

Online Activity Worksheet 7.6

Some cells can harvest energy without oxygen.

Explore a pinball analogy for fermentation.

PAGE 1 OBJECTIVE: to discover how many ATP molecules are made in fermentation

Sometimes cells do not have enough oxygen for cellular respiration to make all the ATP they need. In that case, many cells add a second process, fermentation, to make more ATP. Play fermentation pinball to see how much ATP fermentation makes.

Click the arrow **Lactic Acid Fermentation** in the cytoplasm of the cell to begin the activity.

PAGE 2 OBJECTIVE: to discover if ATPs are made in fermentation and if so, how many

How to Play: Scroll down to reveal the entire pinball picture. Then move the slider to the left to "Low O₂ level." Carefully follow the directions within the game.

Now answer the following questions in the spaces provided.

1. In what part of the cell does fermentation take place?

2. What is the final net gain of ATP molecules when a molecule of glucose undergoes glycolysis and fermentation?

3. How does the number of ATP molecules made in glycolysis and fermentation compare to the number made in cellular respiration?

4. Hypothesize what is happening in your leg muscles when you gasp for oxygen while running down the soccer field.

Closer Look: Fermentation in Muscle and Yeast

Some cells can harvest energy without oxygen.

OBJECTIVE: to examine how both muscle cells and yeast cells benefit from fermentation

As you have seen, fermentation does produce a small number of ATP molecules, providing a cell with an energy source when cellular respiration isn't enough. Both muscle cells and yeast cells benefit from fermentation. Observe how this happens in the animation.

Click **start** to begin, then follow directions within the animation. Click the **muscle cell** or **yeast cell** button, then click **reset** and click the other button.

Now answer the following question in the space provided.

1. Compare the by-products of muscle and yeast cell fermentation. How are they different?
