

# Creating a complex Binary Bug pattern using a glide reflection!

## 10 steps to creating the glide reflection pattern...

1. Use the small square paper template provided.
  - a. Make sure that the paper is facing the right way up – the diagonals should feel like a small hill and the horizontal centre line should feel like a small valley.
  - b. The horizontal axis is missing but you need to imagine that it is there! (see the dotted line in figure 1).
2. Toss a coin to determine how to colour the binary pattern using probability.
  - a. Heads = white (no colour)
  - b. Tails = black (other colour)
3. Starting on the left side at 1, toss the coin and colour accordingly (remember, we do not include zero in this pattern). In the example in Figure 2, number 1 toss = heads and number 2 toss = tails
4. Repeat the coin toss until you reach eight tosses in total.

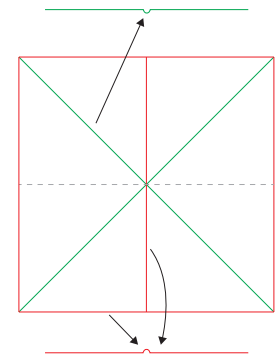


Figure 1

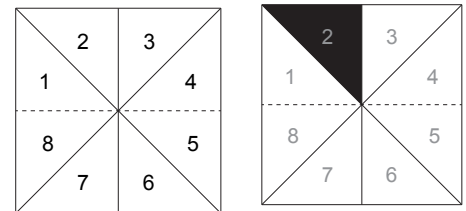


Figure 2

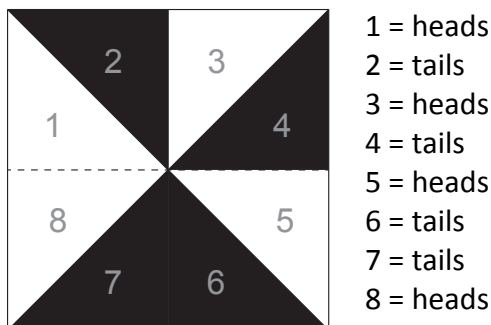


Figure 3 shows the pattern created by randomly tossing a coin eight times

5. To create the “glide reflection” pattern on the surface of the paper template, you need to follow some important steps. Make sure your paper is sitting in the right orientation (see Figure 4). You should see a line of squares across the top of the template. There are vertical lines inside each square. Imagine the horizontal axis or line is there as well.
6. Use the small square template to guide you. Colour the first square according to the probability pattern you created with the coin toss (see Figure 5).

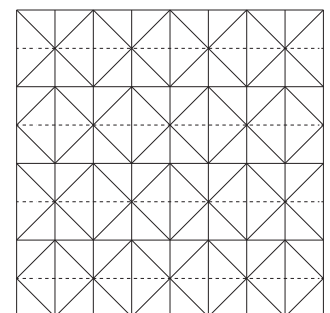


Figure 4 – correct orientation

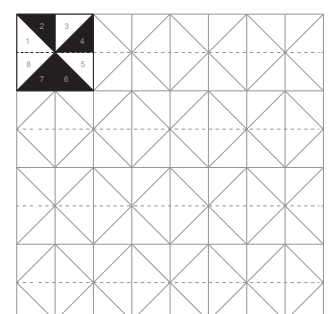


Figure 5 – the first square

The small square probability template will guide the entire process of pattern making according to the “double translation” rules.

7. To create the “glide reflection” pattern, you must locate the place where the original square will translate to the next row on the paper (see Figure 6).
  - a. Reflect the pattern down one row.
  - b. Horizontal translate across by half a square.

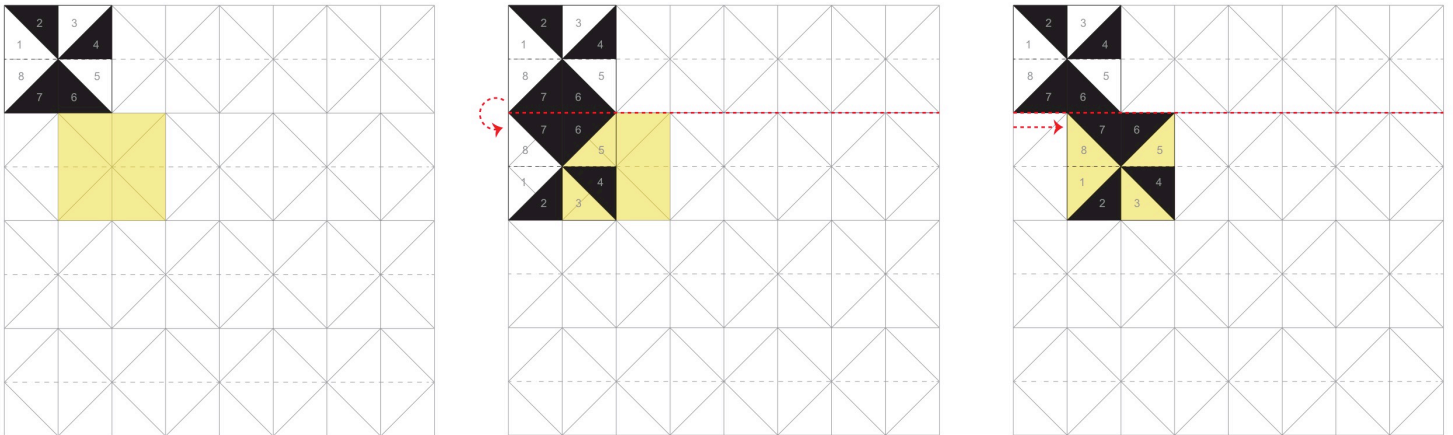


Figure 6 – how to repeat the square using the double translation method.

8. Repeat the first square pattern across the top row (Figure 7).
9. Repeat the second pattern across the second row (Figure 8).  
Look at the numbers at each end of the second row (Figure 9).  
This shows how the pattern repeats at the end of this row using one half each of the original.

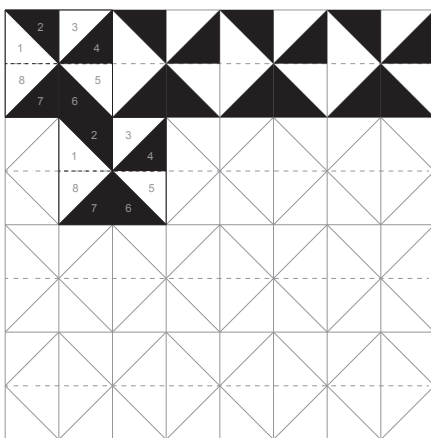


Figure 7 – first row

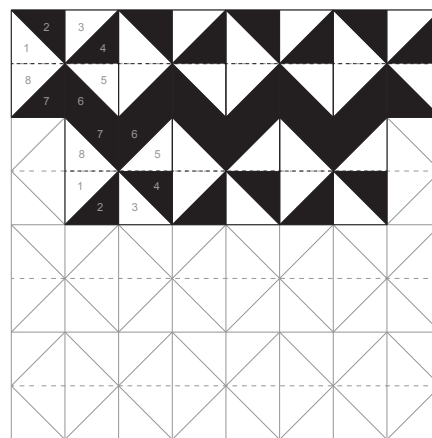


Figure 8 – second row

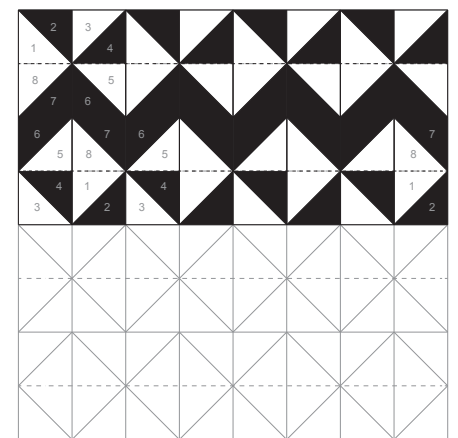


Figure 9 – both ends of second row

10. Repeat the first row in the third row and the second row in the fourth row (Figure 10).

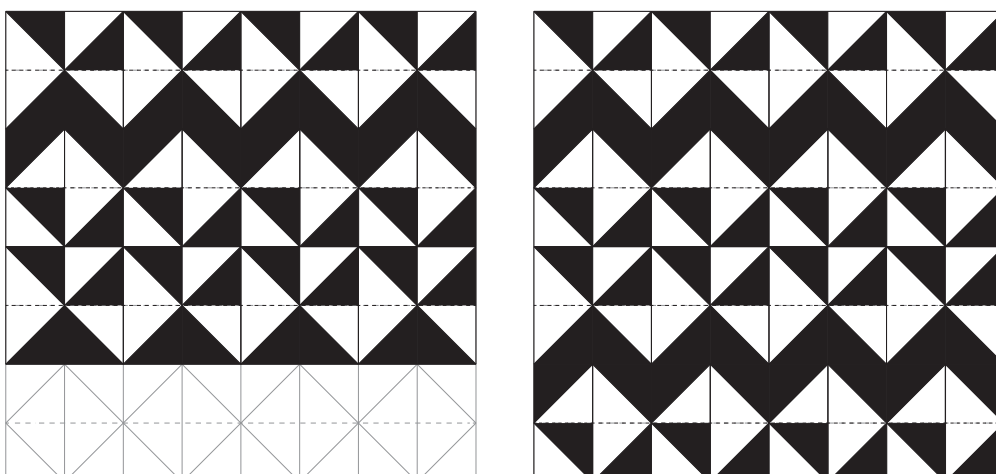


Figure 10 – completing the binary pattern using the glide translation method