



Genetics Society of America

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Sanger sequencing – a hands-on simulation

List of Materials

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Here is a comprehensive list of materials used in the Sanger sequencing simulation:

Each pair of students receives the following:

The following Unifix cubes (<https://www.amazon.com/Didax-Educational-Resources-DD-225-Unifix/dp/B0007PC9CK>);

Each block represents a nucleotide.

- 5 each of two dull colors (representing C and G dNTPs)
- 8 each of two other dull colors (representing A and T dNTPs)
- 2 each of 4 bright colors, with an additional obstruction at the male end (representing C, G, A and T fluorescently-labeled ddNTPs)

Note: these numbers work for the template provided and save money by limiting the number of blocks needed. To provide a more mathematically accurate representation of the simulation, each pair would receive 10 each of all 4 of the dull colors (this would reflect the concentrations simulated by the probabilities of the dye rolls – there are 5x more of the dNTPs than the ddNTPs).

Note: Unifix cubes are plastic stackable cubes designed for teaching math. They work well for this exercise because they are a convenient size, are easy to stick together and take apart, and the 5' and 3' ends of the modeled DNA chain are fairly intuitive to identify. Unifix cubes can be purchased at Amazon.com or at classroom supply stores. Other similar, colored linking units could be used, such as pop beads or Lego blocks. It is useful to add a small obstructing object on the male end of each ddNTP cube to highlight the chain termination feature of the ddNTPs.

- One six-sided die (these can be cheaply purchased at Amazon.com)
- Two copies of a piece of paper with a double stranded DNA template printed on it (Figure 2 in the Background and Guidelines for Instructor, a slide suitable for printing is included in the accompanying Powerpoint presentation)
- Two copies of the Student Handout

Note: Some of the images on the handout are of sequencing chromatographs and are best viewed in color. This means you should either produce color printouts, project the color images on a screen, or have students look at the electronic file on a computer/tablet/phone.