The Electromagnetic Superheroes

WebQuest Description: In this WebQuest you will learn about the properties of every Electromagnetic Wave in the Electromagnetic Spectrum. This is done by helping the Electromagnetic Superheroes.

Grade Level: 9-12
Curriculum: Science
Keywords: Electromagnetic Spectrum, Gamma Rays, X-Rays, Ultraviolet Rays, Visible Light, Infra-Red, Microwaves, Radiowaves.
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Introduction

Have you ever wondered how different your life would be if you were able to transmit electromagnetic waves? This actually happened in this day and age where seven humans have been born with such powers. However, these superheroes are facing a problem; they don't know about the sources and causes of their powers. It is your mission as their manager to detect their powers and guide them about the characteristics of electromagnetic waves.

Tasks

Once you meet the superheroes you have to:

1. Search into educational websites and fill in the worksheet attached which each superhero has to carry as guidelines with him each day. (Tasks 1 to 7)
2. Search into the educational websites and prepare a Power Point Presentation on the common properties of the electromagnetic spectrum. (Task 8)
3. Take an interactive online quiz and game from the given websites, to gain an insight of how much you have learnt. (Task 9)
4. Identify yourself with your favourite superhero and create a role play; together with your schoolmates creating situations, emphasising the properties of your power and how these can be detected by humans. (Task 10)

Process

The following websites should be used in order to work out the tasks 1 to 8:


The information should be used to fill out the attached worksheet; Guide to Heroes, the Electromagnetic Spectrum.

One fine day Mr. G went to hospital to visit his grandmother suffering from cancer. He stared sadly at his grandmother and the other cancer patients found in her room. After a few days he received a phone call saying that all the patients suffering from cancer had recovered. During the evening Mr. G heard a noise and went downstairs to check what the noise was. Suddenly he found a man rummaging through his possessions, he stared angrily at the burglar whom suddenly fainted. Mr. G was bewildered and phoned immediately the ambulance. After some medical tests it resulted that the burglar was suffering from severe cancer. The day after he went to visit the burglar because for some reason he felt a sense of guilt, and healed him.

You are to find out more about gamma rays and their effects on humanity so that you can help Mr. G control his powers in order to become a superhero. Mr. X went out with his friends to a disco, when suddenly his girlfriend's stiletto was broken and she fell down on the dance floor. She couldn't get up because of her pain. Mr. X looked at her ankle and immediately deduced that it was broken. Then he turned to his friends to help him get her out of the disco and to his surprise everyone was seen as a skeleton. He started shouting and screaming and these 'skeletons' took him to hospital.

Your mission is to find more about X-Rays and their effects on humanity so that you can help Mr. X control his powers in order to become a superhero. Mr. X went out with his friends to a disco, when suddenly his girlfriend's stiletto was broken and she fell down on the dance floor. She couldn't get up because of her pain. Mr. X looked at her ankle and immediately deduced that it was broken. Then he turned to his friends to help him get her out of the disco and to his surprise everyone was seen as a skeleton. He started shouting and screaming and these 'skeletons' took him to hospital.

Your mission is to find more about UV rays and their effects on humanity so that you can help Ms. UV control her powers in order to become a superhero.

Ms. UV felt guilty and confused and offered to accompany the blonde model to hospital. Suddenly the blonde model started to get tanned and became also a brunette with red patches all over. Then Ms. UV felt guilty and confused and offered to accompany the blonde model to hospital.

The following websites should be used in order to work out the tasks 1 to 8:


The information should be used to fill out the attached worksheet; Guide to Heroes, the Electromagnetic Spectrum.
about infra red rays and their effects on humanity so that you can help Ms. IR control his powers in order to become a superhero.

Task 6 - Mr. M (Microwaves)
Mr. M and his colleagues went out for dinner and ordered chicken breast in mushroom sauce. Although the restaurant was very expensive, the waiter brought a chicken which seemed to be raw. Mr. M looked angrily at his plate. All of a sudden the chicken’s colour became golden brown and steam started to appear. At the end of the dinner, his colleagues started to complain of stomach aches and they felt very sick. Unlike the others, Mr. M was quite satisfied with his meal, but had to accompany his colleagues to hospital since they were suffering from food poisoning. Your mission is to find more about Microwaves and their effects on humanity so that you can help Mr. M control his powers in order to become a superhero.

Task 7 - Mr. R (Radio Waves)
Mr. R was mountain climbing together with his friend. Suddenly his friend found a lose rock under his foot and fell a few metres down. Unfortunately his friend was unconscious and so Mr R tried to use his phone in order to get help. However he knew that there will be no signal since they were at a high altitude. He looked desperately at his phone and suddenly he established connection. The helicopter rescued them and they were both taken to hospital. Your mission is to find more about radio waves and their effects on humanity so that you can help Mr. R control his powers in order to become a superhero.

Task 8
Now that all the superheroes are in the same hospital you can hold a meeting in which you will give them a PowerPoint presentation of not more than 5 slides on the common properties of their superpowers i.e. on the electromagnetic spectrum. Let us test how much you have learned on the electromagnetic waves abilities of our superheroes by entering the following website and taking the quiz. After completing the quiz write down your answers on the worksheet provided titled ONLINE QUIZ AND GAME. Now, enter the following website and play the game which tests your expertise about the subject. Hope all of you do well, because the superheroes’ future is in your hands.

http://www.purposegames.com/game/electromagnetic-spectrum-quiz
When ready from the game, Print Screen the image of your results and paste it in the space provided on the worksheet titled ONLINE QUIZ AND GAME.

Task 10
Get into groups of 7, and decide which superhero each member is going to be. Now prepare a role play which will present the superhero’s role in the story, and summarise in their own words, including all the necessary information. The percentage result of the quiz and game is not pasted on the worksheet provided titled ONLINE QUIZ AND GAME.

Your mission is to find more about infra red rays and their effects on humanity so that you can help Mr. M control his powers in order to become a superhero.

Worksheet: Guide to Superheroes

The task is not understood. Worksheet is not completed.

The worksheet contains some information on the electromagnetic waves but important points are missing.

The worksheet contains lots of information, however it is presented in a disorganised manner.

The worksheet has a clear description of the electromagnetic waves. All characteristics are mentioned. Uses are also listed.

PowerPoint Presentation: Common Properties of Electromagnetic Waves

Concept of electromagnetic waves is not understood. Slides are disorganised, and not suitably presented.

The presentation has some explanation, however most of it is plagiarised. Guidelines are not followed properly.

The presentation titles, pictures, and text, are sufficient but it contains unreadable text because of the format used. Properties are well explained.

All points are explained and summarised in their own words, including all the necessary information. Presentation is of high quality, following all guidelines given.

Online Quiz and Interactive Online Game

The quiz and game answers and results are not pasted on the worksheet ONLINE QUIZ AND GAME.

Not all the questions of the quiz are worked out. The percentage result of the interactive game is lower than 25%.

More than 6 questions of the quiz are correct. The percentage result of the interactive game is lower than 60%.

All questions of the quiz are answered correctly. The percentage of the interactive game is above 85%. The worksheet is presented neatly.

Superheroes Role Play

The group members do not cooperate together. The role play’s purposes are not met.

At least one member of the group is not participating. The members are unsure of what their roles are. Explanations of electromagnetic concepts contain misconceptions.

All group members contribute in the role play. Most concepts are mentioned and explained in a reasonable manner.

Strong participation of all members. Role play is well-organised. Concepts are clearly and very well explained.

Conclusion

Congratulations!! You have now helped our Superheroes to use their powers in a positive and safe manner for all humanity!! Now you have learnt about the waves making up the electromagnetic spectrum!! And watch out!! If your mummy is
going to have a baby, he or she might be born with these supernatural powers. Make sure that you help your brother/sister to control his powers, for the sake of the World.

**Teacher Page**

General Recommendations

This webquest is ideal for form 3 students who are studying Physics at SEC level. They should have already made use of internet and computer applications such as Microsoft Word and Powerpoint.

Objectives

The students should be able to:

- Identify the different types of electromagnetic waves
- Give applications of where these electromagnetic waves are used in real life
- Gain understanding on how to detect certain electromagnetic waves
- Identify the type of electromagnetic waves that different sources can emit
- List the common properties of all the electromagnetic waves

Time Required

Lesson 1 (45 minutes):
Task 1 will be explained in class, and students will then have to follow the same procedure for all the remaining tasks i.e. task 2 to task 7.

(25 minutes)

Following this, Task 8 will be explained to the students, assuming that they already know how to make use of the Power Point application.

(15 minutes)

Deadlines should be established for Tasks 1 to 8.

(5 minutes)

Lesson 2 (45 minutes):
A number of students are asked to present their slideshow to their classmates.

(30 minutes)

Tasks 9 and 10 will then be explained to the students and deadlines established.

(15 minutes)

Lesson 3 (45 minutes):
Role plays are acted out to the whole class and the previous work assigned, related to the WebQuest is collected by the teacher.

**Standards**

Credits

Other