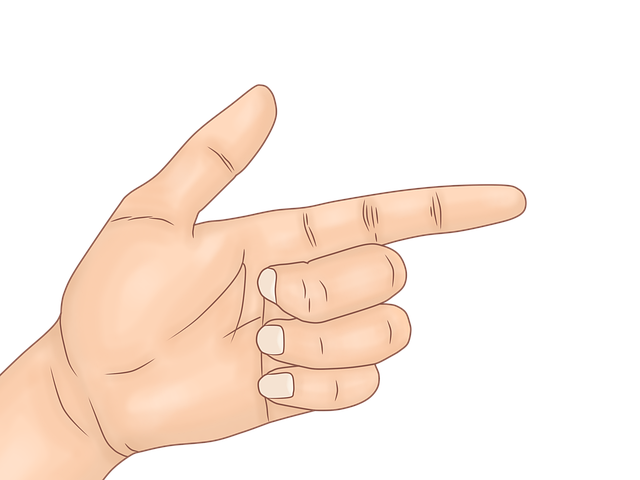
**The hole story**

**Part 1**



Liam has a cut on his finger.

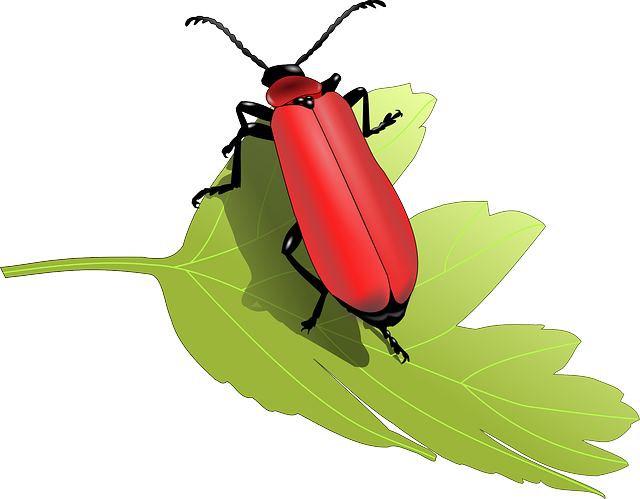
The cut has made a hole in his skin.

If the cut is not cleaned, Liam could develop symptoms of an infection.

|  |
| --- |
| Your teacher has given you some cards.  Some of the cards can be used to make a story that explains how Liam could develop symptoms of an infection.  **To talk about in your group**   * Decide which cards you want to use in the story. * Decide how to arrange the cards to make the story. |

**The hole story**

**Part 2**



An insect has taken a bite out of a leaf.

This has made a hole in the leaf.

The plant could develop symptoms of an infection.

|  |
| --- |
| Look back at the story you made to explain how Liam could develop symptoms of an infection.  **To talk about in your group**   * How would you write a similar story to explain how the plant could develop symptoms? |

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

|  |
| --- |
| **Response activity** |
| **The hole story** |

**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: | Explain simply how pathogens cause symptoms of ill health. |
| Activity type: | Discussion, card sort |
| Key words: | Health, disease, pathogens, symptoms |

This activity can help develop students’ understanding of how pathogens that infected the body can cause symptoms, through small group discussion with and without prompt cards. It can be used in response to the following diagnostic question:

* Diagnostic question: Sam’s symptoms

**What does the research say?**

Symptoms of disease appear when the body’s cells or systems have been damaged or are not working normally. 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’. The students thought that microorganisms would mainly enter the human body through the mouth, but also recognised that they could enter through the nose and skin.

Research suggests that students are inclined to focus on diseases in humans, and do not often think about diseases in plants (e.g. Isik, Çetin and Özarslan, 2017). Learning about plant diseases is important due to the interdependence of organisms; for example, plant disease has a significant impact on human food security. It has been estimated that plant pests and pathogens are responsible for approximately 12.5% of global crop losses (Oerke, 2006), and for losses of up to 42% of the annual production of the six most important food crops (Guest, 2012). A focus only on disease in humans provides an undesirably restricted view, and could lead to (or reinforce) the misunderstanding that only humans get diseases.

**Ways to use this activity**

Students should complete this activity in pairs or small groups. The focus of the activity should be on group discussion to decide how to organise the story cards for the finger (in Part 1) and how to write a similar story for the leaf (in Part 2).

It is through the discussions that students can check their understanding and develop their explanations. Listening in to the conversations of each pair/group will often give you insights into how your students are thinking. The quality of the discussions can be improved with a careful selection of pairs/groups, or by allocating specific roles to students in each pair/group. For example, you may choose to select a student with strong prior knowledge as a scribe, and forbid them from contributing any of their own answers; they may question the others and only write down what they have been told. This strategy encourages contributions from more members of each group.

After their discussions, each pair/group should be prepared to report the key points of their discussion to another pair/group, or to the class.

*Differentiation*

You may choose to read the instructions 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 pair/group:

* cards, printed and cut out from the end of this document
* pens or pencils, and paper (if not writing on the student worksheet)

**Expected answers**

*Part 1*

1. Pathogens on the surface of the skin could get into the cut.
2. Pathogens reproduce inside the cut.
3. Pathogens make toxins that are like poison.
4. Pathogens stop some of the cells in the body from working properly.

Note: Step 2 could be omitted. Steps 3 and 4 could be in either order.

*Part 2*

Students should recognise that the story would be the same for the plant, except that references to the “cut” would be changed to the “bite” or the “hole”, and references to the body would be changed to the “leaf” or the “plant”.

**Acknowledgments**

Developed by Alistair Moore (UYSEG).

Images: hand – pixabay.com/Jorgeduardo (4831864); leaf with insect – pixabay.com/OpenClipart-Vectors (155017)

**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.

Guest, D. (2012). The impact of plant disease on food security. *Agriculture,* 2(Special Issue).

Isik, E., Çetin, G. and Özarslan, M. (2017). Students' views about disease concept: drawing and writing technique. *Asia-Pacific Forum on Science Learning and Teaching,* 18(2).

Oerke, E. C. (2006). Crop losses to pests. *The Journal of Agricultural Science,* 144(1)**,** 31-43.

**Print and cut out cards for card-sort activity in Part 1**

✁

|  |  |
| --- | --- |
| Pathogens on the surface of the skin  could get into the cut. | The cut lets pathogens  escape from the body. |
| Pathogens reproduce inside the cut. | Pathogens walk around inside the body. |
| Pathogens make toxins that are like poison. | Pathogens eat some of the cells in the body. |
| Pathogens stop some of the cells in the body from working properly. | Pathogens help the cut to heal. |