Earth and Space Science - annotated exemplars level 2 AS91190

Investigate how organisms survive in an extreme environment (2.4)

Show: All Earth and Space Science exemplars

Read the STANDARD

TKI Earth and Space Science Assessment Resources

Download all these exemplars and commentary (PDF, 385KB)

This annotated exemplar is intended for teacher use only. The student work shown does not always represent a complete sample of what is required. Selected extracts are used, focused on the grade boundaries, in order to assist assessors to make judgements at the national standard.

Low Excellence

Commentary

For Excellence the student needs to investigate comprehensively how organisms survive in an extreme environment.

The student needs to:

- provide integrated links between conditions of the extreme environment and biological adaptations or technological modifications
- justify, using processed information, how the biological adaptations or technological modifications allow the organism(s) to survive the conditions of the extreme environment.

This student has explained, in depth, the extreme environmental conditions that exist in hot pools (1), and has linked biological adaptations to the extreme environment that makes high temperature cyanobacterial survival possible (2).

For a more secure Excellence, the student could discuss how the ability to photosynthesise in the far red range of the visible spectrum contributes to the survival of cyanobacteria. For example, the role of bilins (cyanobacteria plant pigments) and the ability to use Far-Red Light Photoacclimation (FaRLiP) could be explained and linked to survival in the extreme environment.

Student work extract

Student 1 (PDF, 36KB)

High Merit

Commentary

For Merit the student needs to investigate in depth how organisms survive in an extreme environment.

The student needs to:

- explain links between conditions of the extreme environment and biological adaptations or technological modifications
- explain, using processed information, how the biological adaptations or technological modifications allow the organism(s) to survive the conditions of the extreme environment.

This student has explained the extreme environmental conditions that exist in hot pools (1) and has explained biological adaptations to the extreme environment that makes high temperature cyanobacterial survival possible (2).

To reach Excellence, the student could discuss how the ability to photosynthesise in the far red range of the visible spectrum contributes to the survival of cyanobacteria, and how this ability allows the high temperature cyanobacteria to live in an extreme environment without competition.

Student work extract

Student 2 (PDF, 35KB)

Low Merit

Commentary

For Merit the student needs to investigate in depth how organisms survive in an extreme environment.

The student needs to:

- explain links between conditions of the extreme environment and biological adaptations or technological modifications
- explain, using processed information, how the biological adaptations or technological modifications allow the organism(s) to survive the conditions of the extreme environment.

This student has explained the extreme environmental conditions that exist in hot pools (1), and has given a simple explanation of how a biological adaptation to the extreme environment that makes high temperature cyanobacterial survival possible. (2). High temperature enzymes have been mentioned.

Student work extract

Student 3 (PDF, 34KB)

For a more secure Merit, the student could develop the explanation of how the biology of the cyanobacteria links to its survival. For example, the student could explain how the enzyme high temperature polymerase allows DNA replication to occur at high temperatures and not denature.

High Achieved

Commentary

For Achieved the student needs to investigate how organisms survive in an extreme environment.
The student needs to:

- describe why the conditions of the extreme environment require special biological adaptations or technological modifications for survival
- describe, using processed information, how the biological adaptations or technological modifications allow the organism(s) to survive the extreme environment.

This student has explained the extreme environmental conditions that exist in hot pools (1), and has described biological adaptations to the extreme environment that make high temperature cyanobacterial survival possible (2).
To reach Merit, the student could explain how the biology of the cyanobacteria links to its survival. For example, the student could explain how high temperature enzymes link to the survival of the cyanobacteria in hot pools.

Student work extract

Student 4 (PDF, 34KB)

Low Achieved

Commentary

For Achieved the student needs to investigate how organisms survive in an extreme environment.
The student needs to:

- describe why the conditions of the extreme environment require special biological adaptations or technological modifications for survival
- describe, using processed information, how the biological adaptations or technological modifications allow the organism(s) to survive the extreme environment.

This student has described the extreme environmental conditions that exist in hot pools (1) and has described two biological adaptations to the extreme environment that makes high temperature cyanobacterial survival possible (2).
For a more secure Achieved, the student could describe how the specific enzymes produced by cyanobacteria are used to survive in the hot pool conditions.

Student work extract

Student 5 (PDF, 49KB)

High Not Achieved

Commentary

For Achieved the student needs to investigate how organisms survive in an extreme environment.
The student needs to:

- describe why the conditions of the extreme environment require special biological adaptations or technological modifications for survival
- describe, using processed information, how the biological adaptations or technological modifications allow the organism(s) to survive the extreme environment.

This student has provided some description of the extreme environmental conditions that exist in hot pools (1), and has described one biological adaptation to the extreme environment that makes high temperature cyanobacterial life possible (2).
To reach Achieved, the student could further describe a second adaptation such as describe how the heat resistant enzymes allow cyanobacteria to carry out photosynthesis in a hot pool of water.

Student work extract

Student 6 (PDF, 49KB)