**Activity:** Assessment of Exercise Metabolism

**Introduction**
To assess exercise metabolism in an exercise physiology lab, you would use a metabolic cart. The athlete runs on a treadmill or cycles, wearing a facemask or mouthpiece with nose clips, with tubes connecting them to the cart. The metabolic cart is calibrated with O$_2$ and CO$_2$ gasses, and will tell you the amount of O$_2$ consumed and CO$_2$ produced by the athlete. Since O$_2$ is used for aerobic metabolism, and CO$_2$ is the byproduct, measurement of these gasses is used to estimate the amount of carbohydrate and fat used for energy and various exercise intensities.

The **Respiratory Exchange Ratio (RER)** is the ratio of carbon dioxide produced to oxygen consumed. Based on their chemical structures, fat and carbohydrate differ in the amount of O$_2$ used and CO$_2$ produced during oxidation. Therefore, calculating RER from the metabolic cart data gives an indication of how much fat and carbohydrate is being used for energy at a given intensity.

Since you do not have a metabolic cart to conduct an experiment, in this activity you will estimate the changes you expect to see in RER at different intensities and with different pre-exercise feeding.

**Part 1: RER Values**
Based on what you learned in lecture, fill in the following table:

<table>
<thead>
<tr>
<th>R</th>
<th>% Fat</th>
<th>% CHO</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Part 2: Estimate RER in Different Conditions

On the graph below, draw a line to show how you think RER will change with increasing exercise intensity in the following conditions. You will use different color lines, drawing all three on the same graph:

**RED:** the athlete begins the test in the morning after an overnight fast  
**BLUE:** the athlete has eaten scrambled eggs and coffee for breakfast two hours before the test  
**GREEN:** the athlete has eaten pancakes, strawberries and orange juice two hours before the test

NOTE: while you’re being asked to draw changes in RER as intensity increases, this is a learning activity. When measuring RER in the lab, you would get the value from the metabolic cart at a steady state of exercise.

Learning activities are provided by GSSI, a division of PepsiCo, Inc. Any opinions or scientific interpretations expressed by instructors or students do not necessarily reflect the position of policy of PepsiCo, Inc.