# Discovering Genetic Disorders

by
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**WebQuest Description**: A Scientific Investigation In To Genetic Disorders for High School Biology Students
**Grade Level**: 9-12
**Curriculum**: Life Skills / Careers, Science
**Keywords**: Genetic Disorder, Geneticist, Genetic Researcher, Genetic Counselor, Patterns of Inheritance
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## Introduction

What is a Genetic Disorder? You are part of a genetic counseling team that helps couples with a family history of genetic disorders assess their risk of having a child that would be affected.  Using the family history and the available websites, your team will research one of the couples and the genetic disorder associated with them.  You will then provide the couple with the necessary information and resources involving their chance of having a future child with a genetic disease. 

## Tasks

With your extensive knowledge in the field of genetic disorders, you will help assess the risk of one of three couples.  You and your partners will view the family history to determine the possible afflicting disorder. Then using the available websites, you will compile facts and any relevant information that will aid your particular couple.  This will include the percent possibility, if any, of their having a child with a life changing genetic disorder.Your team includes:Geneticist : a doctor qualified to perform tests that analyze genetic traitsGenetic Researcher: scientist whose expertise is the study of genes and hereditGenetic Counselor: a professional trained to help individuals who undergo genetic testing  (many times to asses risk of passing a life-changing trait on to a child), help couples and individuals cope with results, and helps adjust them to their new lifestyle. When your teams research is complete, you will create a concise presentation to share with your particular couple that will accurately and effectively assess their risk.  You will incorporate punnett squares using known traits to demonstrate the possibility of having both and affected or non affected child.  You will also complete your own short personal reflection that involves how an individual's life is affected when they have the particular genetic disorder you researched.

## Process

1. Your team will begin by choosing one of the following couplesA. Cinderella and Prince CharmingB. Aladdin and JasmineC. Eric and Ariel2. After choosing your couple, your team, especially the geneticist, will view the family history for each member of the couple (see below - attachment #1 ) to identify the genetic disorder present.  Then using the following links your group will research that particular disorder to become experts on the topic. *You must use more than 2 of the links during your research and record what information you took from what site.*  Following your research, you will determine if each potential parent is 1) a carrier of the disease, 2) has the genetic disorder, or 3) has no possibility of passing on a harmful gene.  To guide your progress your group will fill in a brief worksheet (attachment #2 below) to record the genetic details involving each parent from their respective family trees. Research Links (especially focus on how it is inheritered and the symptoms and effects of the disease):http://www.genome.gov/page.cfm?pageID=10001204http://learn.genetics.utah.edu/units/disorders/whataregd/http://www.ornl.gov/sci/techresources/Human_Genome/medicine/assist.shtmlhttp://www.kidshealth.org/teen/your_body/health_basics/genes_genetic_disorders.htmlhttp://www.som.tulane.edu/departments/peds_respcare/genetic.htmhttp://ghr.nlm.nih.gov/ghr/conditionsByCategory/show/bloodlymphaticsystem3. Using this information from the geneticist and subsequent research, the genetic researcher will then complete their task.  Using the known genes of the parents from the family trees and the inheritance pattern of the disorder, you will complete the necessary punnett square cross to determine the possibility, if any, the couple has of having an affected child.  See attachment #3 below for punnett square.4.  Using this punnett square, the genetic counselor will determine the percent possibility, if any, of the couple having an affected child.  They will compile important information for the couple including: A) symptoms of the disorder, B) tests that can be done to diagnose the disorder, C) possible treatments, if any, that are available.  Record what sites you obtained your information from and remember you must use more than 2 resources throughout the webquest to receive the maximum grade!!!!5. After each of the above tasks are completed your group will then create a short presentation that you would present to the couple. This presentation would include: 1. how they used the family trees to determine each potential parents genes2. the inheritance pattern of the disorder in their

family3.  the cross they did to determine all genetic make-up possibilities for their future children4. the calculated percent possibility of having an affected child5. The symptoms to watch for, available tests to diagnose the child, and treatments that are available if they did indeed have a child that did inherit the genetic disorder*The rubric for this presentation is in the evaluation section of the webquest* 

## Evaluation

| Category and Score | 1 | 2 | 3 | 4 | Score |
|---|---|---|---|---|---|
| Effective Completion of Online Activities | Failed to complete all online tasks and failed to use more than 2 resources during research. | Completed all online tasks, but did so with minimal effort and failed to use more than 2 resources during research. | Completed all online tasks with high quality work, but failed to use more than two resources during research. | Completed all online tasks with the highest quality work using multiple (more than 2)resources for research. | 25% |
| Presentation | Presentation lacks organization, quality, and fails to include all of the requirements. | Presentation lacks some organization and quality. All of the requirements are met. | Presentation is well organized and of good quality work. It includes all the necessary requirements. | Presentation is well organized and of the highest quality work. It includes all the necessary requirements. | 25% |
| Group Collaboration | Does not complete assigned tasks or does so in a manner that needs to be redone by another teammate. Is rarely prepared and on task. Rarely listens to, shares with, and supports the group effort. | Completes assigned tasks, but they may need to be reviewed/ redone by group mates. Occasionally prepared and on task. Often tries, but does not effectively listen, share, and support group mates. | Completes assigned tasks with high quality work. Is prepared and on task on most occasions. Usually listens to, shares with, and supports the efforts of group mates. | Completes assigned tasks with the highest quality of work. Is always prepared and on task. Almost always listens to, shares with, and supports the efforts of group mates. | 25% |
| Personal Reflection | Provides 1 or less examples and they lack explanation. | Provides 2-3 examples of effects on lifestyle, but lacks sufficient explanation or fails to provide an example for each category | Provides 4-5 examples of effects on lifestyle, but lacks sufficient explanation or fails to provide an example for each category. | Provides 5 good examples (at least one for each category) of how the disorder would affect their lives. | 25% |
| | | | | Total Score | 100% |

## Conclusion

*Congratulations you have successfully provided these potential parents with invaluable information for their future*Now you must write a personal reflection of approximately two pages (YES each person in the group must do one) of this activity.  Your reflection will involve how the life of an individual is affected if they have the genetic disorder you researched.  You should provide at least 5 examples of how their lives would differ from those unaffected by the disease.  This is too include how the symptoms or side effects of the disease would affect the individuals daily life physically, mentally, and emotionally (if applicable), providing at least one example of each. One example of a physical side affect would be a person with developed Huntingtons, due to affected muscle movement, would be unable to drive a car.  Following this example you would then conclude how this would affect their lifestyle.The rubric for this activity is found in the evaluation section of the webquest.

## Teacher Page

Following the completion of this webquest students should have a thorough understanding of:                    1) what genetic disorders are 2) the causes of genetic disorders 3) the difference between a carrier and those affected by the disorder 4) how to calculate the probability of passing a genetic disorder from one generation to the next 5) the effects a disorder has the lifestyles of those that it affects directly and indirectly 6) how to identify traits that are passed from parent to offspringOther student gains:1) technology / computer skills2) further development of research skills using the internet3) use of higher level thinking skills (connecting their research to the affects on the lives of those affected)4) development of cooperative/collaborative skills during group workTIME FRAME FOR WEBQUEST:  The webquest will take approximately 4 days total to complete.  It will take about 2 days to do the research, worksheet, and punnett square.  Then 1 day should be given for each team to put together their presentation and the final day each group will present their final product to the class.  The reflection is to be done outside of class. Core Learning Goals (Maryland) met by webquest: Goal 1: Skills and Processes Expectation 1.4: The student will demonstrate that data analysis is a vital aspect ofthe process of scientific inquiry and communication.Indicator  1.4.1: The student will organize data appropriately using techniques suchas tables, graphs, and webs (for graphs: axes labeled with appropriatequantities, appropriate units on axes, axes labeled with appropriateintervals, independent and dependent variables on correct axes,appropriate title).Indicator  1.4.2: The student will analyze data to make predictions, decisions, ordraw conclusions.Indicator  1.4.3: The student will use experimental data from various investigators tovalidate results. Expectation 1.5: The student will use appropriate methods for communicating in writingand orally the processes and results of scientific investigation.Indicator  1.5.3: The student will use

computers and/or graphing calculators toproduce the visual materials (tables, graphs, and spreadsheets) that willbe used for communicating results.(NTB)Expectation 1.7: The student will show that connections exist both within the variousfields of science and among science and other disciplines includingmathematics, social studies, language arts, fine arts, and technology.Indicator 1.7.1: The student will apply the skills, processes, and concepts ofbiology, chemistry, physics, or earth science to societal issues.Indicator  1.7.2: The student will identify and evaluate the impact of scientificideas and/or advancements in technology on society.Indicator 1.7.5: The student will investigate career possibilities in the variousareas of science.(NTB)Goal 3: Concepts of Biology: The student will demonstrate the ability to use scientific skills and processes (Core Learning Goal 1) and major biological concepts to explain the uniqueness and interdependence of living organisms, their interactions with theenvironment, and the continuation of life on earth.*SPECIFICALLY* Expectation 3.3 The student will analyze how traits are inherited and passed on from one generation to another.  It specifically addresses indicator 3.3.2 The student will illustrate and explain how expressed traits are passed from parent to offspring.http://www.mdk12.org/instruction/clg/biology/goal3.htmlMaryland Technology Standards Met:I. Information Access, Evaluation, Processing, and Application Access, evaluate, and process information efficiently and effectively.Indicators:1.Identify, locate, retrieve, and differentiate among a variety of electronic sources of information using technology.2. Evaluate information critically and competently for a specific purpose. 3. Organize, categorize, and store information for efficient retrieval.4. Apply information accurately in order to solve a problem or answer a question.II.  Communication A. Use technology effectively and appropriately to interact electronically.B. Use technology to communicate information in a variety of formats.Indicators:1. Use telecommunications to collaborate with peers, parents, colleagues, administrators or experts in the field. 2. Select appropriate technologies for a particular communication goal.3. Use productivity tools to publish information.4. Use Multiple digital sources to communicate information on-line.V. Integrating Technology into the Curriculum and Instruction Design, implement and assess learning experiences that incorporate use of technology in the curriculum-related instructional activity to support understanding, inquiry, problem-solving, communication or collaboration.Indicators:1. Assess students’ learning/ instructional needs to identify the appropriate technology for instruction. 2. Evaluate technology materials and media to determine their most appropriate instructional use.3. Select and apply research-based practices for integrating technology into instruction.4. Use appropriate instructional strategies for integrating technology into instruction.5. Select and use appropriate technology to support content-specific student learning outcomes.6. Develop an appropriate assessment for measuring student outcomes through the use of technology.7. Manage a technology-enhanced environment to maximize student learning.VI. Assistive Technologies Understand human, equity, and developmental issues surrounding the use of assistive technology to enhance student learning performance and apply that understanding to practice.Indicators:1. Identify and analyze assistive technology resources that accommodate individual student learning needs. 2. Apply assistive technology to the instructional process and evaluate its impact on learners with diverse backgrounds, characteristics, and abilities.http://tiger.towson.edu/users/mlazus1/istc301/teachingtechnologystandards.htm *I would higly recommend running through the webquest yourself prior to using it with a class*  That way you can ensure it relates to your curriculum and that you will be able to assist students with any problems while they are completing the webquest.Research Resources:http://www.genome.gov/page.cfm?pageID=10001204http://www.ornl.gov/sci/techresources/Human_Genome/medicine/assist.shtmlhttp://www.kidshealth.org/teen/your_body/health_basics/genes_genetic_disorders.htmlhttp://www.som.tulane.edu/departments/peds_respcare/genetic.htmhttp://ghr.nlm.nih.gov/ghr/conditionsByCategory/show/bloodlymphaticsystemPicture Resources:http://images.google.com/imgres?imgurl=http://ocw.tufts.edu/data/graphics/genetics.jpg&imgrefurl=http://ocw.tufts.edu/Course/20&h=315&w=419&sz=36&hl=en&start=2&tbnid=ue2CQ4yV3WNpWM:&tbnh=94&tbnw=125&prev=/images%3Fq%3Dgenetics%26gbv%3D2%26svnum%3D10%26hl%3Den
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http://images.google.com/imgres?imgurl=http://www.cerezyme.com/healthcare/disease/cz_hc_disease-genetics.gif&imgrefurl=http://www.cerezyme.com/healthcare/disease/cz_hc_disease-genetics.asp&h=493&w=374&sz=28&hl=en&start=12&tbnid=Osfi8dnlDuUMNM:&tbnh=130&tbnw=99&prev=/images%3Fq%3Dgenetics%26gbv%3D2%26svnum%3D10%26hl%3Denhttp://ted.coe.wayne.edu/sse/wq/Wichers/ImageFiles/conclusion.gifhttp://www.teach-nology.com/worksheets/early_childhood/color/detective.gifhttp://yhspatriot.net/~lpeacock/grades.jpg      

## Reviews

**Reviewed by**: Jessica Foister
**Rate**: 5
**Review**: This website is great!
**Reviewed On**: 2008-03-24 09:46:23
**Reviewed by**: Peter Poynter
**Rate**: 5
**Review**: Its all i ever really wanted in a website its freakin awesome keep it coming.
**Reviewed On**: 2008-03-24 09:50:46
**Reviewed by**: megan mason
**Rate**: 5
**Review**: this website is GREAT!!!! it has all the information you will need
**Reviewed On**: 2008-03-24 09:57:17

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