Living things and proportionality

How do you measure living things?



Pilar Rodríguez Forn

prodri25@xtec.cat



Generació Plurilingüe

Second Year 2017-2018





PROJECT PLANNING TEMPLATE

for CLIL and Content-Rich Environments

Identification

Title	Living things and proportionality
Authorship	Pilar Rodríguez Forn
With the support of	Ma Elisa Morell and Loida Perich
School	INS Vallbona d'Anoia
CEFR Level (A1, A2)	C1
Grade	1st ESO
Content areas	Biology and Mathematics
Number of sessions	6
Teacher(s) involved	Pilar Rodríguez Forn, Maria Llopart Font and Karan Joyce Elkin (language assistant)
Key words	living things, cells, size, proportions





Adapted from CLIL-SI 2015. More information at: http: //grupsderecerca.uab.cat/clilsi/



INTRODUCTION TO THE PROJECT

All living things are made of cells but cells are usually difficult to be seen, so we have to use specific devices such as the microscope. Then, we realize that cells do not always look the same. There are different types, sizes, shapes, functions...

The driving question: How can you measure living things?

GOALS	HOW DO YOU KNOW STUDENTS ARE MAKING PROGRESS?(assessment criteria)
 Observe the cell as the unit of life. Label the main structures of cells and draw an example of each type of cell Compare the different types of cells that exist. Describe the form, size, complexity of each one Use mathematical strategies to calculate sizes and proportions of both prokaryotic and eukaryotic cells and share information orally about the results and conclusions you have obtained. 	 Students can: Describe the difference between unicellular and pluricellular organisms Create a poster showing the main differences between prokaryotic and eukaryotic cells Label or name the main structures of the cell and the parts of the microscope Explain how to calculate the microscope magnification of a sample and measure its real size using conversion factors and criteria of proportionality

	- Poster representation of the classifications of cells between prokaryotic and eukaryotic where the sizes and the measuring
PRODUC	units of cells are shown.
TIO	- Exemplify a 3D printed prokaryotic and both animal and plant eukaryotic cells to compare the differences in proportion
I/S	- Exhibition of the printed cells and posters for the Open doors day at school.
	- Record a short oral presentation (TED talk) about the use of the microscope





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CURRICULUM CONNECTIONS SPECIFIC COMPETENCES AND KEY CONTENTS

Subject-matter curriculum	Foreign language curriculum	
 Contingut de Biologia i Geologia de 1r curs: La vida a la Terra (CC9 i CC10) Trets comuns dels éssers vius. Estructura cel·lular La cèl·lula, unitat estructural i funcional. Diversitat de les cèl·lules. Principals estructures cel·lulars. 	 Primer curs ESO: Dimensió comunicació oral: Comprensió oral: global i específica. Tema i idea principal (CC1) Estratègies de comprensió oral: identificació de paraules i expressions clau (CC2) 	
Contingut de Matemàtiques de 1r curs: Proporcionalitat i semblança en figures de dues dimensions (CC9 i CC10) • Escales		

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Collaboration	Information, media and technology	
Communication	Leadership & Responsability	
Critical Thinking and Problem Solving	Initiative & Self-direction	
Creativity & Innovation	Social & Cross-cultural	
Others:		





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KEY COMPETENCES					
Communicative, linguistic and audiovisual competence		Digital competence			
Mathematical competence		Social and civic competence			
Interaction with the physical world competence		Learning to learn competence			
Cultural & artistic competence		Personal initiative and entrepreneurship competence			

CONTENTS (Knowledge and Skills)					
TOPIC-RELATED KNOWLEDGE	TOPIC-RELATED SKILLS				
 Looking for information and drawing the main structures of the cell Knowing and summarizing the functions of the cell Identifying and describing the main differences between prokaryotic and eukaryotic cells Reading the instructions and explaining orally the use of the microscope 	Drawing a poster Using the microscope Describing the represented cell				

CONTENT-OBLIGATORY LANGUAGE

Living and non living things. Grow, reproduce, move, vital functions.

Prokaryotic. Eukaryotic. Bacteria. Animal and Plant Cells.

Size. Micrometers. Microns.

Parts of the cell: organelles

Parts of the microscope.



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PERSONAL & EMOTIONAL DEVELOPMENT

Students are expected to develop a positive sense of themselves and of their partners by working together as a group, to form positive relationships and develop respect for the others, to develop social skills and learn how to manage their feelings, to understand appropriate behaviour in groups and to have confidence in their own abilities.

MATERIALS & RESOURCES

A big piece of paper to make the cell poster. Colours and material according the students' creativity.

Personal computer and Internet connection

Microscope

Camera

REFERENCES

All materials are created by teachers using Google Suite tools such as Google Documents and Google Classroom except for some free images and resources obtained on the Internet.

Video: The difference between living and non living things by Learning Time Fun (Youtube Channel)



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\cdot UNIT OVERVIEW \cdot

S	Activities	Content- obligatory Language	Timing	R/S/L/W /I Skills	Interaction T-S S-S S-Expert S-World	CMC	Assessment (type + tool) Peer assessment Self-assessment Teacher assessment
	The difference between living and non living things (Google Classroom activity) Individually or in groups. Students watch a short video as introduction to the living and non living things concepts, along with some words associated with the vital funcitions.	Living and non living things Vital functions		L-S	T-S		Teacher assessment
1	Can you explain what a living thing is? (Google Classroom activity) Individual task. Students write a sentence explaining by themselves what they have understood a living thing is. They have to use the new words related to vital functions.	Atoms, molecules, cells	1 session	W-I	S-S		Teacher assessment
	What are living things made of? (Google Classroom activity) Individual task. Students have to choose on right answer between four possible options. Test activity to make them aware about what a living thing is made of.			I	T-S		Peer assessment



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2	Let's label the structures of the cells Working in groups, students look for the names of the organelles of a prokaryotic cell, an animal and a plant cell. Then they label the names in the correct place of the drawings.	Names of the principal types of cells, structures and organelles	1 session	R-S-I	T-S S-S	Peer and teacher assessment
3	The sizes of the cells Individual task. Students look for different images and schemes of each type of cell and attach them in the correct place in an online document shared with the teacher.	Micrometers, microns, scale		R	T-S	Teacher assessment
4	Creating a poster Task in groups. Students represent a cell in a big poster. They colour it, name the organelles, write the name of the cell and the scale it is represented		2 sessions	R-S-I-W	S-S	Peer assessment
	Preparing an oral presentation of a cell Task in groups. Students preapre an oral presentation of the poster and record it with a video.			W-I	T-S S-S	Teacher assessment
5	Printing a cell in 3D Task in groups. Using a 3D printer and a model design, each group print their 3D model of a cell and calculate the scale it is represented.	3D printer, PLA filament	1 session	I-S	T-S	Teacher assessment
6	How to use a microscope Individually or in groups. Students learn the use of a microscope, the names of its parts and their function.	Parts and use of the microscope	1 session	R-S-I-W	T-S S-Expert S-World	Teacher assessment





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Google Classroom activities

	PREGUNTA RESPOSTES DELS ALUMNES	
Can yo	u explain what a LIVING THING is?	:
🍘 PILA	R RODRIGUEZ FORN 13 de febr. (Última modificació: 0:59)	
With your p	partner, WRITE A SENTENCE which defines the concept of LIVING THINGS using the words that appear in the video	
Come	ntaris de la classe	
•	Aleix 14 de febr. Living things are flowers, animals, people, trees ans insects. Living things can move, reproduce, breathe, grow and eat nutrients.	
	Alba 14 de febr. living things are animals or objects than can move, grow, breathe, eat nutrients and reproduce, like a flower, bear,	
•	Hector 21 de febr. living things are flowers, animals, persons and not living things objects: table, chair	
Ø	Afegiu un comentari de la classe	

	PREGUNTA	RESPOSTES DELS ALU	MNES
What are living thing	gs made of?		:
🍘 PILAR RODRIGUEZ FORM	I 13 de febr. (Última modi	ficació: 13 de febr.)	
Choose the correct answer: Liv	ving things are made of		
O Atoms			
O Molecules			
O Cells			
All of them are right			
	Generalitat de Catalunya Departament d'Ensenyament	MARC PER AL PLURE INGUISHE	Adapted from CLIL-SI 2015. More information at: http: //grupsderecerca.uab.cat/clilsi/

Updated by GEP trainers 2017-/2018

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INS Vallbona d'Anoia How would you measure living things? GEP2

TYPES OF CELLS AND STRUCTURES

Type of cell:



Label the structures with an arrow:



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Type of cell: Animal cell

Label the structures with a number:



Type of cell: Plant cell

Label the structures with a letter:





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How would you measure living things? GEP2

THE SIZES OF THE CELLS

Cells are the basic units of life. All living organisms are composed of one or more cells. Bacteria consist of single cells and are much smaller than plant and animal cells. Plant and animal cells come in all kinds of sizes and shapes, depending on their function. Most plant and animal cells make up organs and specific tissues and fit together like pieces of a puzzle. Almost all cells are too small for you to see with the human eye, but you can observe them under a light microscope.

Bacterial Cells (Prokaryotic)

Bacterial cells are very small - about 10 times smaller than most plant and animal cells. Most bacterial cells range in size from 0.2 to 10 micrometers (0.0000079 to 0.00039 inches). Common Escherichia coli, or E.coli, bacteria are rod-shaped bacteria, 1 micron by 2 microns long. Smaller cells have a large surface area compared to cell volume, while larger cells have a reduced ratio of surface area to volume. One reason why bacterial cells are so small is that they need a large surface area to cell volume to take in nutrients. Bacteria accumulate nutrients from the environment by diffusion.

Choose an image of a bacterial cell and drop it here IMAGE

Animal Cells (Eukaryotic)

Most animal cells are between 10 to 100 micrometers in size. The size depends partially on the type of cell and its function. Red blood cells, which don't need to divide and replicate are only about 8 microns in diameter, while many muscle and nerve cells are thin, spindly and extremely long. For example, a giraffe's nerve cell can reach about two meters (about 6 feet). Eggs are another example of unusually large single cells. An ostrich egg cell is roughly 6 inches long; a human egg cell is 100 microns. Egg cells serve to store nutrients and don't need to carry out active metabolism.

Choose an image of an animal cell and drop it here IMAGE

Plant Cells (Eukaryotic)

Plant cells are comparable to animal cells in terms of size, ranging between 10 to 100 micrometers; more plant cells are at the higher end of this range, however. While both animal and plant cells have a soft, flexible membrane, the membranes of most plant cells are covered by stiff, angular cell walls. Cell walls are made up of sugar polymers, such as pectin and cellulose. The cell wall in parenchyma cells, which are abundant in young plants and usually contain chlorophyll, is thin. Cells that provide structure, flexible support and conduct water are spindle-shaped, elongated and have thick walls, and may perform their function even after dying. Examples are the cells in trees that make up xylem and conduct water from the roots to above-ground plant parts.

Choose an image of a plant cell and drop it here IMAGE







How would you measure living things? GEP2

ORAL PRESENTATION

Prepare your oral presentation completing the following sentences:

INSTRUCTIONS	
Present the members of the group	Hello, we are
Present your project	Our project is… Here we present a
Tell the audience which type of cell you are presenting	This is a prokaryotic/eukaryotic/animal/plant cell
Name all the organelles and structures that you can identify, and tell a characteristic of each one (size, colour, shape, position in the cell)	Here we can see and it is very big
Explain how did you calculate the scale of your representation of the cell.	The scale is because the real size is and our representation in the poster is





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How would you measure living things? GEP2

THE USE OF THE MICROSCOPE

Let's see the following video about the use of the microscope and fill in the gaps of the following text:

VIDEO: https://youtu.be/-b3Eejf4rDQ

He is going to show us how to use the _____

Grab the _____ with a hand on the arm

Support it with your other hand under the

Take it to the	9
	والمستخدمة والمستخدمة والمستخدمة والمستخدمة والمستخدمة والمستخدمة والمستخدمة والمستخدمة

The		magnifies	up	to	400	times	the	image	of	an	
-----	--	-----------	----	----	-----	-------	-----	-------	----	----	--

object

The _____ or _____ magnify 10 times

There are three _____: Low (4x) Medium (10x) and High (40x)

The _____ lets you change the objective lenses

The _____ holds the slide

There are two _____: coarse and fine

These are the words you have to use to fill in the gaps:

LIGHT MICROSCOPE TABLE EYEPIECES MICROSCOPE (x2) **OCULARS**

FOCUSING KNOBS **OBJECTS REVOLVING NOSEPIECE** BASE STAGE





OBJECTIVE LENSES

Identify in the microscope the following elements and relate them with their function:

Parts of the microscope	Function
Coarse and fine focusing knots	Magnifies the image of the object. Your eyes meet this lens first.
Stage	Magnify the image (High - Medium - Low power lenses)
Body tube	Focus and sharpens the image
3 Objective lenses	Rotates the position of the objective lenses
Revolving nosepiece	Illumination of the slide
Ocular lens or eyepiece	Holds the slide which contains the sample
Light source	Long cilindrical tube





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PRINTING A CELL IN 3D





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