

Biology

Genetics and Lego

Teaching genetics through a simulation game

(Netherlands)

Background

Teaching genetics taught through a simulation game. Using everyday material to simulate biological processes. Embodies simulations (ESs) are teaching and learning activities in which students simulate or enact a specific process in their own interpersonal space using tangible materials and or body actions. The simulated process is usually invisible to the naked eye and it usually takes place at a microscopic scale.

You will need:

- ✓ 2 empty non see-through bags / non see-through containers
- ✓ A mix of 24 bricks of different colours but same shape and length.
- ✓ Random mutations: 2 different coloured bricks not already used but the same shape and length

Follow these steps:

1. Use template in image 1.
2. Put 6 sets of 2 bricks together under A and 6 sets of 2 under B as in image 2
3. Ask students to separate each set but leave bricks in their 2 piles as in image 3
4. A has 12 bricks, B has 12 bricks
5. Label one bag A/mother and the other B/father
6. Place mix of 12 bricks into bag A for mother
7. Place mix of 12 bricks into bag B for father
8. Ask student to randomly collect a brick from bag A and then bag B
9. Connect both bricks together, & place in box for zygote
10. Repeat step 8 5 more times from bag A and bag B. Collect a total of 6 sets of bricks.
11. Discuss your results; colour of sets of bricks; the bricks left in the bags and other possibilities.

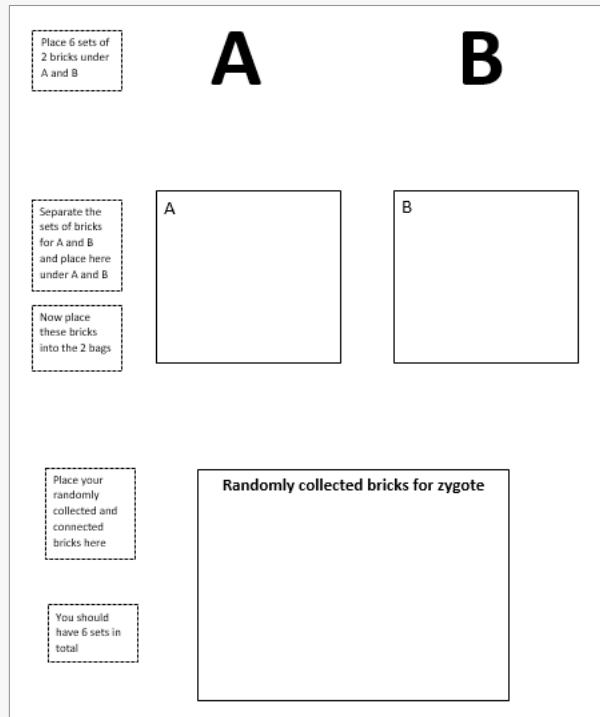


Image 1

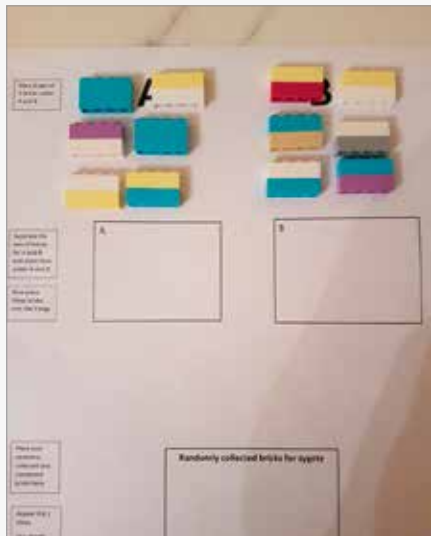


Image 2

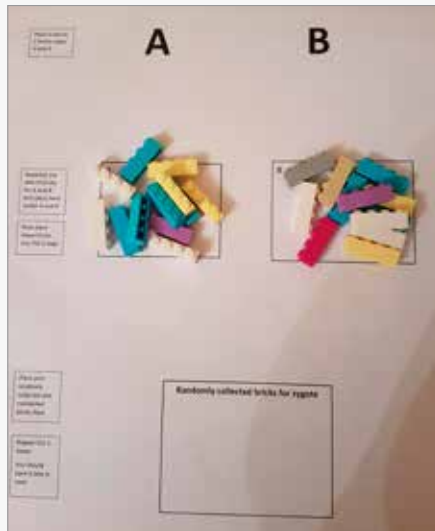


Image 3

Part 2.

12. Separate the zygote bricks and place back into bags
13. Remove a random brick from bag A and remove a brick from bag B
14. Replace 1 brick with a different colour brick representing a random mutation to bag A
15. Replace the other brick with the 2nd brick representing a random mutation to bag B
16. Now repeat steps 8-11
17. What are the results, did any mutations occur?

mutation added to the bags, demonstrates the possibilities of inheriting a genetic disorder.

- ✓ The bags represent the parent's chromosomes.
- ✓ The coloured bricks within the bags are the possible alleles/genes and possibility of a random mutation.
- ✓ The randomly chosen bricks at the end are a representation of the genes passed on to the zygote.

There are 6 sets of bricks / chromosomes for each parent. The parent passes on 6 single chromosomes to form the zygote. The zygote then has their own 6 sets of chromosomes.

What next?

Bricks for the male could be represented as a long and short chromosome, XY, by changing the length of the brick used.

So what happened?

The activity demonstrates Mendel's law of segregation at step 3 and the law of independent assortment at step 8.

Repeating the selection of bricks with a random

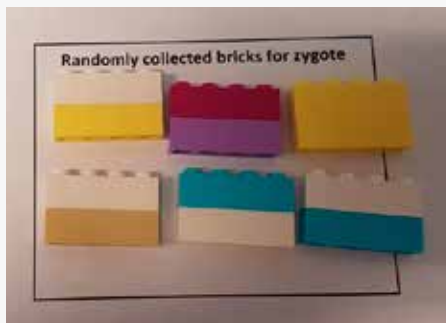


Image 4