

Cellular Respiration Webquest

WebQuest Description: This webquest will allow the user to research and understand the underlying chemical processes by which cells get energy by the production of ATP in the mitochondria.

Grade Level: 9-12

Curriculum: Science

Keywords: cellular respiration, respiration, glycolysis, krebs cycle, citric acid cycle, electron transport chain, chemiosmosis, atp synthase,

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WebQuest URL: <http://zunal.com/webquest.php?w=19049>

Introduction

DID YOU EVER THINK ABOUT WHY YOU NEED TO EAT? DID YOU EVER WONDER WHY YOU GET TIRED? DID YOU EVER WANT TO KNOW HOW YOUR BODY REALLY WORKS? You are about to embark upon a dark and dangerous journey into the inner workings of the very cells that make up YOU. Its not always a pretty sight; there are slimy, globular parasites that invaded your cells billions of years ago and have never left! Inside them are miniature, tireless machines that never cease working to produce the most phenomenal power ever seen on planet earth! And by miniature, I mean MOLECULAR. Oh and by the way, you are about to experience one of the most complex areas of your biological education. (Ask any college bio major about the Krebs cycle if you want to see a grown-up cry!) PREPARE to be AMAZED and CHALLENGED as you encounter CELLULAR RESPIRATION!!

Tasks

You have been assigned a dangerous mission. You, yes you, will discover the basis of one of the most fundamental mysteries of life, how the cell makes its energy. It is a long, complex process, fraught with intellectual dangers. It has been known to drive college freshman MAD! Eventually YOU will discover the true secret of life, CELLULAR RESPIRATION!! At the end of your mission, if you survive, you and your lab group will be assigned the task of explaining a portion of the cellular respiration process to the class in the form of a poster that we will display in the classroom as a constant reminder of your brave and successful accomplishment. Good Luck and Let's GO!

Process

1. Overview of Cell Respiration: Go to the following site and read the entire page.
<http://staff.jccc.net/PDECELL/cellresp/respintro.html>
Answer questions on Part I of the handout.
2. Glycolysis : Ancient and Primitive
Learn the ancient mysteries of Glycolysis and answer questions on Part II.
http://www.google.com/imgres?imgurl=http://www.accessexcellence.org/RC/VL/GG/ecb/ecb_images/13_03_glycolysis.jpg&imgrefurl=http://www.accessexcellence.org/AB/GG/ecb/outline_glycolysis.php&usq=__QczDETGH-MO_dMIBKmgVAbh3tIs=&h=580&w=780&sz=83&hl=en&start=8&zoom=1&um=1&itbs=1&tbid=av_oZPJXJsZXCm:&tbnh=106&tbnw=142&prev=/images%3Fq%3Dglycolysis%26um%3D1%26hl%3Den%26sa%3DN%26tbs%3Disch:1
Watch this animation for critical details of the process. <http://www.science.smith.edu/departments/Biology/Bio231/glycolysis.html>
3. The Krebs Cycle (or the citric acid cycle): The Mighty Mitochondria
Learn the wonders of the Krebs Cycle and answer questions on Part III.
http://library.thinkquest.org/C004535/aerobic_respiration.html
And if you really love chemistry, go to <http://www.johnkyrk.com/krebs.html>
4. The Electron Transport Chain (ETC): Molecular Machines
Learn about the amazing machines of the ETC and answer questions, Part III
<http://www.elmhurst.edu/~chm/vchembook/596electransport.html>
Now watch the machines at work in a video:
<http://vcell.ndsu.nodak.edu/animations/etc/movie.htm>

Evaluation

Category and Score	Beginning 1	Developing 2	Very Good 3	Exemplary 4	Score
behavior and attitude during computer research phase	followed directions minimally majority of time spent not on task use of non-biology related websites	followed directions majority of time spent on task minimally interested in work	followed directions asked appropriate questions 100% of time on task Moderate interest in work	followed directions and investigated alternate links asked insightful questions 100% of time on task Interested in work	%20
Worksheet Completion	minimal work answers left blank illegible or unclear	most questions answered accurately	all questions answered accurately with information gained from assigned sites.	all questions answered accurately with information gained during process from sites and other links Answers show detailed knowledge of topic	%30
Poster Design	Poster shows inaccuracies Poster missing major concepts Minimal effort applied to poster artistry	Poster information is accurate Poster missing only minor concepts Poster is generally visually appealing	Poster information is accurate No major or minor concepts omitted Poster is original and visually appealing	Poster shows information in unusual detail No concepts omitted; exceptional understanding demonstrated Poster is original and appealing	%30
Class Presentation	Presenters uninformed and not engaged time spent not on task	Presenters informed and engaging most time spent on task minimal enthusiasm displayed	Presenters very informed and engaging 100% of time on task enthusiastic and well presented information	Presenters exceptionally informed and engaging 100% of time on task enthusiastic and well presented information which enriched class experience	%20
				Total Score	%100

Conclusion

Now you have completed your mission. You have learned of the super-secret workings of the inner cell, its means of creating energy (in the form of ATP) and its detailed workings. Do you now know why you have to eat? Are your cells tired? Why might that be? Isn't the process of cellular function just a little bit less mysterious? Now that you have accomplished this formidable task, don't forget to review the PowerPoint presentation found on my website, your notes and study for the upcoming test! And check out some of the great animations on line by using Google and the phrases: glycolysis animations; Krebs cycle animation; electron transport chain animations

Teacher Page

This site was designed for AP Biology class at Sayville HS, NY. This site covers details of cellular respiration not appropriate to high school level biology, although some honors level students or those with special interest in cellular biochemistry may find it appropriate. I begin the unit with a lecture overview on cellular respiration, with reminders of the overall formula: $C_6H_{12}O_6$ (glucose) + $O_2 \Rightarrow CO_2 + H_2O + \text{energy}$. I then allow them to participate in the webquest where their knowledge will be enhanced in a non-threatening, non-boring (I hope) way. NYS Learning Standards that apply to this lesson are: MST 1C Scientific Inquiry Coordinate explanations at different levels of scale, points of focus, and degrees of complexity and specificity and recognize the need for such alternative representations of the natural world Refine their research ideas through library investigations, including electronic information retrieval and reviews of the literature, and through peer feedback obtained from review and discussion; MST 2C Technology Access, select, collate, and analyze information obtained from a wide range of sources such as research data bases, foundations, organizations, national libraries, and electronic communication networks, including the Internet; MST 4C The Living Environment Describe and explain the structures and functions of the human body at different organizational levels (e.g., systems, tissues, cells, organelles) Explain how a one-celled organism is able to function despite lacking the levels of organization present in more complex organisms; Explain the basic biochemical processes in living organisms and

their importance in maintaining dynamic equilibrium

Standards

Credits

Other