

PHOENIX

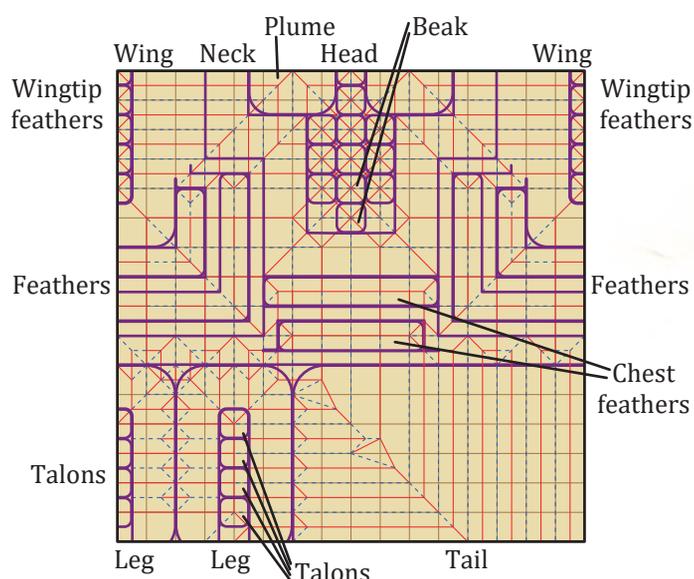
First time:  50cm/20"

Paper preferences:

- Thin
- Tearproof
- Shapeable

Recommended papers:

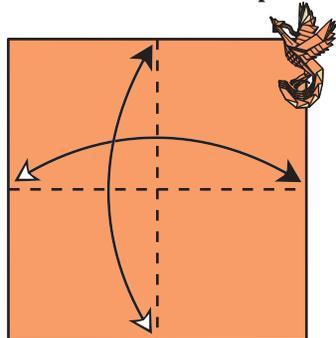
- Single tissue
- Foil-backed paper



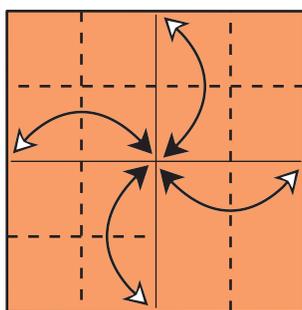
In order to get the Phoenix to stand up by itself, you need light, strong paper. Large paper helps to make the details easier to fold, but it can work against you here because the weight makes it hard to balance.

However, if you want to make the tail in a different way, ignore from step 225 onwards.

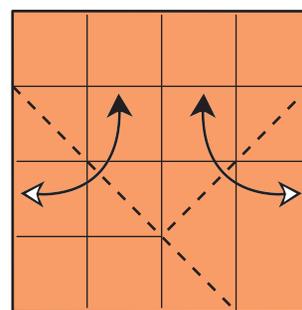
Start colour side up.



1. Fold and unfold the opposite raw edges together.

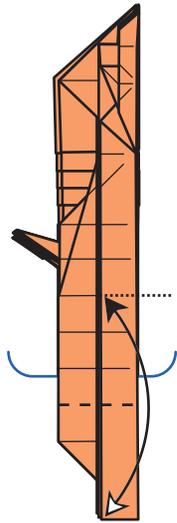


2. Fold and unfold the raw edges to the creases. Note the bottom fold-line is only in the left half of the paper.

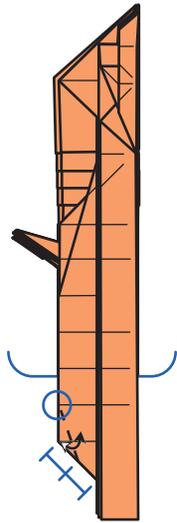


3. Fold and unfold two diagonal lines where shown.

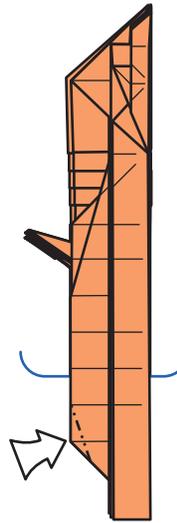




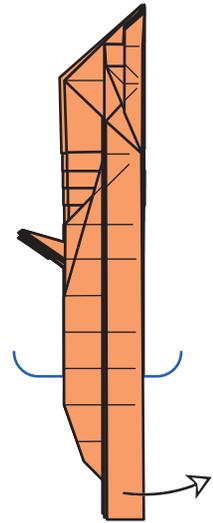
173. Fold and unfold.



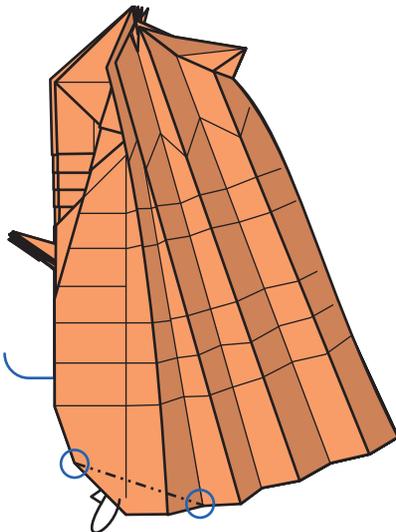
174. Fold and unfold.



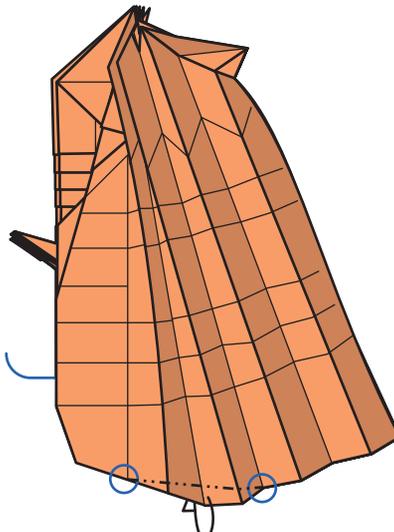
175. Closed-sink the corner.



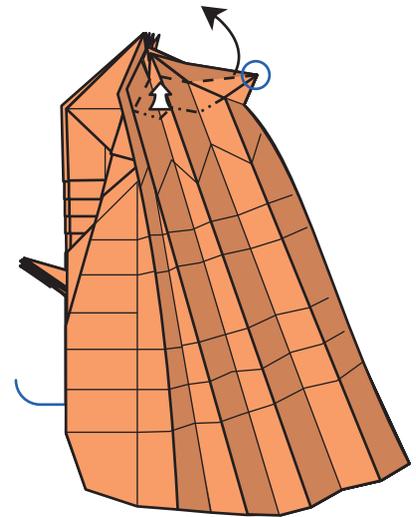
176. Spread the narrow pleats. The paper won't lie flat until after step 182.



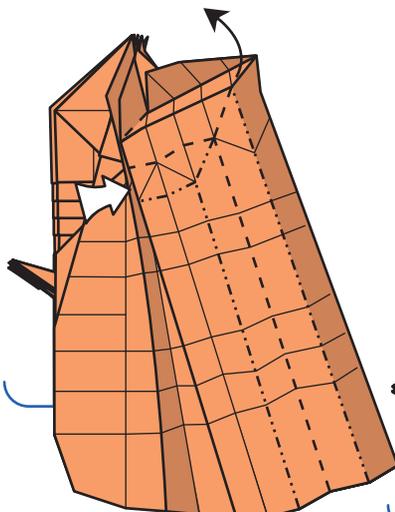
177. Mountain-fold.



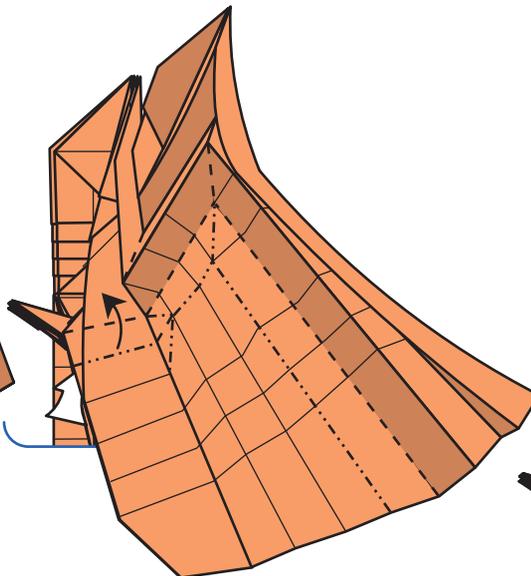
178. Mountain-fold.



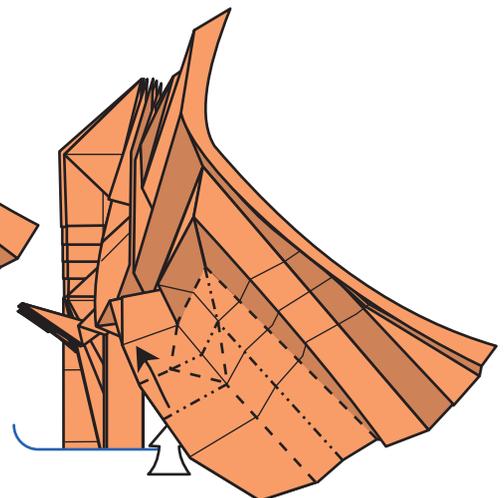
179. Begin to pull the circled corner upwards, and fold part of an existing horizontal pleat.



180. Continue to box-stretch using existing creases.

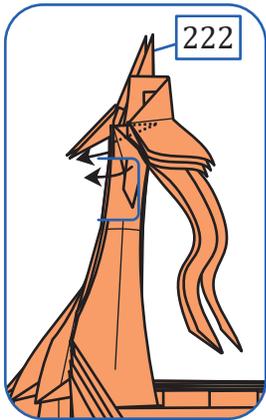


181. Push the top pleat from step 171 upwards.

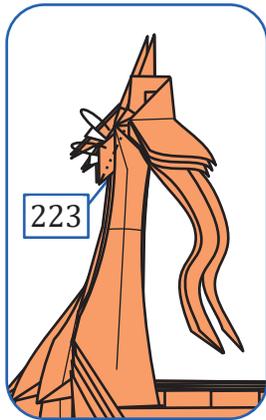


182. Collapse the second pleat from step 171 and flatten the paper.

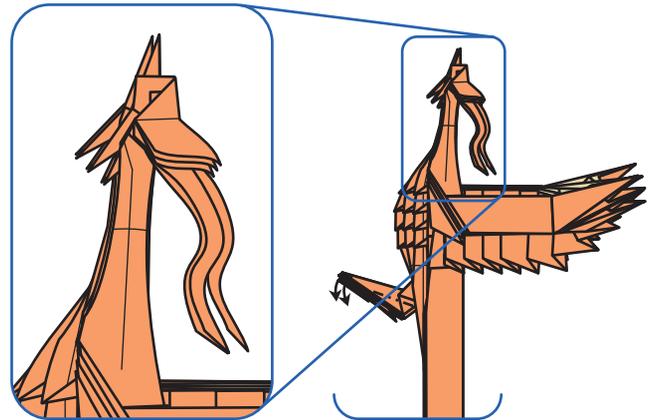




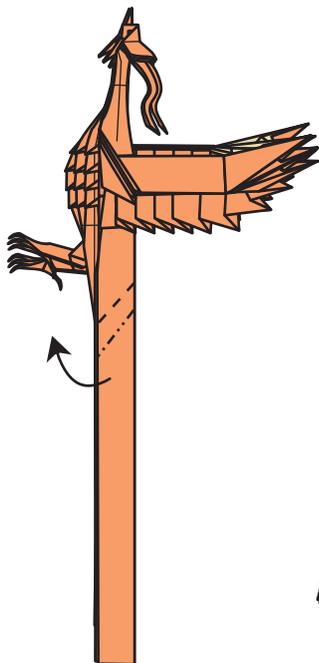
222. Crimp two hidden corners so that the points are spread evenly along the side of the head. Repeat behind.



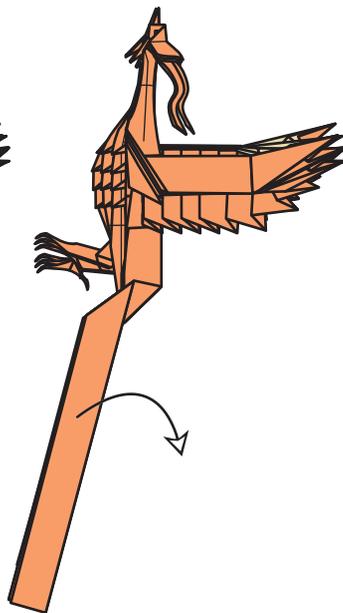
223. Mountain-fold two edges to make the corner sharper. Repeat behind.



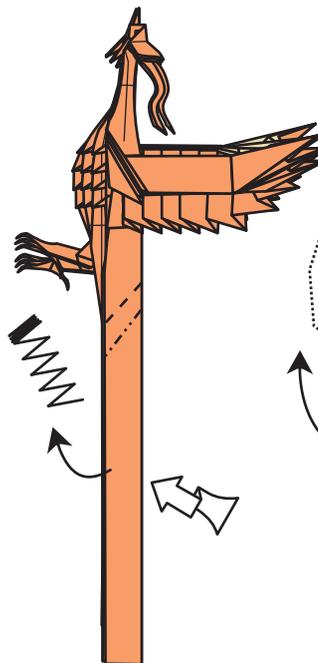
224. Pinch and spread the talons.



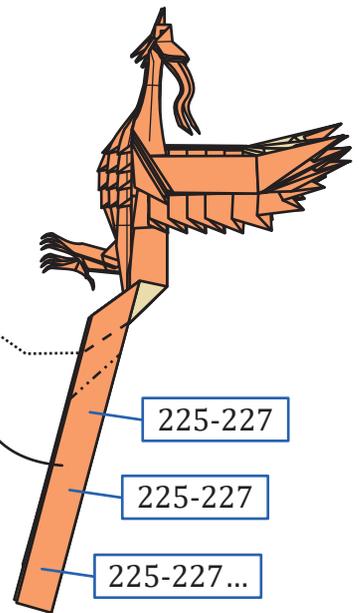
225. Pleat the tail forwards and back again through all layers.



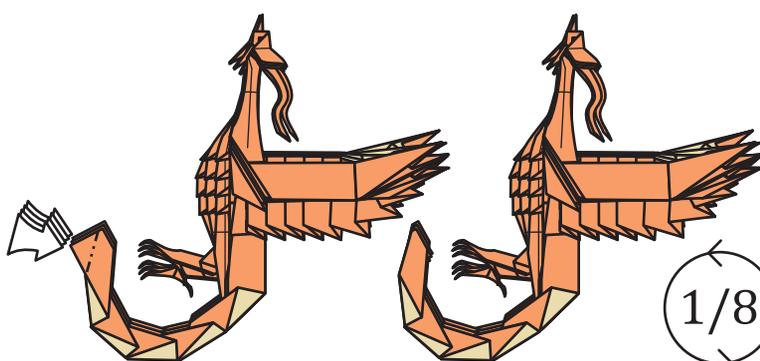
226. Unfold step 225.



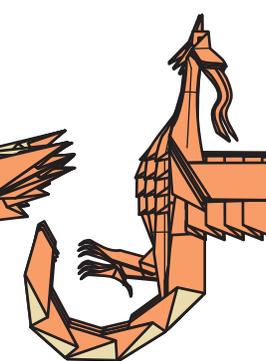
227. Mixed-reverse-fold the tail back and forth using creases from step 225. Treat the thick connected layers at the back as though they were a single layer.



228. Repeat steps 225 to 227 all the way along the tail, so that tail curves underneath the body.



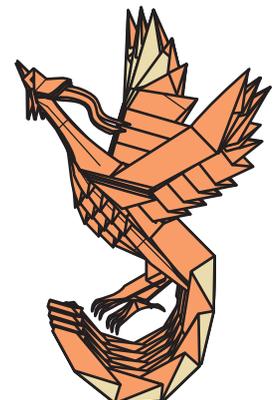
229. Reverse-fold four corners at the tip of the tail. Treat the near raw corner as though it is attached to the layer behind it.



230. Rotate the model.



231. Open the wings and spread the layers of the tail, so that the Phoenix can stand by itself.

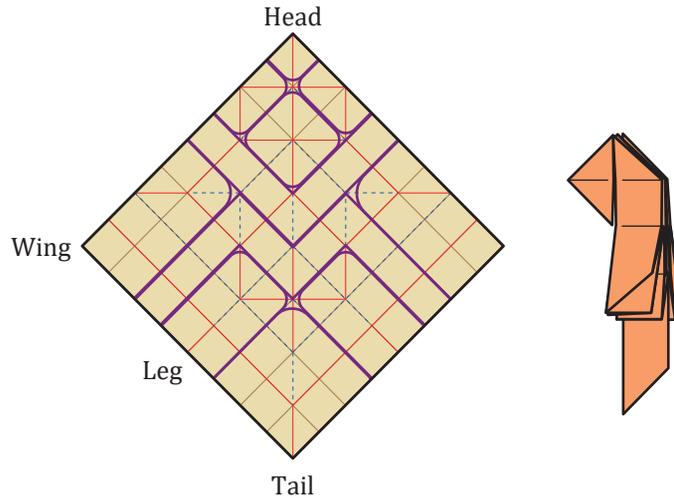


The coarse grid

We can make things even easier by ensuring the coarse grid is also easy to fold, which means using a power of 2. Let's begin with an 8×8 grid and consider some initial arrangements.

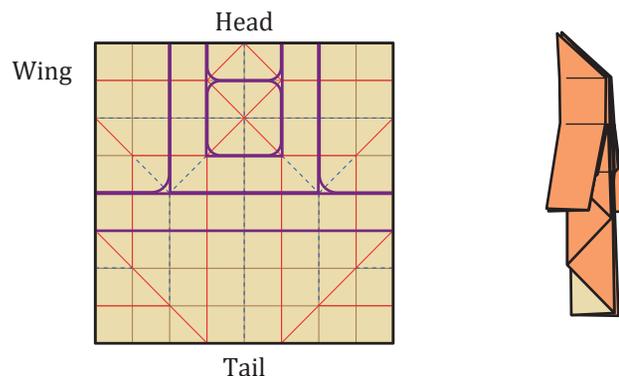
As usual, we have a symmetric model in mind, so we'll consider two types of symmetry:

- Diagonal symmetry – one corner for the head, the opposite corner for the tail, and the other two corners for the wings. Note that the leg flaps have enough paper for making talons later, and the wings have some extra paper to make feather pleats. This arrangement is effective for making a long, thin tail that tapers towards the flap tip because it is at the raw corner. But we want the tail to be wide so that the pattern is visible all the way along the tail. We can't efficiently add more paper to the tail with this layout, so this arrangement won't work very well. Additionally, we probably have more flaps for the head than we need.



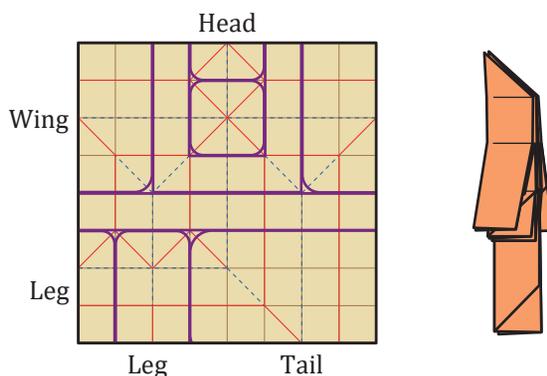
Crease pattern and folded base of a diagonal-symmetry phoenix. Note that this arrangement doesn't actually utilise the full diagonal length from head to tail since this diagonal is not aligned with the grid lines.

- Book symmetry – two adjacent raw corners for the wings, the centre of the top edge for the head, and the opposite edge for the tail. This allows for several horizontal pleats all the way across the paper to make both details on the head and feathers at the wingtips, which is great. The lower portion of the paper has enough paper for a wide tail too (perhaps even more than we need). But there isn't enough remaining space for both leg flaps, let alone with talons on. This is unfortunate, because compared to the above arrangement, there is actually more paper in the lower half! The extra paper just isn't in the right place to be used without making the tail narrow.



Crease pattern and folded base of a book-symmetry phoenix with a wide tail.

So we try a surprising third option: let's not have a fully symmetric model. We'll use the top half of the book symmetry approach, but we push the tail to one side nearer to a raw corner, which makes the tail flap much more efficient. This makes room for both leg flaps, including extra paper for the talons!

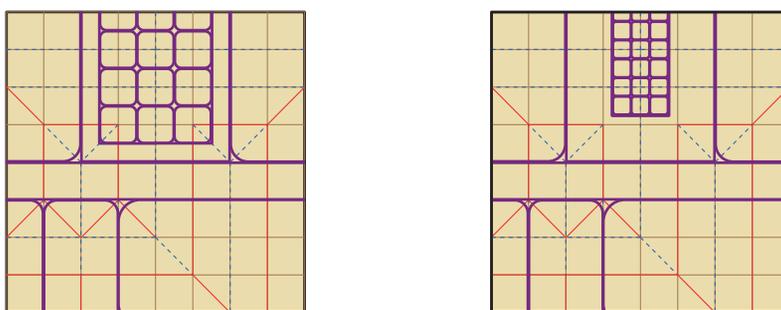


Crease pattern and folded base of an asymmetric phoenix. By pushing the tail to a raw corner, we increase the efficiency and make room for the leg flaps.

The fine details

So we've made our rough plan, and now we have to flesh it out by subdividing our grid. Since we're prioritising ease of folding, it would be foolish to do anything except using more powers of 2, so we'll end up halving repeatedly within each feature until we have enough detail. For visual consistency across the model, it will be best if we have a similar level of detail across different features. We ought to start with the areas that will need most adjusting.

We'll begin with the head. As a bare minimum, we ought to have four central flaps: one for the lower beak, one for the upper beak, one for the eyes, and one for the crest. Adding these by directly altering the crease pattern has no guarantee of adjusting the base in a way that corresponds to an easy folding sequence. So in practice, the best way forward to ensure we can add details to a flap is to fold the base and add features by applying methods like point splitting. Nonetheless, the clearest way to see the effects of different methods is by examining the arrangement of each option on the flat square. Two options are shown below.



Adding flaps to the head by point splitting.

Left: An arrangement with a 16×16 grid. These flaps are still too big and the neck ends up too small.

Right: An arrangement with a 32×32 grid. We have more flaps than we need, but the proportions are about right.

A 32×32 grid seems most suitable (folding smaller than this would be rather fiddly for most folders without using very large paper), so let's commit to using a 32×32 grid for the other features too.