

# REPRODUCTION PROJECT

Agent Sheets: Reproduction Model

Excel: Fill-in tables, average calculations and observation questions.

Our model would be utilized as a virtual lab in a sixth grade classroom. The agent sheets simulation would be set up previously so the kids can just play, observe, and interpret the model. In addition to following the simulation, the kids will also be given an excel worksheet. The worksheet includes tables to record data and questions about the experiment. In addition to learning about the biological component of sexual reproduction, there are many mathematics/statistics components of the lab. For example, the students will calculate the average number of boy versus girl babies based on their own experimental results; the class will then share their results in order to calculate a class average with more accuracy.

## NY STATE COMMON CORE STANDARDS: Grade Level 6

### **MATHEMATICS**

#### Mathematical Practices:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

#### Statistics and Probability:

Develop understanding of statistical variability.

Understand ratio concepts and use ratio reasoning to solve problems:

Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

### **BIOLOGY**

#### General Skills:

3. Use appropriate units for measured or calculated values
4. Recognize and analyze patterns and trends
5. Classify objects according to an established scheme and a student-generated scheme
8. Identify cause-and-effect relationships
9. Use indicators and interpret results

#### Appendix B:

##### Standard 1: Scientific Inquiry

Key Idea 1: The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process. After being shown the disparity between the amount of solid waste that is recycled and the amount that could be recycled, students working in small groups are asked to explain why this disparity exists. They develop a set of possible explanations and select one for intensive study. After their explanation is critiqued by other groups, it is refined and submitted for assessment. The explanation is rated on clarity, plausibility, and appropriateness for intensive study using research methods.

Key Idea 2: Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity. Students develop a research plan for studying the accuracy of their explanation of the disparity between the amount of solid waste that is

recycled and the amount that could be recycled. After their tentative plan is critiqued, they refine it and submit it for assessment. The research proposal is rated on clarity, feasibility, and soundness as a method of studying the explanations accuracy. They carry out the plan, with teacher-suggested modifications. This work is rated by the teacher while it is in progress.

Key Idea 3: The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena. Students carry out their plan, making appropriate observations and measurements. They analyze the data, reach conclusions regarding their explanation of the disparity between the amount of solid waste that is recycled and the amount that could be recycled, and prepare a tentative report which is critiqued by other groups, refined, and submitted for assessment. The report is rated on clarity, quality of presentation of data and analyses, and soundness of conclusions.

7.1c In all environments, organisms interact with one another in many ways. Relationships among organisms may be competitive, harmful, or beneficial. Some species have adapted to be dependent upon each other with the result that neither could survive without the other.

Key Idea 4:

The continuity of life is sustained through reproduction and development.

Introduction: The survival of a species depends on the ability of a living organism to produce offspring. Living things go through a life cycle involving both reproductive and developmental stages. Development follows an orderly sequence of events.

4.1c Methods of sexual reproduction depend upon the species. All methods involve the merging of sex cells to begin the development of a new individual. In many species, including plants and humans, eggs and sperm are produced.

4.1d Fertilization and/or development in organisms may be internal or external.

Explain the role of sperm and egg cells in sexual reproduction.

Major Understandings:

4.2a The male sex cell is the sperm. The female sex cell is the egg. The fertilization of an egg by a sperm results in a fertilized egg.

4.2b In sexual reproduction, sperm and egg each carry one-half of the genetic information for the new individual. Therefore, the fertilized egg contains genetic information from each parent.

4.3b In humans, the fertilized egg grows into tissue which develops into organs and organ systems before birth.

Describe sources of variation in organisms and their structures and relate the variations to survival.

Major Understandings:

3.1a The processes of sexual reproduction and mutation have given rise to a variety of traits within a species.

1.2i The male and female reproductive systems are responsible for producing sex cells necessary for the production of offspring.