**Divide and conquer**

Bacteria multiply by dividing!

To reproduce, each bacterium divides in two. This makes two new bacteria.

**To answer**

The bacteria in the photograph divide once every hour.

1. Complete the table to show how many bacteria there would be after 4, 5 and 6 hours.

|  |  |
| --- | --- |
|  | **Number of bacteria** |
| Start (0 hours) | 100 |
| After 1 hour | 200 |
| After 2 hours | 400 |
| After 3 hours | 800 |
| After 4 hours |  |
| After 5 hours |  |
| After 6 hours |  |

1. How much longer would it take for there to be twice as many bacteria? Draw a ring around the right answer.

**One more hour Two more hours Six more hours A lot longer**

1. After how many hours would there be 102,400 bacteria?
2. The bacteria cause symptoms of disease whether there are over 1,000,000 (one million) of them. After how many hours would the bacteria start to cause symptoms?

*Biology> Big idea BHD: Health and disease > Topic BHD3: Health and infectious disease > Key concept BHD3.1: Pathogens*

|  |
| --- |
| **Response activity** |
| **Divide and conquer** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | The health of humans, other animals and plants can be affected by infection with pathogens, including viruses and some bacteria and fungi. |
| Observable learning outcome: | Apply the idea that pathogens do not cause symptoms of ill health until they are present in sufficient numbers. |
| Activity type: | Application and practice |
| Key words: | Health, disease, pathogens, bacteria |

This activity can help develop students’ understanding of the rate at which bacteria reproduce, and can be used in response to the following diagnostic question:

* Diagnostic question: Food poisoning

|  |  |
| --- | --- |
| **B** | **BRIDGING**  This activity explores ideas that are usually taught at age 14-16, to build a bridge to later stages of learning. |

**What does the research say?**

Symptoms of disease appear when the body’s cells or systems have been damaged or are not working normally. An organism may not always show symptoms after infection with a pathogen; pathogens only cause symptoms when they are present in sufficient numbers. Barenholz and Tamir (1987) found that students aged 15-17 could not adequately explain how microorganisms cause symptoms of disease; although they held some correct rudimentary notions such as that microorganisms inside the human body would breed and ‘poison us’, they also held animistic and anthropomorphic views such as that they would ‘walk about’ and ‘eat us’.

**Ways to use this activity**

Students should complete this activity individually or in pairs as a paper and pencil exercise.

*Differentiation*

You may choose to read the information and questions to the class, so that everyone can focus on the science. In some situations it may be more appropriate for a teaching assistant to read for one or two students.

**Equipment**

For each student/pair:

* calculator
* pencil or pen, and paper (if not writing on the student worksheet)

**Expected answers**

1. After 4 hours = 1600

After 5 hours = 3200

After 6 hours = 6400

1. One more hour
2. After 10 hours
3. After 13/14 hours (13 hours = 819,200 bacteria; 14 hours = 1,638,400 bacteria)

**Acknowledgments**

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Images: pixabay.com/geralt (123081)

**References**

Barenholz, H. and Tamir, P. (1987). The design, implementation and evaluation of a microbiology course with special reference to misconceptions and concept maps. In Novak, J. D. (ed.) *Proceedings of the 2nd International Seminar: Misconceptions and Educational Strategies in Science and Mathematics, 26-29 July.* Ithaca, N.Y.: Cornell University.