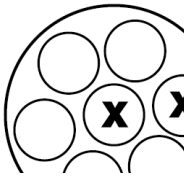
TEMPERATURE – WHY DO ANIMALS HUDDLE ?

SENSOR(S) - Two to three External temperature sensors

View from top s
possible sensor pos



INVESTIGATE

- How animals are adapted to their environment
- That heat loss depends upon temperature difference between an object and its surroundings.
- That objects cool or warm to the temperature of their surroundings when left.
- To form a prediction and compare this to the result to create a conclusion

INTRODUCTION TO THE INVESTIGATION

Often when you see pictures of penguins they are standing close together, huddling. The same behaviour can be found in other animals especially small animals such as mice and wood lice. Discuss with the pupils why animals behave like this ? This behaviour is an example of how an animal can adapt to its surroundings.

Using this investigation the pupils can investigate one of the reasons why animals, including humans, huddle together in cold environments. It can be part of a much larger project into looking at different habitats and how animals and plants adapt to their surroundings.

As well as looking at animal adaptation the investigation re-enforces work on temperature measurement, how heat energy is lost, insulation and that objects cool or warm to the temperature of their surroundings.

RESOURCES

- Explorer datalogger , datalogging software, computer, LogIT computer link cable.
- 2 or 3 Explorer external temperature sensors
- Electric kettle to heat water (CARE! - Water above 55° C can scold so BE CAREFUL)
- A measuring jug
- Test tubes carefully taped or banded together to represent huddling animals.
- If test tubes are not available use drinks bottles taped together (take care that hot water will not soften the plastic).
- Deep tray to place test tubes in to catch any spillage and plenty of paper towels or similar to deal with spillages

WHAT TO DO

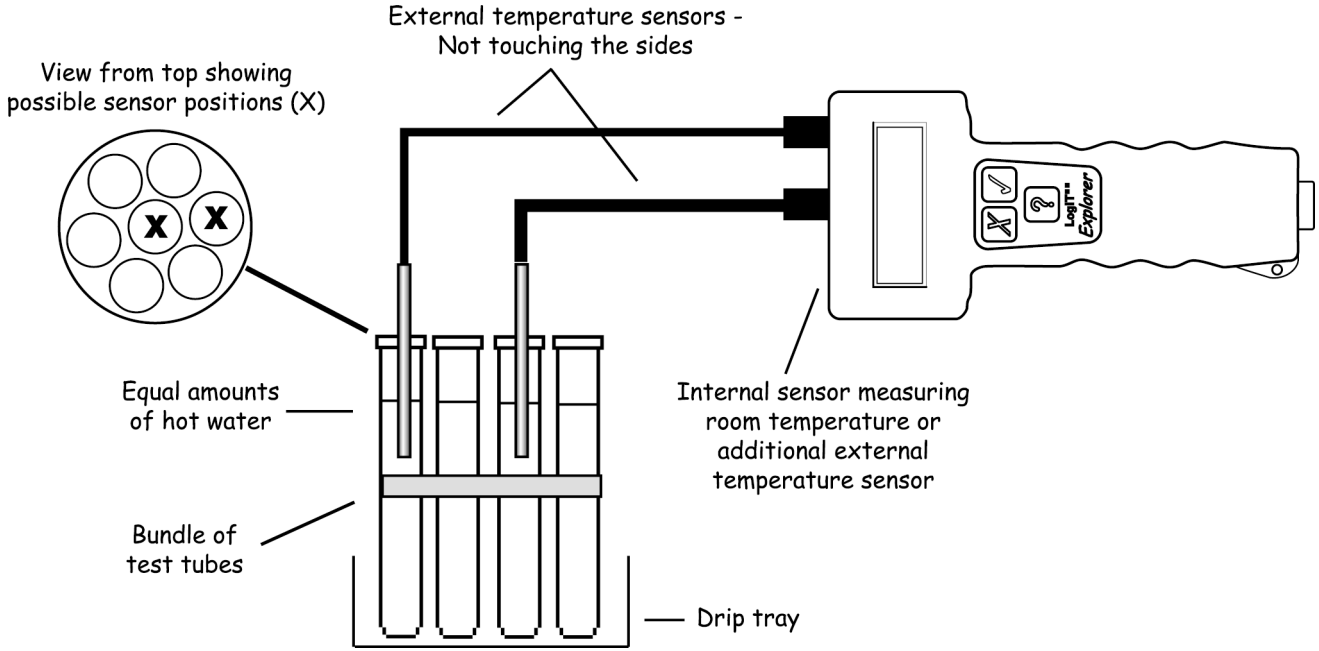
- Plug the external temperature sensors into the Explorer datalogger (avoid over plugging the internal temperature sensor if only 1 or 2 external sensors are available as the internal sensor can be used to monitor room temperature).
- Connect the Explorer to the computer and run the datalogging software
- Set up the logging facility of the software (if necessary set the time span of the software to at least 20 minutes, depending on the time available).
- Discuss where best to place the temperature sensors to give the 'best' results – normally one in the middle and one on the outside works best.
- Carefully pour equal amounts of hot water into the test tubes (for safety reasons it is best that this done by the teacher unless temperatures used are below 50°C).
- Start the software logging.
- While logging the experiment can be discussed and pupils asked to predict what will happen – get them to describe or draw the graph lines.
- At the end of the experiment stop the computer logging, save and print the graph
- Discuss and/or write up the Ţndings

If computers are limited the same investigation can be carried out using the Explorer's remote logging facility which is selected by using the blue button. Results can then be downloaded to a computer. By using remote logging the investigation can be left for a long period without tying up a computer.

SAFETY

- Extreme care is needed when using hot water.
- Hot water can soften some types of plastic containers causing water to spill.
- Children should be kept well back if water is more than hand hot.
- Liquids and computers do not mix so ensure that a tray is used to catch spillage and that paper towels are on hand to mop up accidents.

DIAGRAM



ABOUT THE RESULTS

- Discuss fair testing - is there a draught on one side of the test tube bundle and not the other, should the test tubes have lids, was the same volume of water used in each test tube ?
- Was there any difference in temperature of the 'animals' after 15 minutes ?
- Does the investigation show a possible reason why animals huddle ? If so, why ?
- Where is the best place to be in the huddle ?
- If left for a long period of time what temperature would they Ţnally be (i.e. room temperature).

EXTENSION ACTIVITIES

- What happens if the 'animals' stand further apart ?
- What happens if the middle animal is wearing a coat ?
- What if the outside animals have a coat but the middle doesn't ?
- Try different sizes of animal (this can be done by Ţlling balloons with different amounts of warm water and placing them in a tray of cold water).
- What happens if there is a wind (use an electric fan to simulate this) - does it affect where the best and worst positions are ?
- Attach the sensors to either side of an outer test tube to see if one side of the animal is kept warmer than the other.
- This work could be linked to investigations on cooling by evaporation which is how many animals cool themselves in warm climates by sweating or having large areas of exposed skin such as elephant's ears.

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