CLIL Science Webquest

Teacher's Notes

The Large Hadron Collider

Aims	To learn about how the Large Hadron Collider works
Activity	Identifying what an LHC is; matching vocabulary and definitions and consulting an online dictionary; completing a text with technical vocabuary; skimming and scanning web sources for information; matching numbers and information; searching the internet for specific information; researching and planning a presentation about one of the LHC's Big Questions.
Language	Comparison of adverbs; adverbs of degree; position and order of adverbial phrases; future tenses; vocabulary relating to plans and predictions, space, science and numbers.
To use	After Unit 3, either in class or as homework.
Procedure	• This CLIL worksheet can be given as homework or be done in class. For each activity, students can either check answers in pairs and then with the whole class, or use the Macmillan Online Dictionary to help with vocabulary if they are working at home: www.macmillandictionary.com. • Ask students to answer the question in pairs if they are in class, or individually if they are working at home. Invite them to check their answers on the Internet by doing a search for *Large Hadron Collider*. • Ask students to match the words with the definitions. Suggest they check their answers on the Macmillan Online Dictionary. • Ask students to complete the text individually and then check their answers by consulting the suggested websites. They can compare their answers first in pairs and then as a whole class. • Ask students to search the Internet for the facts and figures about the LHC. Suggest they use the websites listed to help them, and compare their answers first in pairs and then as a whole class. They can use a monolingual dictionary to help them if they are working at home. • The project stage can be set as homework and completed in class. Invite students to choose one of the LHC's 'Big Questions' and research and prepare a presentation about it, answering the three questions listed in Exercise 5. When students are ready, ask them to present their ideas to the class.

Key

Exercise 1
c

Exercise 2
a 5   b 1   c 6   d 8   e 7   f 4   g 9   h 3   i 2

Exercise 3
How it works
The Large Hadron Collider (LHC) is a very big machine that makes hadrons. It works like this: (1) <u>subatomic particles</u>, made up of tiny (2) <u>quarks</u>, accelerate in two (3) <u>beams</u> of light, which rotate in opposite directions. When the particles reach their maximum speed (almost the speed of light), they are made to (4) <u>collide</u> with each other with the help of (5) <u>magnets</u>. This occurs at four points where the two rings of the LHC (6) <u>intersect</u>. Scientists record and measure the results of these collisions and try to identify and track the behaviour of the new particles which they produce.

What it can be used for
The purpose of the LHC is to develop our understanding of physics. The LHC will be able to simulate the conditions just after the (7) <u>Big Bang</u>, when our universe was created, improving our understanding of the origins of the universe and the basic structure of (8) <u>matter</u> and its (9) <u>mass</u>.

Exercise 4
38,000 tonnes – the weight of the LHC
27 km – the distance covered by the LHC
100 metres – the depth of the LHC under the Swiss/French border
26,659 m – the circumference of the LHC accelerator
9300 – the number of magnets inside the LHC
10,080 tonnes – the liquid nitrogen used to pre-cool the LHC magnets
11,245 – the number of times a second at which trillions of protons race around the LHC
600 million – the number of collisions which will take place every second
10–13 atm - the internal pressure of the LHC, ten times less than the pressure on the Moon
100,000 – the number of times hotter than the temperature of the heart of the sun that the heat is, generated when the two beams of the protons of the LHC collide
-271.3°C – the temperature around the accelerator ring, colder than outer space
15 million gigabytes – the amount of data the LHC will generate every year

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