



## Design Challenge

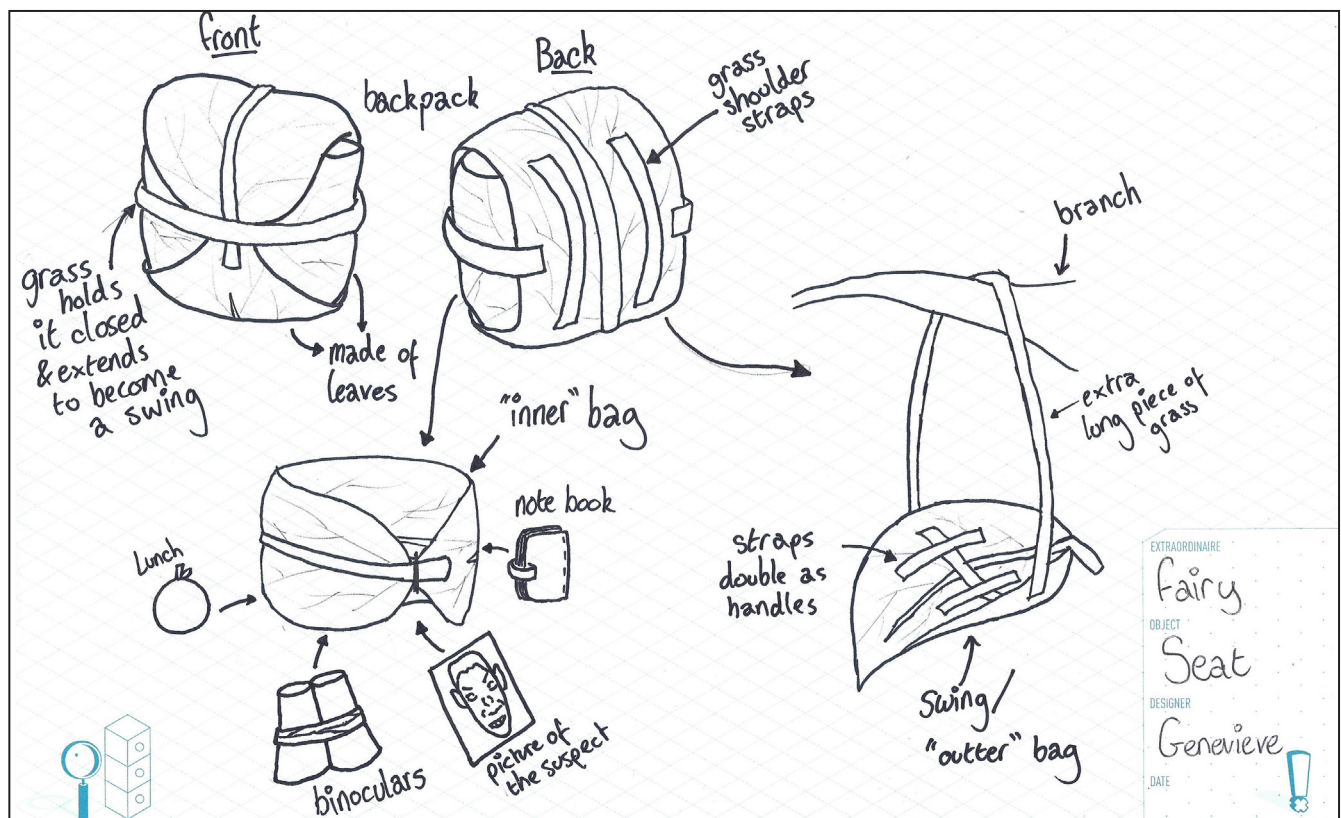
**Extraordinaire:** The Fairy

**Design Project:** Somewhere to sit

### About the Extraordinaire

The Fairy lives among nature with the birds, insects, and woodland creatures. Her clothes and shoes are made from petals, buds, and leaves. Her furniture is made from natural items found in the forest. The Fairy is also a detective. She snoops and searches for clues in the forest and solves fairy mysteries. She uses detective gadgets that are made out of natural materials. So, any invention for the Fairy should be designed from items found in nature. The invention should help her to remain comfortable during those long stakeouts in the forest when she is watching a suspect. The invention must be easily portable, too, because she may have to fly away to another location quickly.

**Design Solution:** The Backpack Swing



### Materials

- Three or four long stems of grass or reeds (Annual Meadow Grass or Bluegrass).
- Two leaves of the same size, oval (elliptic or ovate) shaped, about 4 inches long each.
- A craft knife, scissors, or scalpel.

## Procedure

1. Take one of the long stems and remove any attached leaves or flowers.
2. Separate your stem based on the nodes. The nodes are the rigid joints in the stem, which connect each segment. You should be left with three or four pieces, between 2 and 5 inches in length.

*You will need a single piece of stem (no nodes) which is roughly 6 - 8 inches for "rope" in order to create the swing. Place your longest piece to the side for now!*

3. Taking a ruler or the back of a pair of scissors, press gently down on the stem and, in one continuous action, run the edge along the full width of the stem. This should remove any liquid from the stem. This part can be quite tricky, as if you press too hard the stem will get torn. This should create a "reed" for you to use.

*Once you create a reed, they don't last long so you need to use them quickly. If you wait too long to use it, the part will become brittle and break when you try to bend it. If you want pieces to last longer, coat them in PVA or Mod Podge!*

4. Once you have a reed, take one of your leaves and gently pull the stem (petiole) and tip of the leaf toward the centre so they overlap.
5. You may need a friend for this part. Tie your reed around the overlapping stem and tip in a secure double knot. At this stage, when you tie the knot you may find that if you are tying it too tight, the reed snaps. Should this be the case, simply go back to stage 3, and try again! Similarly tying the reed loosely will result in the leaf simply falling back to its original shape. Finding the balance can be quite tricky. Trim any long end pieces, being careful not to cut your knot.

Now you have the "inner bag" where the fairy puts all of her tools for investigating suspects. The next step is to create the "outer bag" which acts as the seat for the fairy, as well as the device which turns what you've just made into a backpack.

6. Take your second leaf and position it flat on the table. Place the inner bag on top with the knot you tied facing down, and so that the midribs (the central "main" vein of the leaf) form a + (plus) symbol.
7. Similar to step 4, you then need to wrap the tip and stem of the second leaf around the inner bag. Hold these pieces in place, and turn the entire bag over.
8. Looking at the back of the bag, mark or make note of where you want the straps to be. They should be symmetrical each side of the midrib, and far enough apart for the fairy to easily slide her arms in and out of the straps. Release the tip and stem of the leaf and put the inner bag somewhere safe for later.

*Look back at step 2 and 3. To create straps for a backpack, the reeds you make need to be at least twice the distance between the top and bottom slit. Remember that these reeds will need to loop through the holes and tie together, as well as being long enough to ensure the fairy can get her arms in.*

9. Taking your craft knife or scissors, cut small thin horizontal slits for the straps into your second leaf. Because of how delicate leaves are you want to be very careful to create holes a distance from the edge of the leaf. If these slits rip too much, you may need to start this again. Kids may need a grown-up to help with this step.

- 10.** Following steps 2 and 3, create two reeds to form the straps for your bag. You then need to gently feed the reeds through the slits you just made.
- 11.** Now comes the really tricky part. Tie the ends of each strap together in a secure double knot. If the reeds you created were too short, then you may find the straps don't have much of a curve, and you might try again with longer reeds. If the reeds you created were overly long, watch out that the straps don't end up being too wide.
- 12.** Now you have the rough shape of a backpack, it's time to form the swing aspect. Bring out your longest single piece of grass, and follow steps 2 and 3 to create a very long reed.
- 13.** Place the long reed across the centre of the straps. Making note of the size of the reed, cut two vertical slits, one for the reed to enter and one to leave, once again being sure to distance these from the edge of the leaf. Feed the reed through the slits.

*You now have a swing for a fairy to sit on!*

- 14.** Finally, bring back your "inner bag". Retracing steps 6 and 7, fold the tip and stem together. After making a small incision you can then tuck the stem into the leaf, securing the bag. Lastly either tie the long reed around the bag, or wrap the ends around, and feed them back through the vertical slits.