

GENOME CHALLENGE

Activity overview



Age: 11 – 18 years old

Time: 15 min

Topics: Genomics, DNA, genes, genetic variation

Learning objectives:

- A genome is an organism's complete set of genetic instructions. Each genome contains all of the information needed to build that organism and allow it to grow and develop.
- Genes are sections of DNA within the genome that act as the individual instructions giving an organism its traits.

BACKGROUND

A bit like a recipe book, all the biological instructions for making an organism are contained in a long molecule called DNA (deoxyribonucleic acid). All living things, from humans and mice, to plants and bacteria, have a unique set of instructions written in the four chemical letters of DNA: A, C, G, and T. The whole set of instructions for an individual is called a genome.

Within the DNA code are the instructions for all the proteins (molecular machines) that our body needs to function. These instructions are called genes, with there being different genes for every feature of an organism.

In this activity we will explore how the size of an organism's genome (the amount of DNA that makes up its instruction manual) and the number of genes it has can vary wildly. These observations aim to spark discussions as to why this is and what links can be drawn between the organisms in question and their genetics. This will also address misconceptions in regard to species complexity and the relationship between this and evolutionary theory in the context of genomics.

This activity has multiple 'sets' for you to choose from. Each set has a different focus and as such has a unique answer sheet associated with it for use in the discussion.

We recommend running this activity with groups of 2-4 but larger groups or individuals can also do the activity.

Find out more

What is DNA:

www.yourgenome.org/facts/what-is-dna

What is a genome:

www.yourgenome.org/facts/what-is-a-genome

What does DNA do:

www.yourgenome.org/facts/what-does-dna-do



ACTIVITY PREPARATION

Materials

- Worksheet
- Organisms sheet
- Answer sheet

Set up

1. Give out worksheets to the group.
2. Either cut out the pictures on the organisms sheet or distribute the sheet so that groups can sort them into the correct order.

ACTIVITY GUIDANCE

Warm up

1. Begin the activity by discussing with the group that DNA contains the instructions for making all living things. All the DNA instructions in an organism is called the genome. Within the DNA code are instructions for making proteins – these instructions are called genes. The genes give the organism its characteristics. Explain how different organisms have different amounts of DNA (different length instruction manuals) and different numbers of genes (often depending on how many things the creature needs to do).
2. Explain to the group that they are going to work in small teams to sort the organisms in order from the largest to smallest genome and again ranking them from the most to fewest number of genes.
3. Ask the group if they can make any predictions before beginning and what their logic behind those predictions are (random guessing is fine logic at this stage!).

Run the activity

1. Introduce the group to the set of organisms you have chosen to run the activity with.
2. Give them 5 min to put the organisms in order of genome size. Once they have done that have them compare answers to see if everyone agrees.

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3. Give them another 5 min to put the organisms in order of number of genes. Again ask them to compare answers to see if everyone agrees.
4. Tell the group the answers. Hand out the relevant answer sheet for the students to see and read the science behind the answers.

Reflect on it

Were the group's predictions right? Discuss again the logic people followed when sorting the organisms.

Refer to the relevant answer sheet for further discussion points such as notable features of the organisms and the scientific theories explaining why certain organisms have the genomic features they do.

Take it further

Want to explore the function of different genes? Try decoding DNA codes to unlock nature's potential.

Function finders: www.yourgenome.org/activities/function-finders

You have explored how much DNA is in different organisms but what does all that information really look like? Try your hand at extracting DNA from fruit and see for yourself what the molecule of life looks like.

Extracting DNA from fruit: www.yourgenome.org/activities/extracting-dna-from-fruit