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| MSPLesson Plan |
| **NAME: Tanya Mullen** |
| **SUBJECT/GRADE RANGE: 9th Biology** |
| **TOPIC: Fermentation 2 days** |
| **List of appropriate standards that support the lesson.**   * Identify the cellular sites of and follow through the major pathways of anaerobic respiration, compare reactants and products and account for energy (ATP) produced. * Show the chemical reactions of fermentation through laboratory experimentation. * Design and conduct investigations appropriately using essential processes of scientific inquiry. * Manipulate variables in experiments using appropriate procedures. |
| **List of appropriate objectives that guide the lesson.**   * Conduct an experiment to determine if yeast undergo alcoholic fermentation. * Make predictions and develop a plan to answer a research question or problem, design the experiment, test the experiment, collect and analyze data, manipulate variables, redesign and test, interpret results and draw conclusions. |
| **An equipment list in table format, stating the quantity and source for each item.**   |  |  |  | | --- | --- | --- | | Equipment | Quantity | Source | | Test tubes | 3 for each group first lab  6 for each group Yeast Challenge | Carolina | | Test Tube Rack | 1 per group | Carolina | | Graduated Cylinders | 25ml and 10ml for each group | Flinn | | Electronic Scale | 200g and 400g for entire class | Carolina or Flinn | | Incubator | 1 for class | Carolina or Flinn | | Water Bath | 1 for class | Carolina or Flinn | | Thermometers | Two for each group | Carolina or Flinn | | Weigh Boats or wax paper squares | 2 per group | Flinn or Walmart | | Scoops | 2 per group | Carolina or Flinn | | Timer | 1 per group | Student phones | | Ruler | 2 per group | Walmart | | Hot plate | 2 per class | Carolina or Flinn | | 500 ml beaker | 2 per class | Carolina or Flinn | | Sugar 5 lb bag or box of 100 packets per class |  | Walmart | | Yeast | 1 large jar per class | Walmart | |
| **List of safety requirements for your lesson. (when applicable)**   * Monitor hot plates and water baths – use of oven mitts * Broken glass procedures and container * Goggles * Wash hands with soap and water after labs. |

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| **A detailed plan of instruction including activities, timeline, and questions you plan to ask students.**   |  |  |  | | --- | --- | --- | | ***Engagement*** | | | | Timing | Activities | Planned Questions & Expected Answers/Misconceptions | | 10 min | Mystery Cubes – dealing with photosynthesis, cellular respiration and fermentation | What is the rule for the cube? How do you know? What evidence do you have? According to the rule that you have developed, what is your prediction for the unknown side? | | or |  | | Is yeast living or nonliving? How do you know? (check prior knowledge) | Because yeast comes in a dehydrated form students think it is nonliving. Can bring in bread making process. What causes bread to rise? | | Show visuals – review for characteristics of living things |  | | ***Exploration*** | | | |  | | | | Timing | Activities | Planned Questions & Expected Answers/Misconceptions | | 35-40 min. | Do yeast undergo alcoholic fermentation? Introductory lab – group of two to four students | How could we determine that? What questions do you have? What do you need to know? What materials would you need? How would you execute? What is the process? How will you know? | | ***Explanation*** | | | |  | | | | Timing | Activities | Planned Questions & Expected Answers/Misconceptions | |  | During introductory lab: Have students develop the equation for fermentation. Students develop the lab with input here and there from me when needed. . Have students predict which solution will produce the most CO2 production | What are our reactants? Products?  What are the bubbles produced? If yeast is heated what will happen? | | ***Elaboration*** | | | |  | | | | Timing | Activities | Planned Questions & Expected Answers/Misconceptions | |  | Challenge:  Jim Baker wants to make his bread as fluffy as possible without spending too much time waiting for the dough to rise. He has asked our class to find the amount of sucrose and temperature that produces the most CO2 in 10 minutes. He does not want his bread to be too sweet, so he doesn't want to use any more sucrose than needed for maximum CO2 production. | Some students will add way too much sugar and kill the reaction – be sure to ask what happened and why – relating it to homeostasis (hyper, hypo and isotonic solutions) | | ***Evaluation*** | | | | See below | | | |
| **Assessments. A copy (or description) of how you will assess whether the students have achieved your objectives along with a key showing how you will evaluate responses.**  Effective questioning throughout.  Student lab report, with all work attached, including “post-its” or scratch paper from brainstorming.  Lab Report Rubric |
| **Any visual aids and handouts that you will use.** |