UTI Instructions: Respiration in Sammy’s Cells

Introduction:
This activity uses the example of exercise and asks students to think about the products and consequences of each of the three main processes in cellular respiration. Students should work in groups of no more than four each, and preferably with students they have not yet worked with this semester. Each team works on all of the questions and presents only one of the graphs it generates. Do not tell which team is presenting which graph until the end-of-class discussion begins.

Procedure:

Begin with what they know:
Begin class by providing the students an opportunity to bring to their working mental palette what they can remember about cellular respiration. This works best when students work alone quietly. Ask students to put everything away but a piece of paper and a pen. Ask students to think about what they remember about the process of cellular respiration. Pause for 5 full seconds. Remind them that there are three major parts to cellular respiration (and one minor half-step). Have students write down the steps they can remember. Wait at least one minute (or longer if students are still writing). Ask students to think about the starting material in cellular respiration. Have them write down the starting and ending material(s) used/produced during respiration. 3-5 min.

Work with what they know:
Have students form teams of four and compare what they have written. Allow 1-2 min. Collect student attention and review the three main steps, reactants, and products of cellular respiration. Distribute the activity, pens, and overheads and remind students that they will present their work at the end of class. As students work, roam the room helping students work through any questions they have without directly telling them answers. Eye the clock and remind students how many minutes remain for them to complete their graphs.

The above two exercises will take less than 10 minutes, but provide some of the MOST VALUABLE learning time for your students. Be sure not to rush, and allow student the opportunity to think things through on their own. Encourage students to volunteer what they know to their team.

Present what they know:
When 15 minutes of class remain, gather student attention and distribute the graph comparison chart. Have student teams present a graph and an explanation for each scenario. Graphs are required for questions 1, 3, 4, 5, and 8. When a team presents its graph, the other teams should compare their graph to the one presented. Students should explain the graph in words and answer any questions posed by other members of the class. Although the primary goal of this activity is for students to understand the process of cellular respiration, it is also important that they recognize alternative correct depictions of the rate of cellular events. For example, as Sammy exercises, her heart rate will increase, and then decrease during the cool down exercises. Below are three graphs that depict an increase followed by a decrease:
Your role is to help students determine if their graphs are **EQUIVALENT IN MEANING**. Each of these graphs could depict what actually happens to Sammy’s heart rate: it starts out normal, increases, and then decreases. Reward students for representing the big idea. Once you have discussed/presented each graph, allow a few minutes for teams to discuss the graphs presented. Students submit this comparison chart before leaving class.