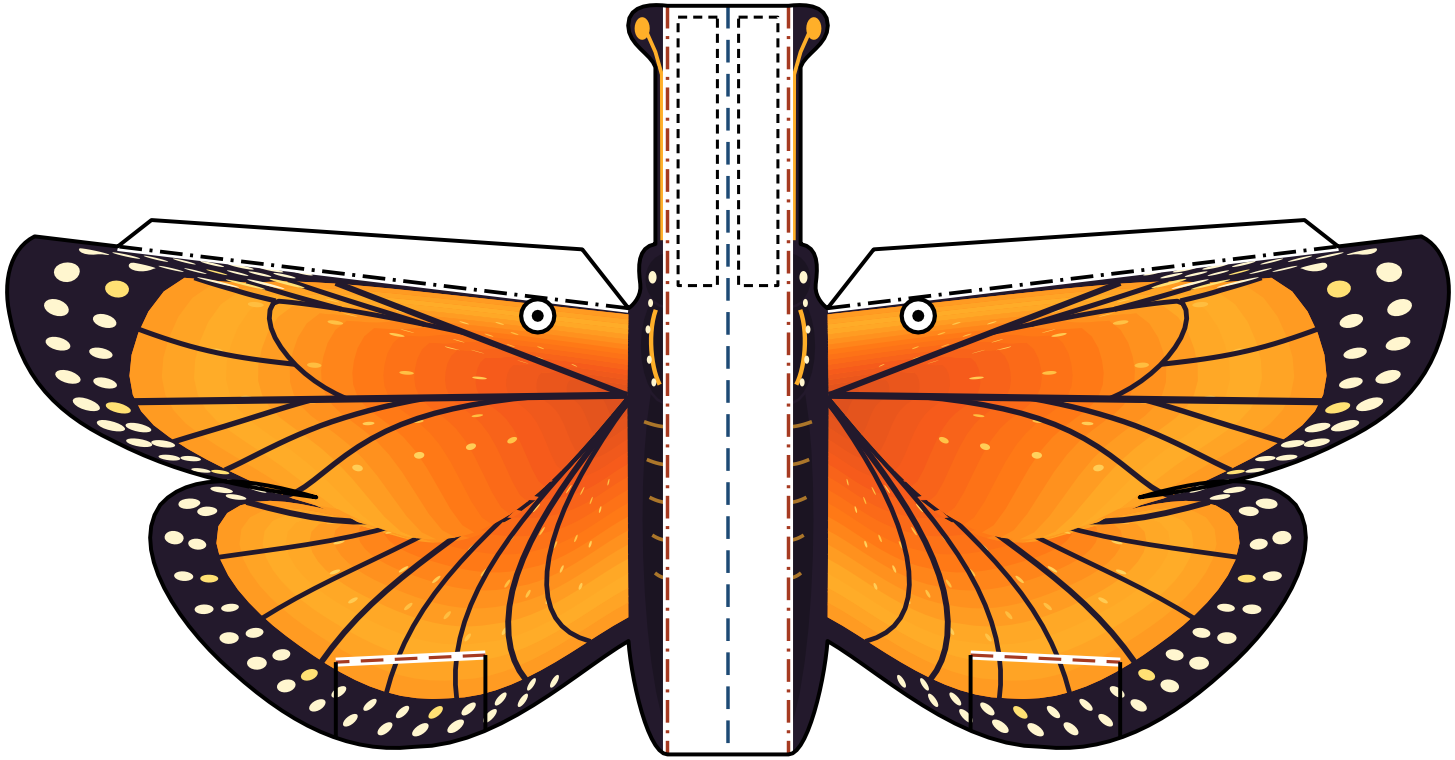
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Monarch

172 mm finished span

K2 costa glider · Fold the leading edge under each wing



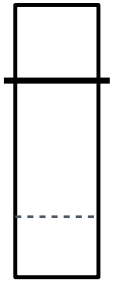
Cut — Center valley — Wing and costa mountains — Edge strip folds under — Clip zone — Balance dot

50 mm Print at 100% / actual size, landscape. Measure this line before cutting.

Paper and clips

120 g/m² uncoated printer paper or light card (100–140 works).
The wings run along the long side of the sheet. Most office paper is stiffer that way.
2 standard metal paper clips, 33 mm long.
Estimate for 172 mm on 120 g/m² with two clips: balance 41 mm behind the nose, glide about 2.7 m/s. Not yet measured.

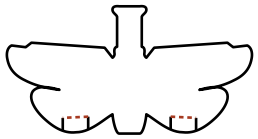
Tip-height strip



Cut out. Stand it on the table beside a wingtip. 18 mm above the body.

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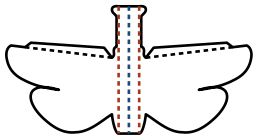
Build, balance and trim · Monarch



1. Cut

Cut the outside line, including the edge strips and the antenna clubs. Cut the four short slits at the back of the hindwings.

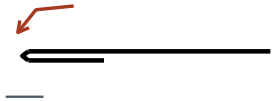
One piece. Each hindwing has a tab between two slits.



2. Score

Lay a ruler on each dashed line and press along it with an empty ballpoint pen.

Every fold line shows a groove. Thick paper now folds cleanly.



3. Fold the costa

Fold each edge strip under its wing along its dashed line. Press it flat.

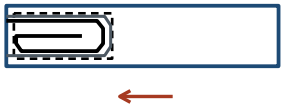
The front edge is straight and doubled, like the costa vein of a real wing.



4. Fold the body

Fold in half on the dashed centre line, colors inside. Then fold each wing back out on its dash-dot line.

The two body layers hang underneath and touch.



5. Clip the head

Slide both clips onto the head over the two body layers, one on top of the other, all the way to the nose.

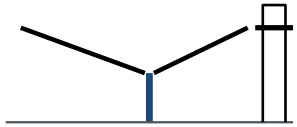
The clips stay inside the dashed clip box.



6. Balance

Rest the wings on two fingertips under the ringed dots. Tail drops: add a clip. Nose drops: slide a clip back, or remove one.

It stays level on your fingers.



7. Set the V

Lift both wings into a shallow V. Look from the tail and compare each wingtip with the strip.

Both tips are the same height.

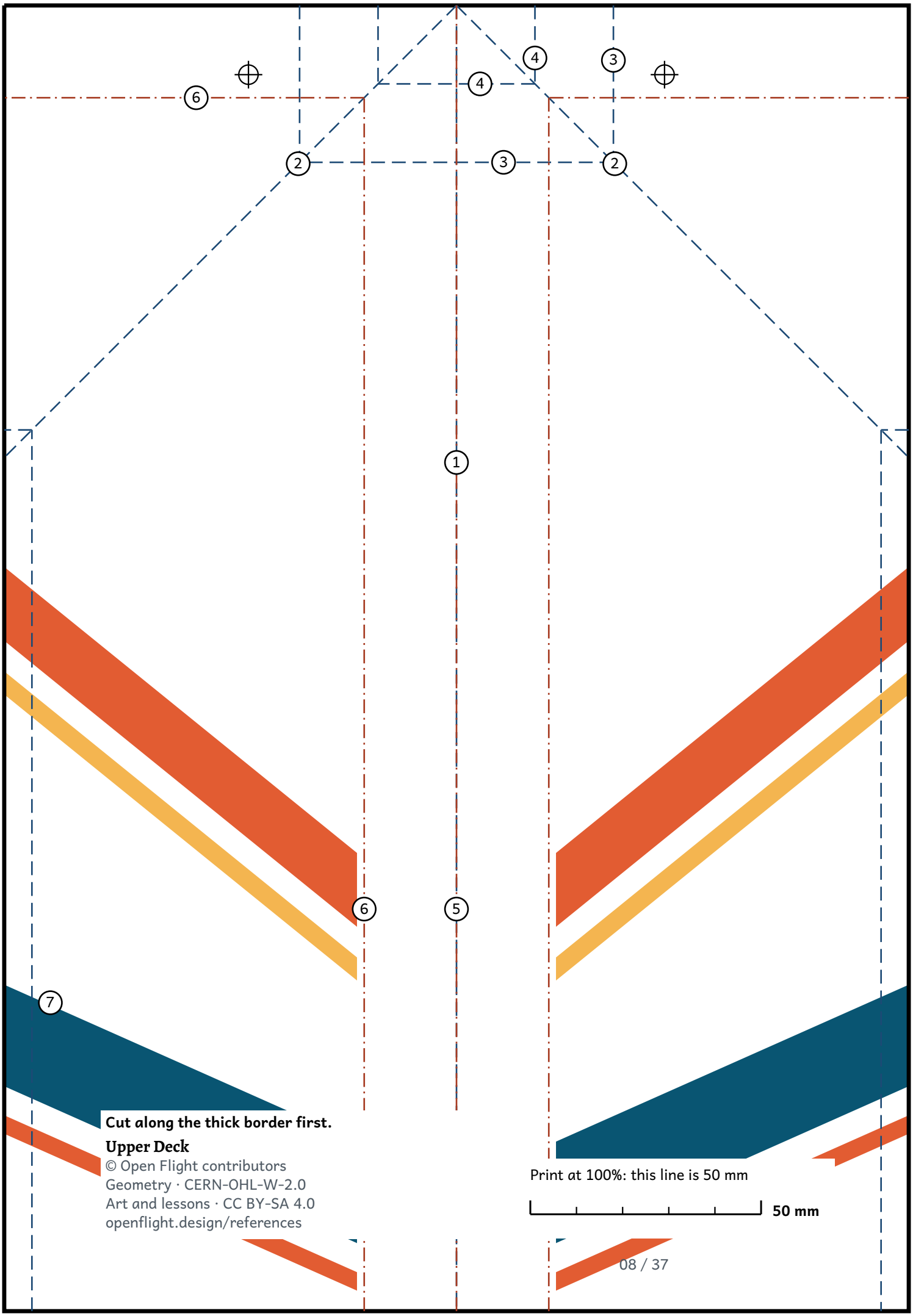


8. Launch and trim

Push it smoothly forward, nose level, about as fast as a jog.
Dives: bend both tabs up 1–2 mm.
Swoops up and stalls: flatten them.

Turns left: bend the right tab up a little. Turns right: the left tab.

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Cut along the thick border first.

Upper Deck

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Print at 100%: this line is 50 mm

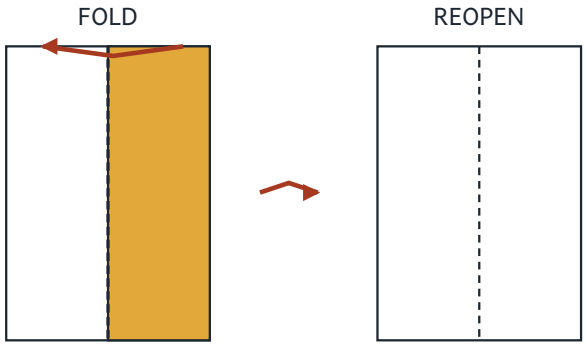
50 mm

Upper Deck

Folding guide 1 / 3

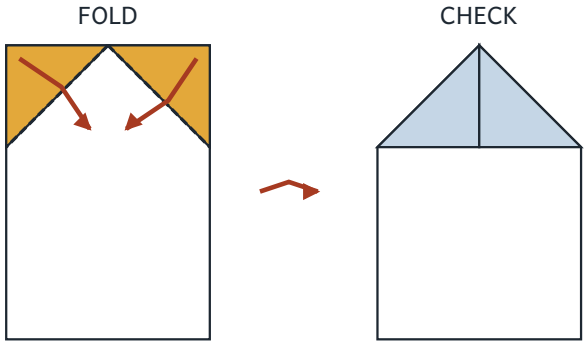
Use the airplane template. For two printed faces, print the template and its reverse from the separate airplane PDF, flipping on the long edge. Cut along the thick border, then fold. Any print scale works because the lines meet the border you cut.

1 Find the centre



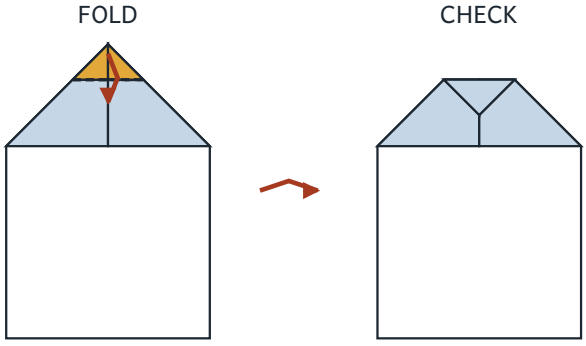
Cut out the sheet along the thick border. Print side up. Put the short edge at the top. Bring the two long edges together, press the middle crease, then open the sheet again.

2 Bring the corners to the centre



Fold each top corner inward. Lay the two short top edges along the centre crease. Press the two diagonals.

3 Turn the nose down



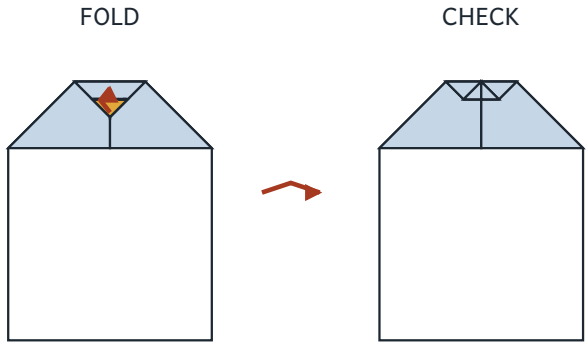
Fold the pointed nose towards the tail on line 3. The tip rests 68 mm from the original top edge. Press across all the layers.

Upper Deck

Folding guide 2 / 3

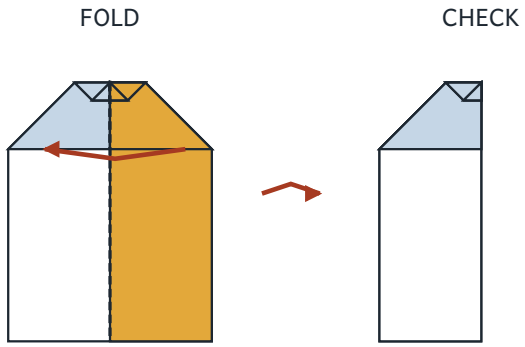
Use the airplane template. For two printed faces, print the template and its reverse from the separate airplane PDF, flipping on the long edge. Cut along the thick border, then fold. Any print scale works because the lines meet the border you cut.

4 Make the upper-deck pleat



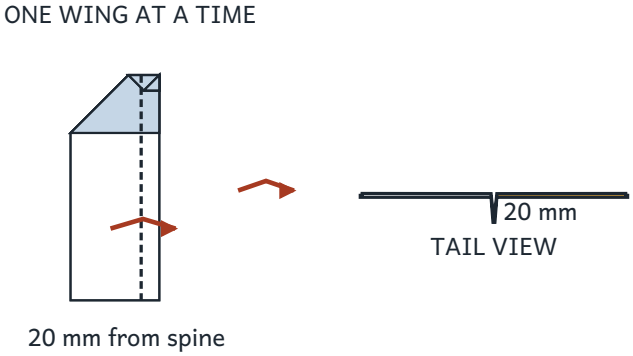
Lift only the loose triangular tip. Fold it back towards the nose on line 4 until its point touches the new front edge. The lower layers stay flat.

5 Close the body



Keep the folded details face up. Fold the right half away from you, behind the left, along the centre line. The folded details will be on the outside.

6 Fold one wing, then match its twin



Hold the closed body with the centre edge on your right. Fold only the upper wing outward on the line 20 mm from that edge. Turn the model over and fold the other wing to match. From behind, the wings make a T with the body hanging below.

Upper Deck

Folding guide 3 / 3

Use the airplane template. For two printed faces, print the template and its reverse from the separate airplane PDF, flipping on the long edge. Cut along the thick border, then fold. Any print scale works because the lines meet the border you cut.

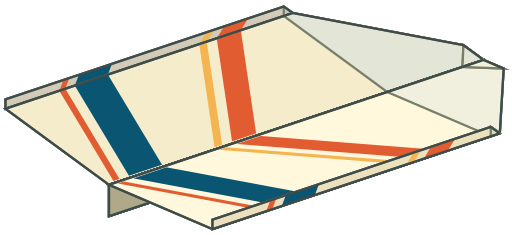
7 Raise the wing tips

Match the height of both tips



TAIL VIEW

Lift each wingtip about 10 mm above the body fold. Turn up the outer 6 mm of each long side until both tips stand upright. Sight from the tail and match the heights.



Flight notebook

Hold the body near the front. Launch gently and level into clear space. Make a second copy with a deeper body fold. Predict first: will its balance point move? Balance both on a pencil to check. Then launch each five times from the same height. Mark where each first touches the floor, and whether it glided, dived or stalled.

Launch	Where did it land? What changed?
1	
2	
3	
4	
5	

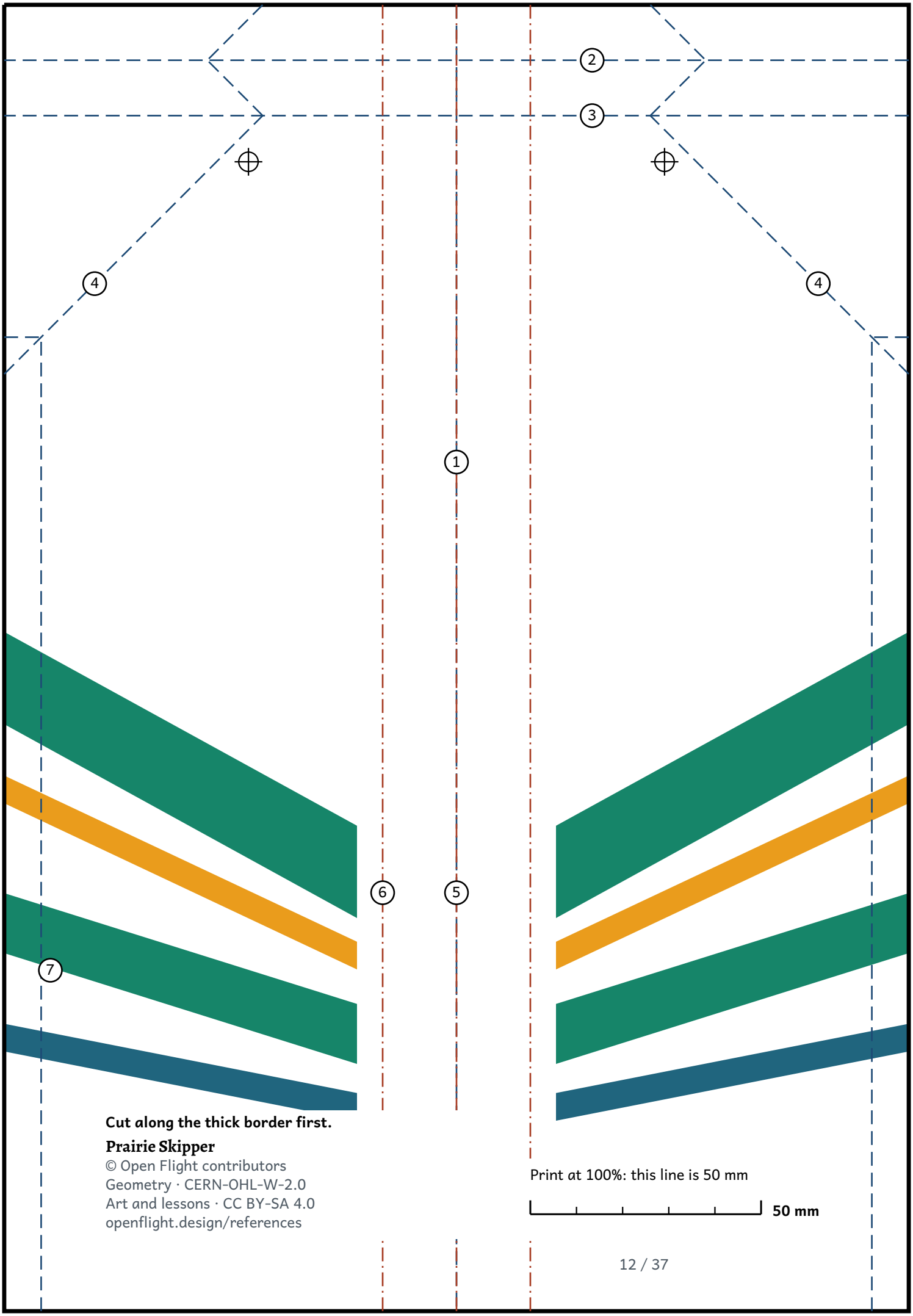


Raised upper deck

Fold 4 · Lift the loose tip back toward the nose to make the step. Look from the side for the two layers at the nose. The stepped bands repeat the idea in color.

The Museum of Flight • Boeing 747-121

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Cut along the thick border first.

Prairie Skipper

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Print at 100%: this line is 50 mm

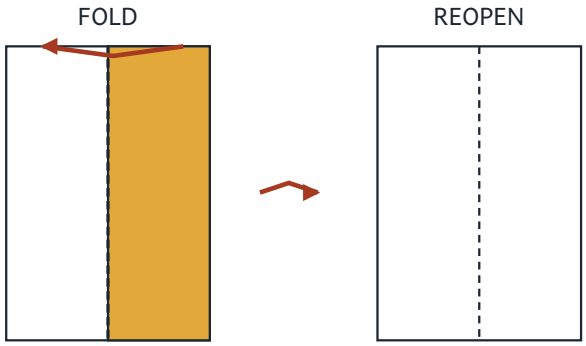
50 mm

Prairie Skipper

Folding guide 1 / 3

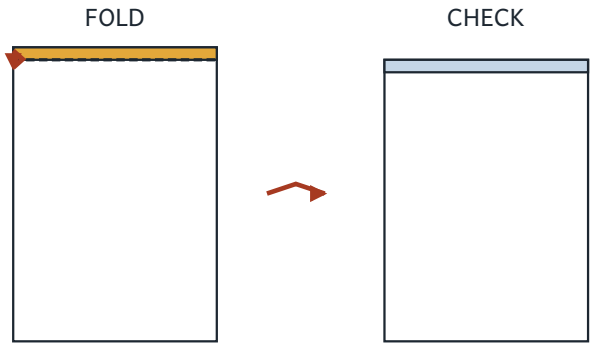
Use the airplane template. For two printed faces, print the template and its reverse from the separate airplane PDF, flipping on the long edge. Cut along the thick border, then fold. Any print scale works because the lines meet the border you cut.

1 Find the centre



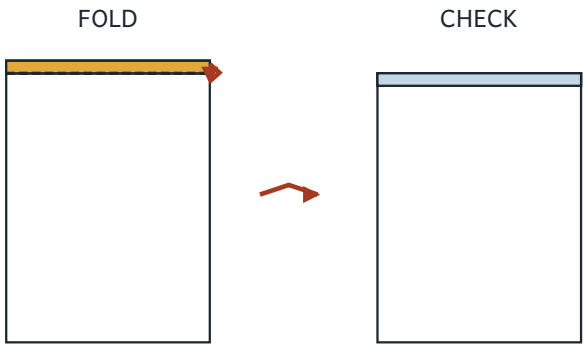
Cut out the sheet along the thick border. Print side up. Put the short edge at the top. Bring the two long edges together, press the middle crease, then open the sheet again.

2 Fold a narrow front cuff



Bring the short top edge down 24 mm to make a 12 mm cuff. Press the whole width.

3 Roll the cuff once more



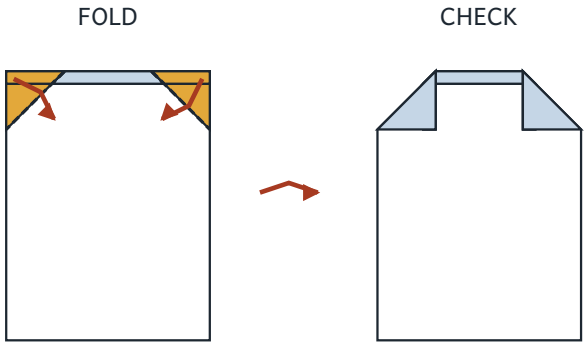
Roll the same strip towards you over its lower edge. The new front sits 24 mm from the original top. Both folds should be parallel.

Prairie Skipper

Folding guide 2 / 3

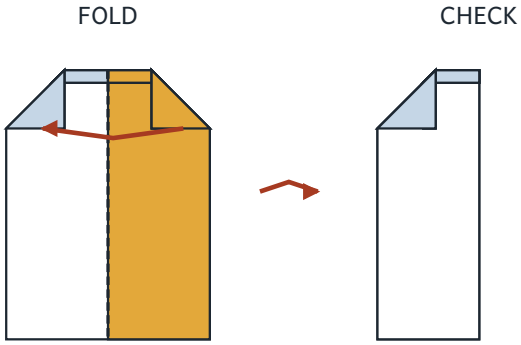
Use the airplane template. For two printed faces, print the template and its reverse from the separate airplane PDF, flipping on the long edge. Cut along the thick border, then fold. Any print scale works because the lines meet the border you cut.

4 Fold in the shoulders



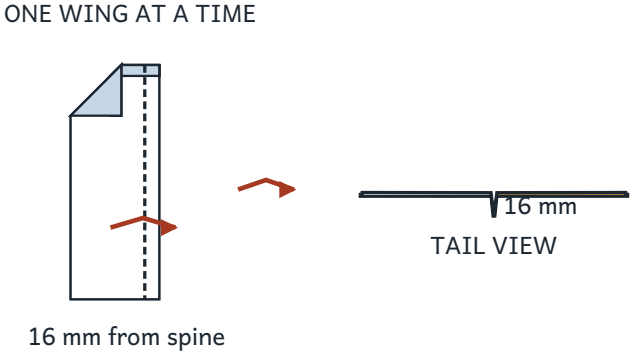
On each side fold the cuff corner diagonally inwards on line 4. The marked diagonal joins two points 56 mm from that corner. A straight strip stays across the middle of the nose.

5 Close the body



Keep the folded details face up. Fold the right half away from you, behind the left, along the centre line. The folded details will be on the outside.

6 Fold one wing, then match its twin



Hold the closed body with the centre edge on your right. Fold only the upper wing outward on the line 16 mm from that edge. Turn the model over and fold the other wing to match. From behind, the wings make a T with the body hanging below.

Prairie Skipper

Folding guide 3 / 3

Use the airplane template. For two printed faces, print the template and its reverse from the separate airplane PDF, flipping on the long edge. Cut along the thick border, then fold. Any print scale works because the lines meet the border you cut.

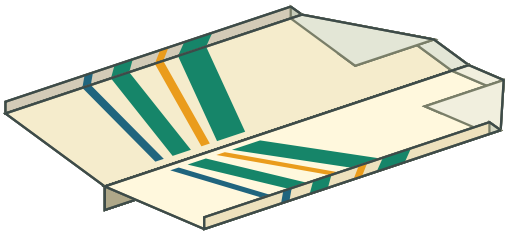
7 Raise the wing tips

Match the height of both tips



TAIL VIEW

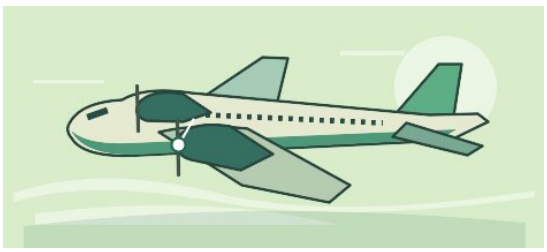
Lift each wingtip about 10 mm above the body fold. Turn up the outer 8 mm of each long side until both tips stand upright. Sight from the tail and match the heights.



Flight notebook

Hold the body near the front. Launch gently and level into clear space. Open the wings into a very shallow V. Compare five gentle launches with five from a copy with taller turned-up tips. Count how often each lands wings-level.

Launch	Where did it land? What changed?
1	
2	
3	
4	
5	



Long wing and twin propellers

Folds 2–4 · Roll the front edge twice and fold in its corners. Pinch the double edge and look for the broad outline and fan-shaped stripes.

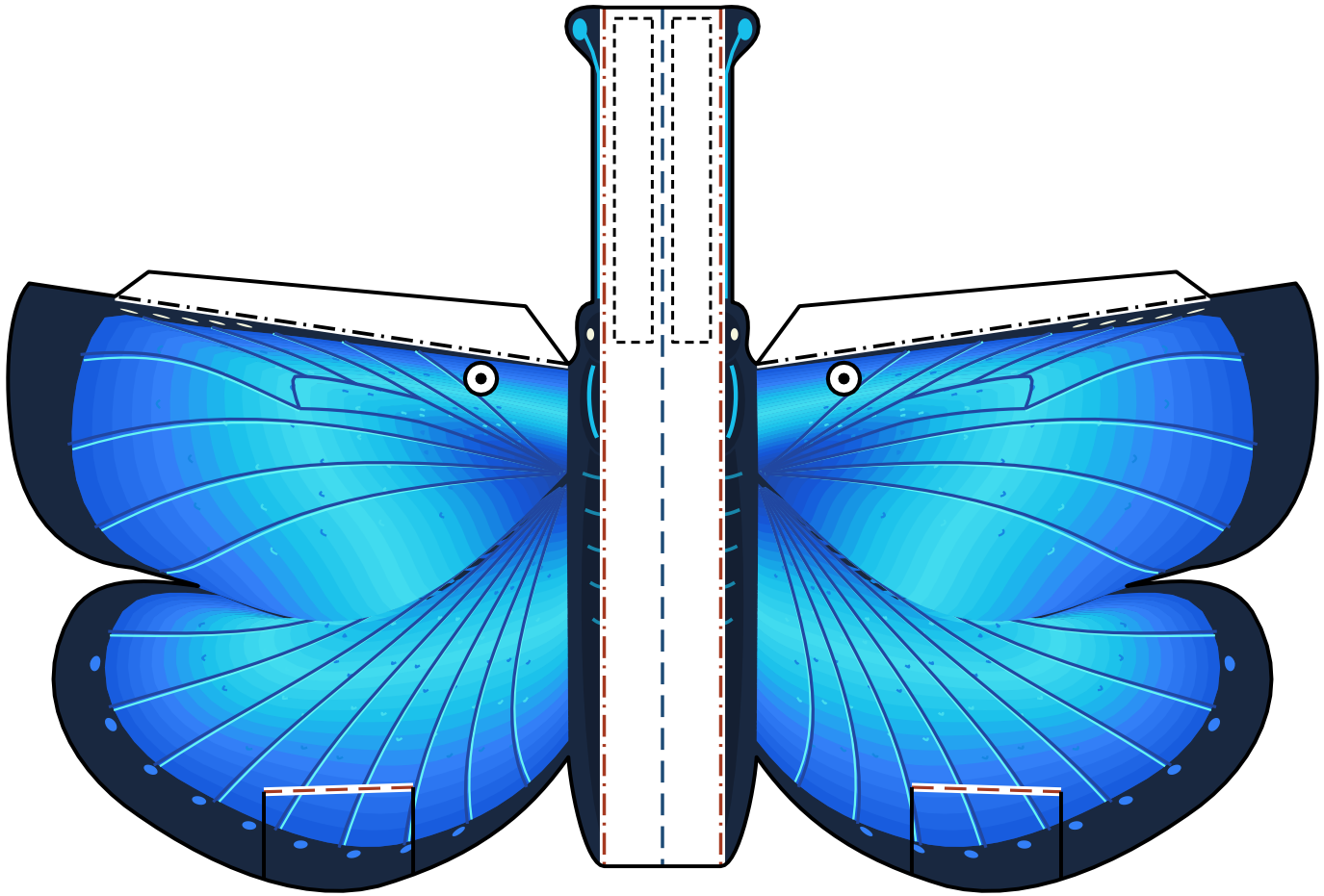
Smithsonian • Douglas DC-3

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Blue morpho

164 mm finished span

K2 costa glider · Fold the leading edge under each wing



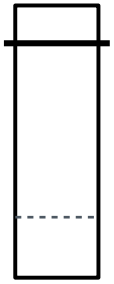
Cut — Center valley — Wing and costa mountains — Edge strip folds under — Clip zone — Balance dot

50 mm Print at 100% / actual size, landscape. Measure this line before cutting.

Paper and clips

120 g/m² uncoated printer paper or light card (100–140 works).
The wings run along the long side of the sheet. Most office paper is stiffer that way.
2 standard metal paper clips, 33 mm long.
Estimate for 164 mm on 120 g/m² with two clips: balance 51 mm behind the nose, glide about 2.5 m/s. Not yet measured.

Tip-height strip

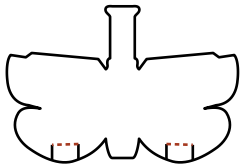


wingtip

Cut out. Stand it on the table beside a wingtip. 23 mm above the body.

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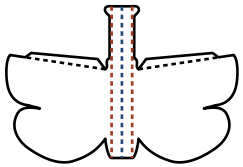
Build, balance and trim · Blue morpho



1. Cut

Cut the outside line, including the edge strips and the antenna clubs. Cut the four short slits at the back of the hindwings.

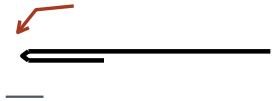
One piece. Each hindwing has a tab between two slits.



2. Score

Lay a ruler on each dashed line and press along it with an empty ballpoint pen.

Every fold line shows a groove. Thick paper now folds cleanly.



3. Fold the costa

Fold each edge strip under its wing along its dashed line. Press it flat.

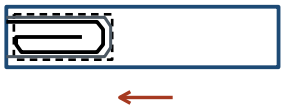
The front edge is straight and doubled, like the costa vein of a real wing.



4. Fold the body

Fold in half on the dashed centre line, colors inside. Then fold each wing back out on its dash-dot line.

The two body layers hang underneath and touch.



5. Clip the head

Slide both clips onto the head over the two body layers, one on top of the other, all the way to the nose.

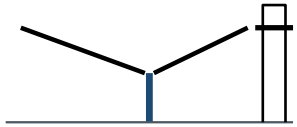
The clips stay inside the dashed clip box.



6. Balance

Rest the wings on two fingertips under the ringed dots. Tail drops: add a clip. Nose drops: slide a clip back, or remove one.

It stays level on your fingers.



7. Set the V

Lift both wings into a shallow V. Look from the tail and compare each wingtip with the strip.

Both tips are the same height.

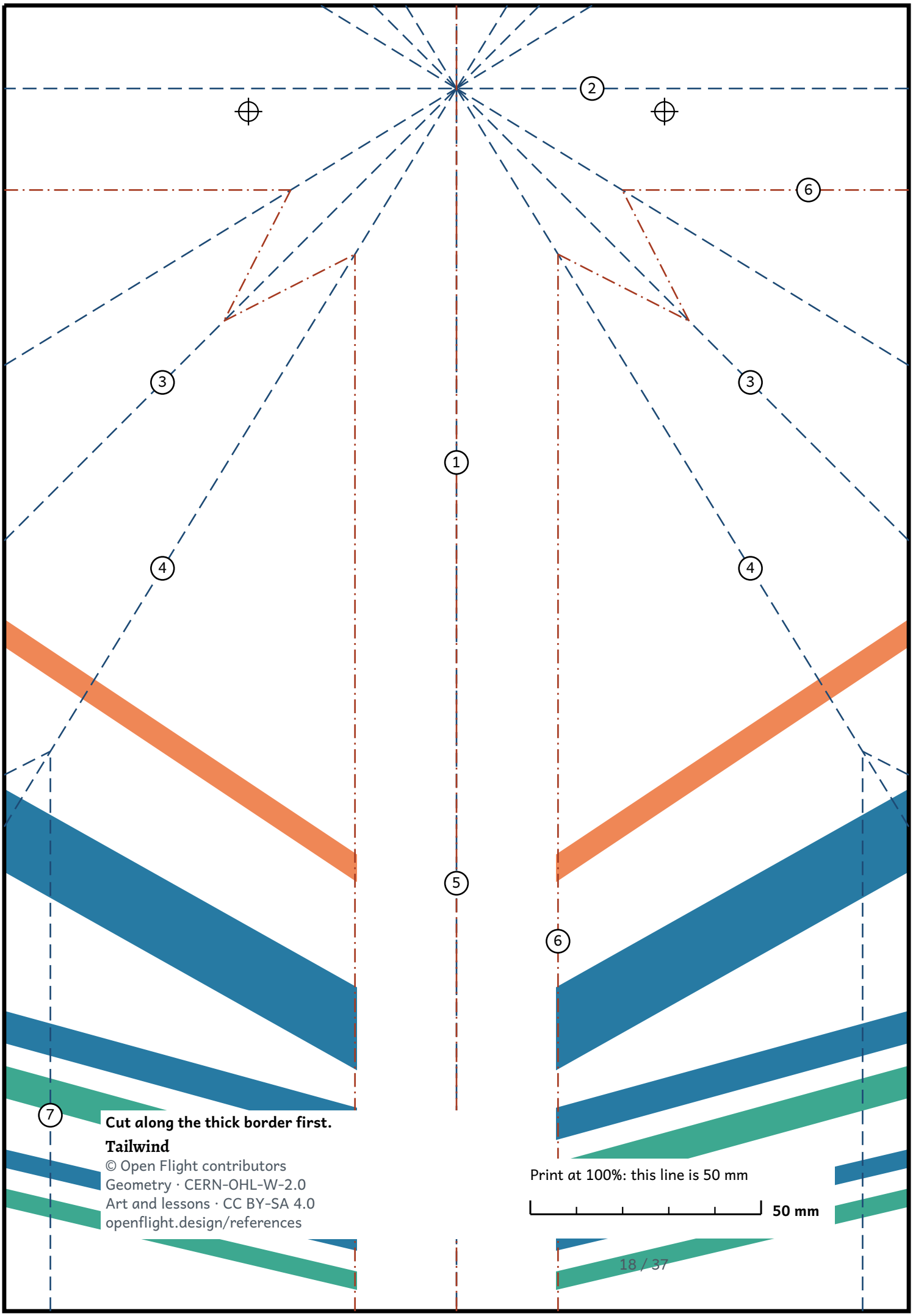


8. Launch and trim

Push it smoothly forward, nose level, about as fast as a jog.
Dives: bend both tabs up 1–2 mm.
Swoops up and stalls: flatten them.

Turns left: bend the right tab up a little. Turns right: the left tab.

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Cut along the thick border first.

Tailwind

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Art and lessons · CC BY-SA 4.0

openflight.design/references

Print at 100%: this line is 50 mm

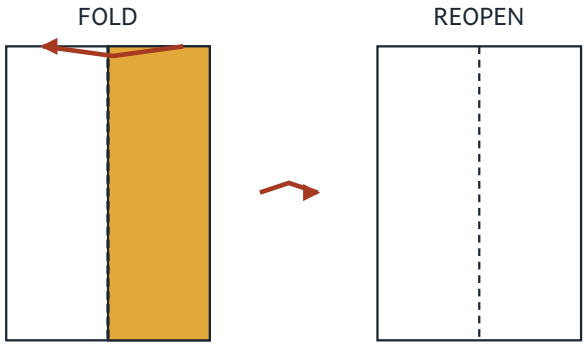
50 mm

Tailwind

Folding guide 1 / 3

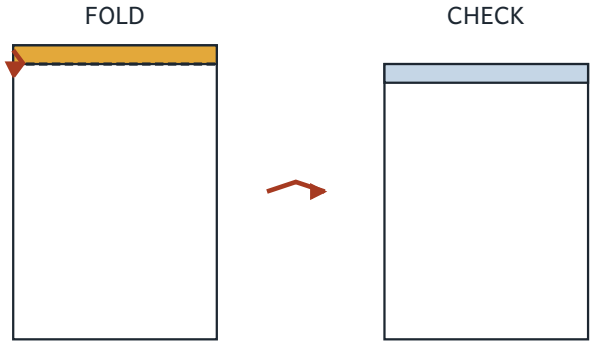
Use the airplane template. For two printed faces, print the template and its reverse from the separate airplane PDF, flipping on the long edge. Cut along the thick border, then fold. Any print scale works because the lines meet the border you cut.

1 Find the centre



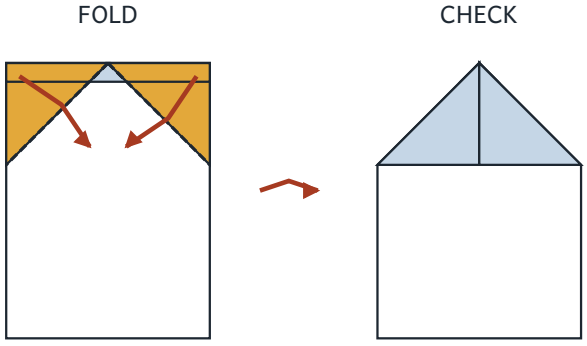
Cut out the sheet along the thick border. Print side up. Put the short edge at the top. Bring the two long edges together, press the middle crease, then open the sheet again.

2 Weight the front edge



Fold the top edge down to the 36 mm mark. This makes an 18 mm band across the sheet.

3 Fold the hemmed corners



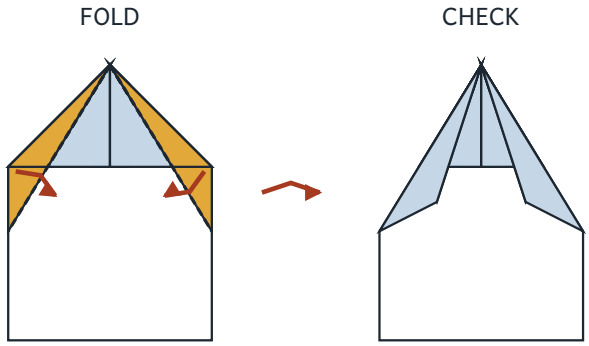
Using the new front edge, fold both corners to the centre. Smooth each thick diagonal outwards from the tip.

Tailwind

Folding guide 2 / 3

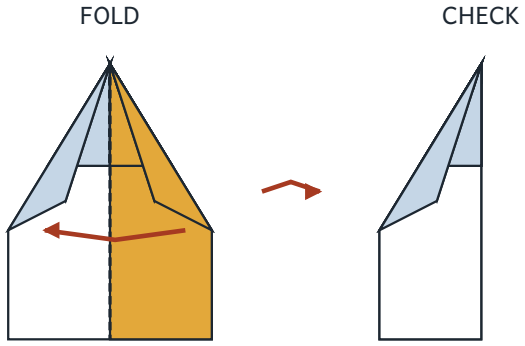
Use the airplane template. For two printed faces, print the template and its reverse from the separate airplane PDF, flipping on the long edge. Cut along the thick border, then fold. Any print scale works because the lines meet the border you cut.

4 Shape the swept shoulders



Fold each sloping shoulder inward on line 4. The crease runs from the nose to a mark 160 mm down each side from the new front. The folded edges stay apart.

5 Close the body



Keep the folded details face up. Fold the right half away from you, behind the left, along the centre line. The folded details will be on the outside.

6 Fold one wing, then match its twin

ONE WING AT A TIME



22 mm from spine

Hold the closed body with the centre edge on your right. Fold only the upper wing outward on the line 22 mm from that edge. Turn the model over and fold the other wing to match. From behind, the wings make a T with the body hanging below.

Tailwind

Folding guide 3 / 3

Use the airplane template. For two printed faces, print the template and its reverse from the separate airplane PDF, flipping on the long edge. Cut along the thick border, then fold. Any print scale works because the lines meet the border you cut.

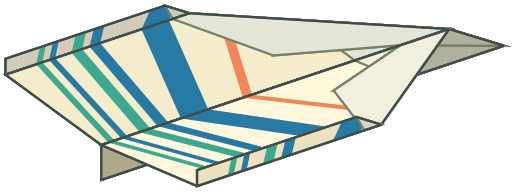
7 Raise the wing tips

Match the height of both tips



TAIL VIEW

Lift each wingtip about 10 mm above the body fold. Turn up the outer 10 mm of each long side until both tips stand upright. Sight from the tail and match the heights.



Flight notebook

Hold the body near the front. Launch gently and level into clear space. Make one copy with flat tips and one with 10 mm tips. Give each five level launches. Record any left or right landings before changing another fold.

Launch	Where did it land? What changed?
1	
2	
3	
4	
5	



Twin pairs at the tail

Fold 4 · Fold the shoulders inward to angle back the paper wing. Look for the pairs of stripes toward the wing tips. The bands suggest the paired engines.

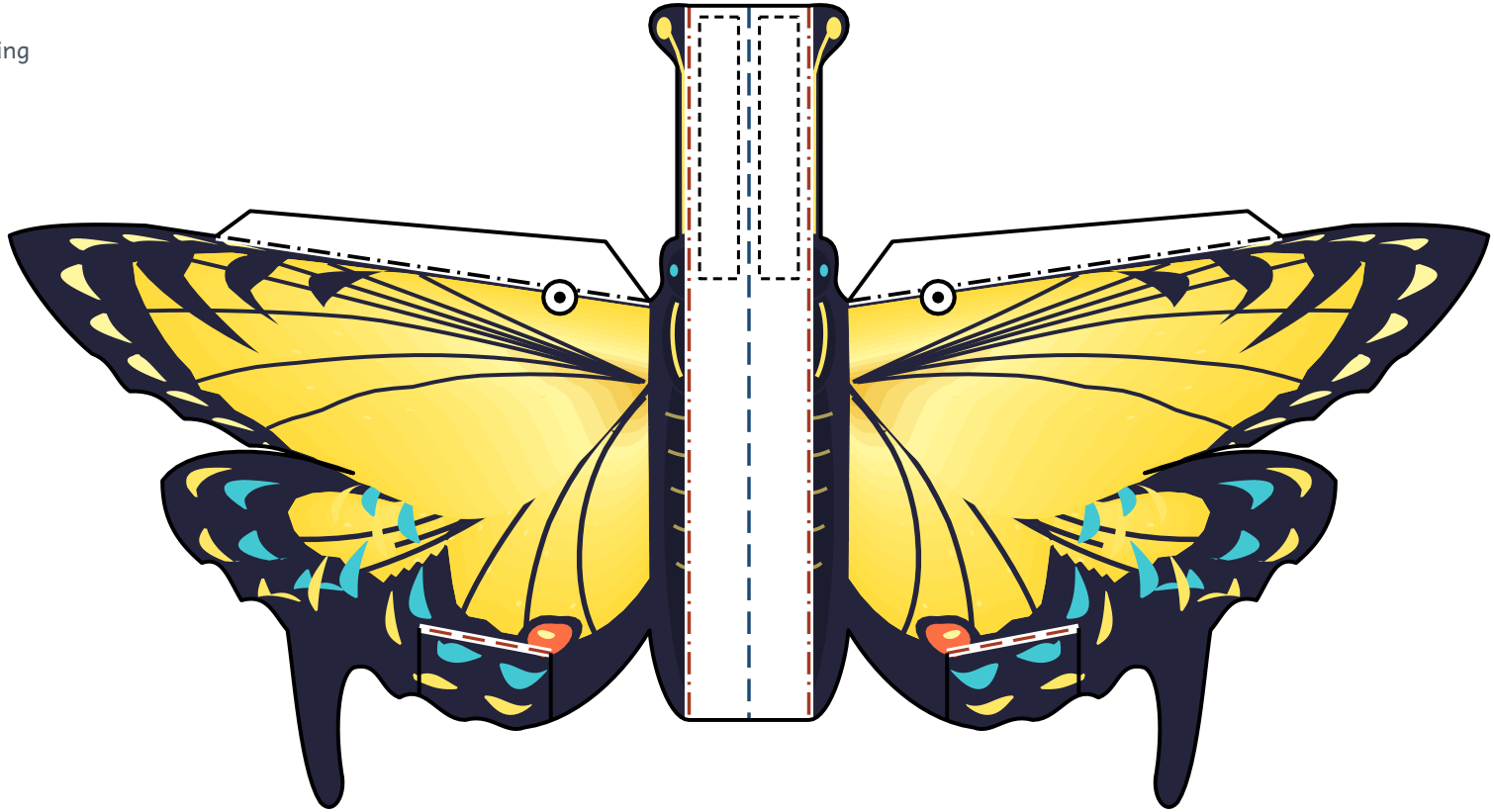
State Aviation Museum • Il-62

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Swallowtail

176 mm finished span

K2 costa glider · Fold the leading edge under each wing



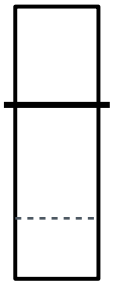
Cut — Center valley — Wing and costa mountains — Edge strip folds under — Clip zone — Balance dot

50 mm Print at 100% / actual size, landscape. Measure this line before cutting.

Paper and clips

120 g/m² uncoated printer paper or light card (100–140 works).
The wings run along the long side of the sheet. Most office paper is stiffer that way.
2 standard metal paper clips, 33 mm long.
Estimate for 176 mm on 120 g/m² with two clips: balance 39 mm behind the nose, glide about 2.7 m/s. Not yet measured.

Tip-height strip

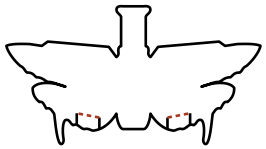


wingtip

Cut out. Stand it on the table beside a wingtip. 15 mm above the body.

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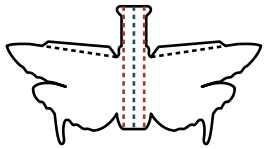
Build, balance and trim · Swallowtail



1. Cut

Cut the outside line, including the edge strips and the antenna clubs. Cut the four short slits at the back of the hindwings.

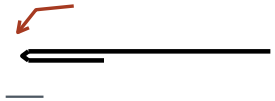
One piece. Each hindwing has a tab between two slits.



2. Score

Lay a ruler on each dashed line and press along it with an empty ballpoint pen.

Every fold line shows a groove. Thick paper now folds cleanly.



3. Fold the costa

Fold each edge strip under its wing along its dashed line. Press it flat.

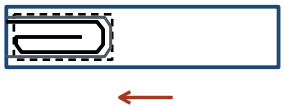
The front edge is straight and doubled, like the costa vein of a real wing.



4. Fold the body

Fold in half on the dashed centre line, colors inside. Then fold each wing back out on its dash-dot line.

The two body layers hang underneath and touch.



5. Clip the head

Slide both clips onto the head over the two body layers, one on top of the other, all the way to the nose.

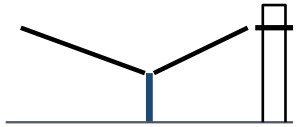
The clips stay inside the dashed clip box.



6. Balance

Rest the wings on two fingertips under the ringed dots. Tail drops: add a clip. Nose drops: slide a clip back, or remove one.

It stays level on your fingers.



7. Set the V

Lift both wings into a shallow V. Look from the tail and compare each wingtip with the strip.

Both tips are the same height.

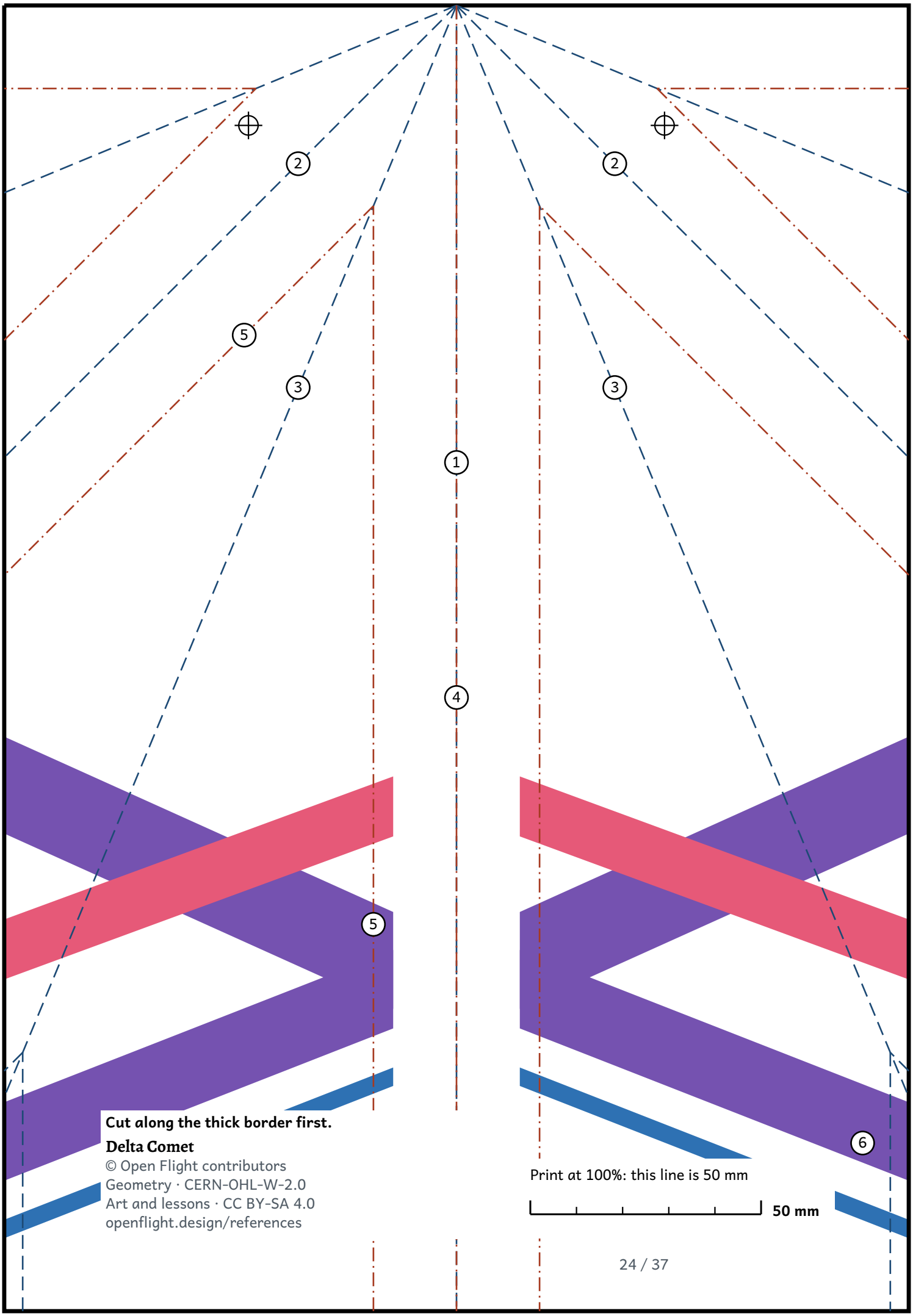


8. Launch and trim

Push it smoothly forward, nose level, about as fast as a jog.
Dives: bend both tabs up 1–2 mm.
Swoops up and stalls: flatten them.

Turns left: bend the right tab up a little. Turns right: the left tab.

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Cut along the thick border first.

Delta Comet

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openflight.design/references

Print at 100%: this line is 50 mm

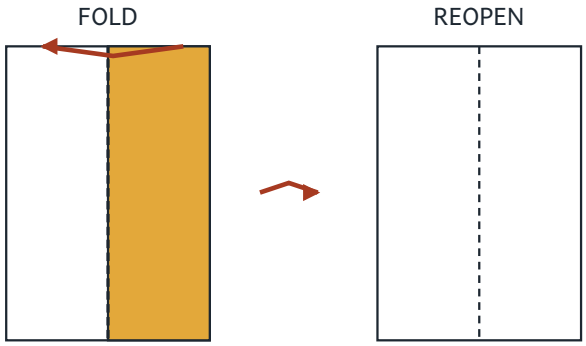
50 mm

Delta Comet

Folding guide 1 / 2

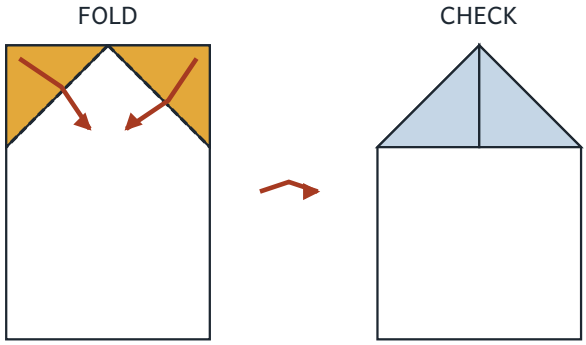
Use the airplane template. For two printed faces, print the template and its reverse from the separate airplane PDF, flipping on the long edge. Cut along the thick border, then fold. Any print scale works because the lines meet the border you cut.

1 Find the centre



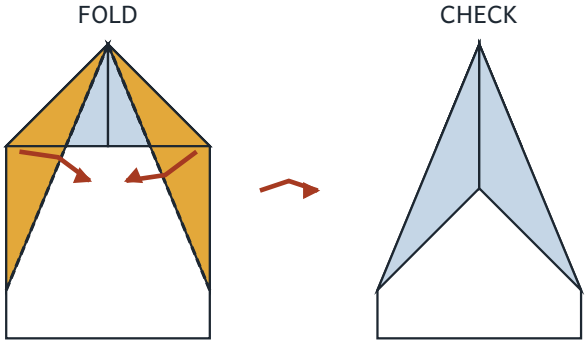
Cut out the sheet along the thick border. Print side up. Put the short edge at the top. Bring the two long edges together, press the middle crease, then open the sheet again.

2 Bring the corners to the centre



Fold each top corner inward. Lay the two short top edges along the centre crease. Press the two diagonals.

3 Sweep the edges in *again*



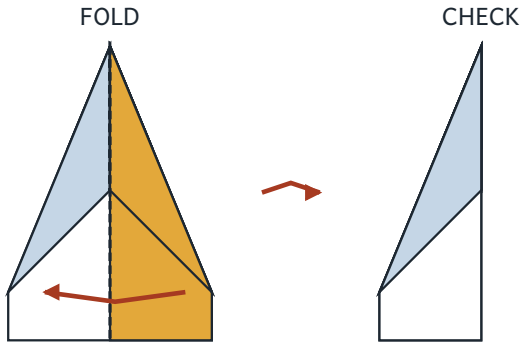
Bring each sloping front edge in until it lies along the centre crease. Start at the nose and smooth out the long diagonals one at a time.

Delta Comet

Folding guide 2 / 2

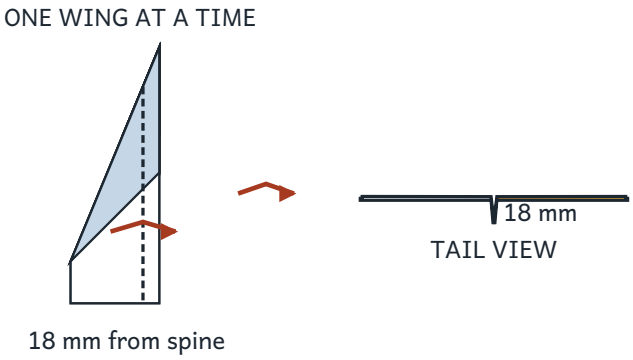
Use the airplane template. For two printed faces, print the template and its reverse from the separate airplane PDF, flipping on the long edge. Cut along the thick border, then fold. Any print scale works because the lines meet the border you cut.

4 Close the body



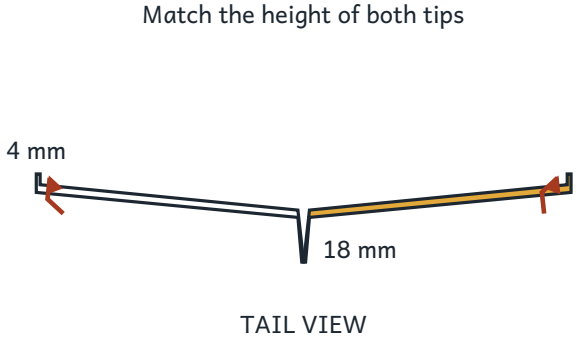
Keep the folded details face up. Fold the right half away from you, behind the left, along the centre line. The folded details will be on the outside.

5 Fold one wing, then match its twin

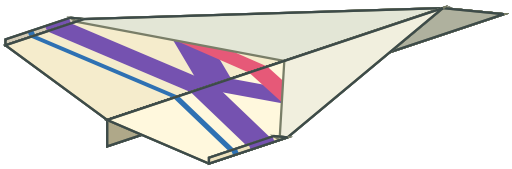


Hold the closed body with the centre edge on your right. Fold only the upper wing outward on the line 18 mm from that edge. Turn the model over and fold the other wing to match. From behind, the wings make a T with the body hanging below.

6 Raise the wing tips



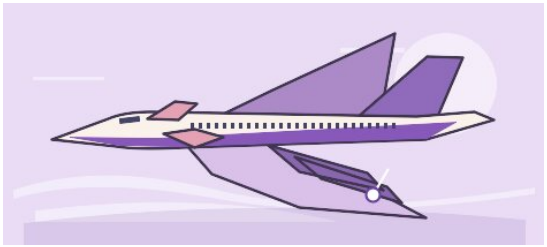
Lift each wingtip about 10 mm above the body fold. Turn up the outer 4 mm of each long side until both tips stand upright. Sight from the tail and match the heights.



Flight notebook

Hold the body near the front. Launch gently and level into clear space. Fold one Delta Comet. Throw it five times with flat back edges, then bend up the back 15 mm of each wing, next to the body, by 2 mm. Throw five more times with the same firm push. Predict first: which flies flatter and further? Mark where each flight first touches the floor.

Launch	Where did it land? What changed?
1	
2	
3	
4	
5	



Long delta wing

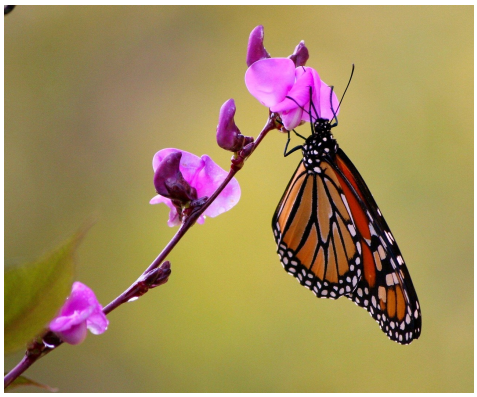
Fold 3 · The second diagonal draws the paper into a slimmer triangle. Look for the triangular outline and the angled stripes that follow it.

Technik Museum Sinsheim • Tupolev Tu-144

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openflight.design/references

Butterfly field notes

Monarch



Danaus plexippus · JamesDeMers · CC0



Natural Earth

Where to find it

Wintering site · Sierra Chincua, Michoacán, Mexico · Autumn migration and winter

In autumn, many monarchs from eastern North America fly south to spend the winter in fir forests in central Mexico.

Look closely

Milkweed feeds the caterpillars. The adults also need flowers for nectar and forest shelter in winter.

The workshop photograph shows one adult. The map marks a wintering site for the eastern population.

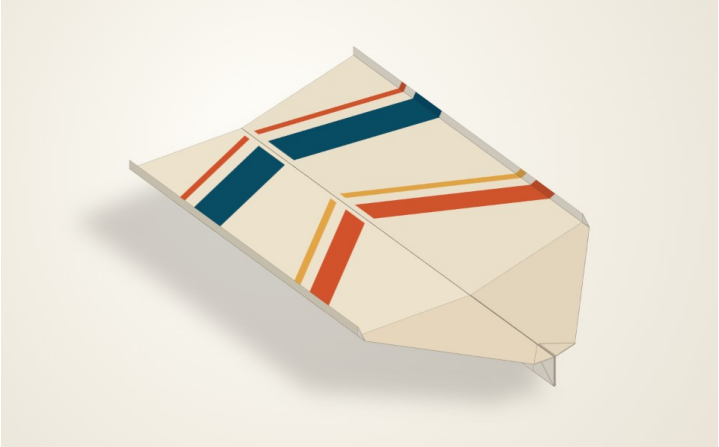
Explore the sources

U.S. Fish & Wildlife Service · fws.gov

CONABIO · Monarch migration · biomx.biodiversidad.gob.mx

Aircraft history

Boeing 747





Natural Earth

Where and when

First flight · Everett, Washington, USA · 9 February 1969

Boeing built the first 747 in a new factory in Everett. Its broad cabin had room for two aisles. The raised flight deck gave it a hump.

What changed?

The 747 introduced wide-body passenger flying. Trace the hump on the paper model with your finger.

Who worked on it?

Joe Sutter — Led the design team · Jack Waddell — Pilot on the first flight

From the pilot archive

John Glenn · 16 July 1957 · Project Bullet. For Project Bullet, test pilot John Glenn flew an F8U-1P Crusader from Los Alamitos, California, to Brooklyn, New York. The crossing took about 3 hours and 23 minutes, averaging faster than sound. Glenn's later Earth orbits in 1962 were aboard Friendship 7.

Explore the sources

Boeing · Everett and the first 747 · boeing.com

Museum of Flight · Waddell archive · archives.museumofflight.org

Boeing · Aircraft history · boeing.com

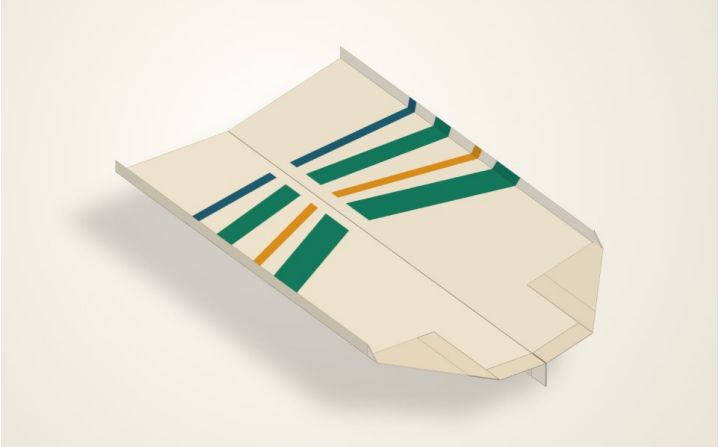
U.S. Naval History and Heritage Command · history.navy.mil

Ohio State University · John Glenn archive · library.osu.edu

NASA · Glenn's aviation and space flights · nasa.gov

Aircraft history

Douglas DC-3





Natural Earth

Where and when

First flight · Santa Monica, California, USA · 17 December 1935

Douglas built the first version in Santa Monica with beds for overnight passengers. A daytime version with seats followed.

What changed?

The DC-3 helped airlines earn money by carrying people. Feel the paper model's doubled front edge and look for its broad wing.

Who worked on it?

C. R. Smith — Airline president who asked Douglas for a sleeper airplane

Explore the sources

Smithsonian · Douglas DC-3 · airandspace.si.edu

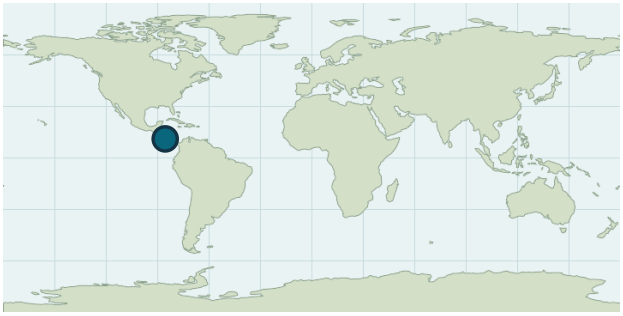
Boeing · Douglas aircraft history · boeing.com

Butterfly field notes

Blue morpho



Morpho peleides · Meli1670 · CC0



Natural Earth

Where to find it

Habitat example · Guanacaste, Costa Rica · Tropical forest

This blue morpho lives in tropical forests from Mexico through Central America into South America. Look for the flash of blue as it turns.

Look closely

Tiny layers in the wing scales reflect blue light. Adult morphos feed on fallen fruit in the forest.

The photo shows one adult in a butterfly house. Guanacaste is an example of its wild habitat. Some collections use the name Morpho helenor peleides.

Explore the sources

Natural History Museum · Blue morpho · nhm.ac.uk

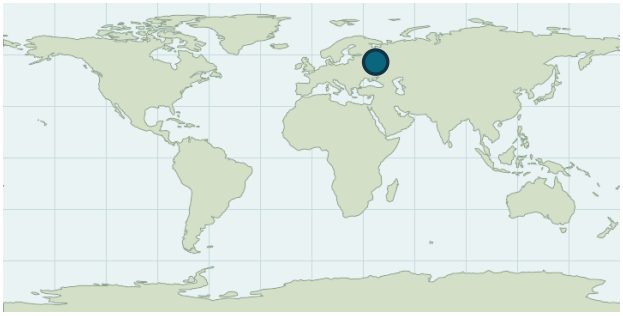
Guanacaste Conservation Area · acguanacaste.ac.cr

Harvard Museum of Comparative Zoology · Name record · mczbase.mcz.harvard.edu

Aircraft history

Ilyushin Il-62





Natural Earth

Where and when

Design and prototype · Moscow, USSR (now Russia) · January 1963

Ilyushin's team in Moscow built a Soviet jet for long passenger routes. The prototype first flew in January 1963.

What changed?

Four engines sat by the tail, leaving a clear wing. Two pairs of stripes on the illustrated paper wings recall those engines.

Who worked on it?

Sergei Ilyushin — Led the design team · Vladimir Kokkinaki — Pilot on the first flight

From the pilot archive

Yuri Gagarin · 1955–1957 · Jet training. Gagarin trained at the flight school in Chkalov and progressed to the MiG-15bis jet. He graduated in 1957. On 12 April 1961 he launched from Baikonur aboard the Vostok spacecraft and became the first person in space.

Explore the sources

Il design bureau recollections · aviaport.ru

Engineer Genrikh Novozhilov's memoir · mashin.ru

Russian State Archive · Gagarin's training · rgantd.ru

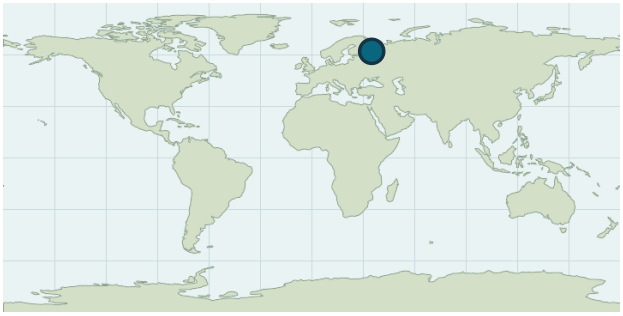
Presidential Library · Vostok flight · prlib.ru

Butterfly field notes

Old World swallowtail



Papilio machaon · makamuki0 · CC0



Natural Earth

Where to find it

Habitat example · Kizhi, Karelia, Russia · Early summer at Kizhi

The swallowtail lives across much of temperate Eurasia and in parts of North Africa and North America. The Kizhi museum records it where forests, meadows and wetlands meet.

Look closely

The caterpillars eat plants in the carrot family, such as wild angelica in Karelia. Can you spot the short tail on each hindwing?

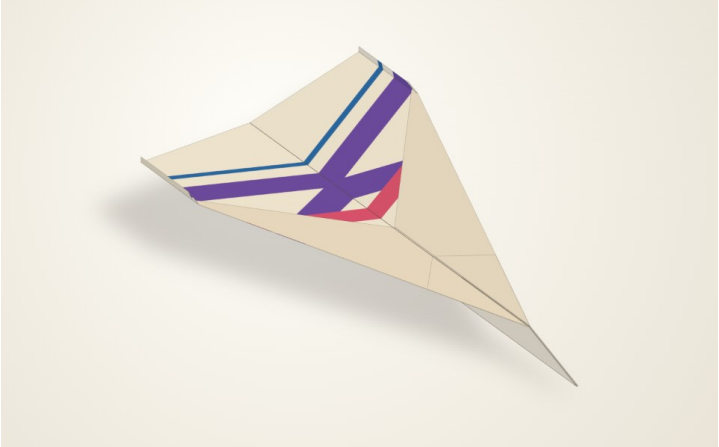
The map marks a documented population in the Kizhi archipelago. The photographed butterfly's location is unverified.

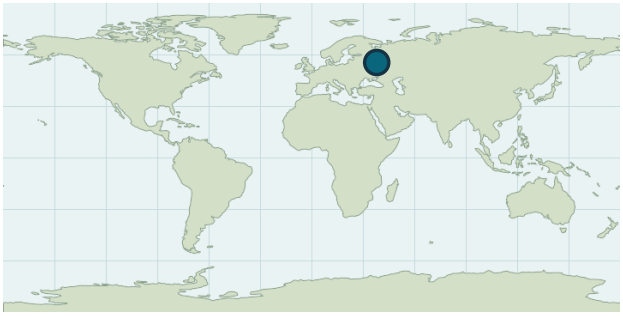
Explore the sources

Kizhi Museum Reserve · Swallowtail · site.kizhi.karelia.ru

Aircraft history

Tupolev Tu-144





Natural Earth

Where and when

First flight · Zhukovsky, USSR (now Russia) · 31 December 1968

The Soviet Tupolev team made the first supersonic passenger airplane to fly. The prototype took off near Moscow on the last day of 1968.

What changed?

Its triangular wing was made for fast flight. The airplane first flew faster than sound in June 1969.

Who worked on it?

Eduard Elyan — Pilot on the first flight

Explore the sources

TsAGI · Tu-144 flight and wing · tsagi.ru

Tupolev · Aircraft history · aviationunion.ru

Ring glider

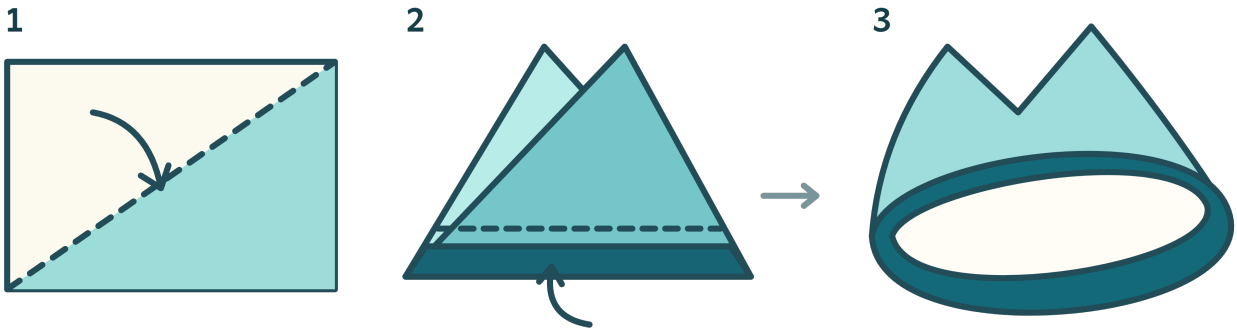
Can a loop of paper glide farther when you make the ring smaller?

Print single-sided at 100%. Check the 50 mm line with a ruler. 50 mm

Materials No printing needed: one plain A4 or US Letter sheet (write down which) and a ruler. A small piece of tape is optional.

1. Lay the sheet sideways. Fold along the diagonal between opposite corners. The other two corners form two separate peaks.
2. Fold the long folded edge over by about 13 mm, then once more by the same width. NASA/JPL folds it once; the second fold adds weight at the front.
3. Bend that thick edge into a ring with the folded strip on the inside. Tuck one end into the fold of the other, or add a small piece of tape.
4. Hold the ring at the bottom of the V between the peaks, two fingers inside and your thumb outside, rim forward. Reach your arm back, swing it up and let go gently beside your ear.

Folding guide · Use a separate plain sheet for the glider.



Flight trial

Measure across the opening. Try five level tosses and mark the first landing of each. Tuck the ends a little farther in, measure again and repeat from the same spot.

Opening (mm) / first landing (cm)

Diameter _____ mm _____ _____ _____ _____ _____

Diameter _____ mm _____ _____ _____ _____ _____

The folds put more paper in the front rim. The curved sheet forms a wing around an opening. Changing the overlap changes both diameter and seam stiffness.

If it goes wrong Dives: unroll one rim fold. Climbs and falls back: launch more gently. If the ends slip apart, tuck them deeper or tape them, the same way for both sets.

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Maple spinner

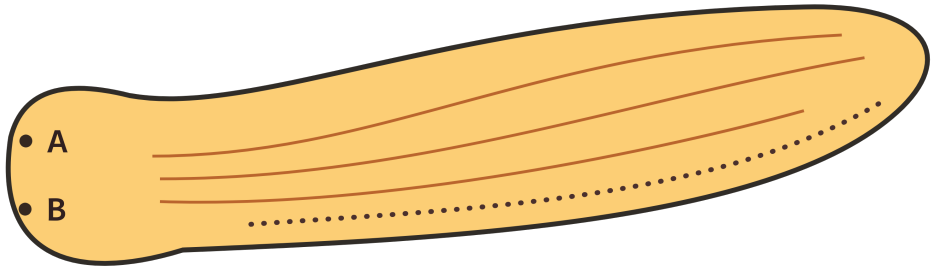
Can you make one paper wing spin just by letting it fall?

Print single-sided at 100%. Check the 50 mm line with a ruler. 50 mm

Materials The maple wing template, scissors and one small metal paper clip. A helper can cut the outline.

1. Cut along the solid line around the printed wing. Keep the wing and its rounded root in one piece.
2. Slide the clip onto the short edge at dot A. Its long side should lie flat on the paper.
3. With the printed side up, lift the dotted long edge slightly with your fingers to give the wing a shallow curl.
4. A tall helper holds the wing tip as high as they can, about 2 m and never lower than 1.5 m, clip pointing down, and opens their fingers. Watch for complete turns.

Full-size template · Cut along the solid outline.



Flight trial

Drop five times from the same height. Count full turns, including zero. Move the same clip to B and repeat. Keep the curl and release the same.

Clip position / full turns

Clip A _____ _____ _____ _____ _____

Clip B _____ _____ _____ _____ _____

The clip shifts the balance toward the root. As the wing falls, air pushes on its curved surface and makes it spin around its balance point, near the clip, tracing a cone.

If it goes wrong If it falls straight, try a little more curl. Start both sets again with that curl.

Reference Gregory Vogt · NASA Glenn SVG attached

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Williams tandem glider

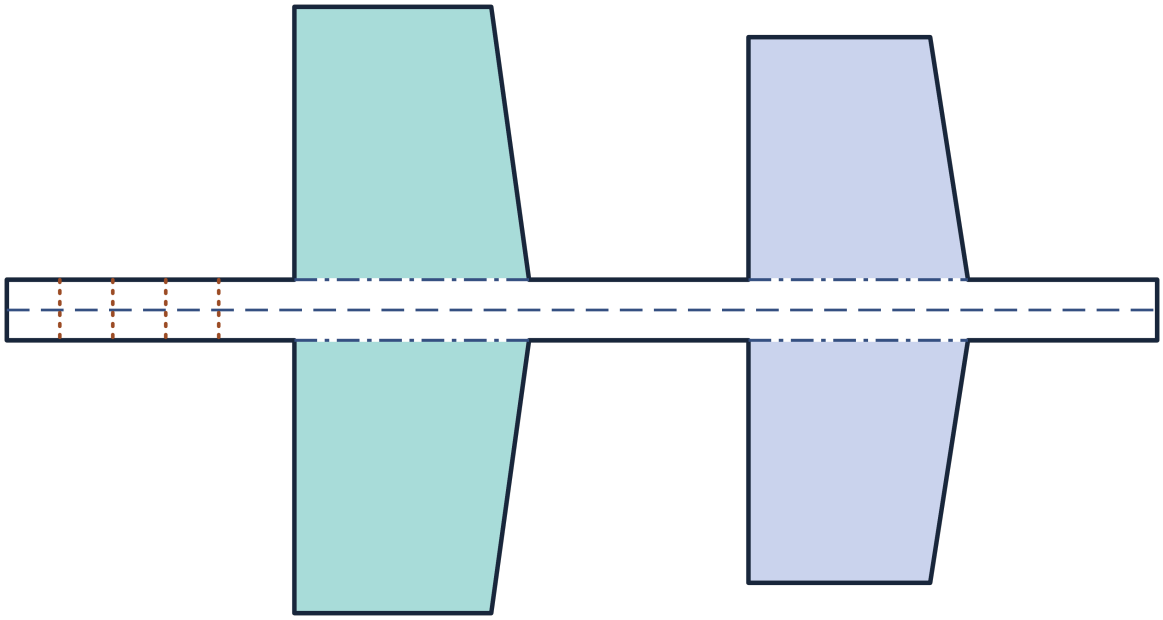
What happens when you raise all four wingtips just a little?

Print single-sided at 100%. Check the 50 mm line with a ruler. 50 mm

Materials One printed sheet of ordinary paper, scissors, a ruler and one small paper clip. Cutting is easier with a helper.

1. Print at 100% and cut around the solid outline.
2. With the printed side up, find the four dotted lines on the left. Fold the nose inward at each line, starting at the end.
3. Fold the long dashed center line so the printed faces meet. Turn the folded edge down. Open all four wings along the dash-dot lines until they sit level.
4. Slide the clip onto the keel just behind the nose. Look from behind: the back wings must line up with the front wings, left and right at the same height.

Full-size template · Cut along the solid outline.



Flight trial

Give it five gentle, level pushes indoors from the same line and height. Then raise the tips slightly and try five more.

Mark the first landing each time. Compare distance and how far the glider drifted sideways.

Level					
Tips raised					

The two wing pairs share the lift. Raising both sides may help the glider roll back toward level after a small tilt.

If it goes wrong Sinks flat: slide the clip forward. Plunges: move it back, or unroll one nose fold. Turns: line up the wings again. Williams's rules, 1918.

Reference Archibald Williams · Things To Make · Paper Gliders, Fig. 128 (Model B) SVG attached

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