

penguin assessment

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In my assessment I will be first writing about all the factors that prevent heat loss then I am going to do an experiment based on one of the factors and seeing if it actually prevents heat loss.

PLAN

There are various factors, which affect the rate of heat loss in penguins. These include:

- . Feathers: They have a thick layer of insulating feathers, which are waterproof designed to keep them warm in water. So they can keep their body temperature while in the water, this is because heat is lost more rapidly in water then in air.**
- . Body mass (blubber): Penguins have a thick layer of blubber under their skin, which stops the cold leading to the organs. This helps them from the extreme cold.**
- . Flippers: They hold their flippers out from their bodies and pump hot blood to them so that they can act as radiators.**
- . Circulatory system: This allows the main organs to be warm.**
- . Blood vessels: Penguins have specially adapted vessels in their feet to help them cope with standing on cold ice. The blood vessels supply just enough heat to prevent the penguins freezing to the ice. The blood vessels carries warm blood to the feet, which are intertwined with those carrying the cold blood back from the feet.**
- . Huddles: Penguins intend to huddle each other when the temperature is low, this is to keep them warm, reducing heat loss.**

I f each of these factors changed they will have the following effect on the rate of heat loss:

- . Feathers: If penguins did not have feathers it would be hard for them to swim under water. Penguins spend 75% of their lives in water so it is basically a place where they need to be. If they do not have the waterproof feather coating, heat will be lost rapidly in water**
- . Body mass (blubber): If penguins did not have their body mass to keep them warm then the cold would lead to the organs and their body temperature would drop. Therefor rate of heat loss will increase.**

. Flippers: If penguins did not have flippers then they would not be warm inside of their bodies. The blood vessels will probably freeze.

. Circulatory system: If penguins did not have their circulatory system to keep them warm, then their organs will be lower than their average body temperature.

Method:

In this experiment I am going to find out whether huddling reduces heat loss in penguins. Test tubes were used instead of penguins.

I boiled water and poured approximately 50ml in to each test tube. I took the temperature on the test tube placed in the middle of all the test tubes. I then timed how much heat was lost in 5 minutes. I repeated this experiment 5 times, each time I increased the number of test tubes:

- . 1 test tube**
- . 3 test tubes**
- . 6 test tubes**
- . 8 test tubes**
- . 10 test tubes**

Measurements:

In order to carry out this experiment I used the followings:

- . Stop clock, to measure the time.**
- . Thermometer, to measure the temperature of the water in the middle test tube.**
- . Test tube, to hold the water.**
- . Measuring bowl was used to pour the same amount of water into the test tube.**

Fair test:

For my fair test I had to start at 0 seconds and finish at 5:00 minutes, this is because I needed the time to be exactly right, otherwise the temperature readings would be wrong.

I also needed the amount of water to be approximately 50ml. This is because the measures of the heat loss would not be accurate.

In addition the same stop clock and thermometer were used for consistency.

Safety:

To ensure safety I wore goggles through out the experiment. In addition hot water was handled with care through out the experiment.

Prediction:

I predict that the more test tubes (penguins) are huddled together the less the heat is loss. Which means that the penguins are kept warmer for longer.

EXPERIMENT

1)

First we measured one test tube (penguin) on its own, and checked how long it takes for heat to transfer out. I took the time, which was 5 minutes. Then took the temperature.

FAIR TEST

Time start: 0:00

Finish time: 5:00

Approx. of water: 50ml

RESULTS

Temperature start: 75

Temperature finish: 56

It decreased 19

2)

Then we tried it with three tubes (penguins), but only taking the temperature of the test tube labelled X, which was in the middle. We checked how long it took for the heat to transfer out.

FAIR TEST

Time start: 0:00

Finish time: 5:00

Approx. of water: 50

RESULTS

Temperature start: 75

Temperature finish: 60

It decreased 15

3)

Then we tried it with 6 test tubes (penguins), but only took the temperature of the test tube measured X, which was in the middle. We checked how long it took for heat to transfer out of the test tubes.

FAIR TEST**Time start: 0:00****Finish time: 5:00****Approx. of water: 50ml****RESULT****Temperature start: 75****Temperature finish: 65****It decreased 10****4)**

Then we tried it with 8 test tubes (penguins), but only took the temperature of the test tube marked X, which was in the middle. We checked how long it took for heat to transfer out of the test tubes.

FAIR TEST**Time start: 0:00****Time Finish: 5:00****Approx. of water: 50ml****RESULT****Temperature start: 75****Temperature finish: 68****It decreased 7****5)**

Finally, we tried it with 10 test tubes (penguins) but only took the temperature of the test tube marked X, which was in the middle. We checked how long it took for heat to transfer out of the test tubes.

FAIR TEST**Time start: 0:00****Time finish: 5:00****Approx. of water: 50ml****RESULT****Temperature start: 75****Temperature finish: 72****It decreased 3**

ANAYSIS

The results are shown on the table below:

<i>Amount of test tubes (penguins)</i>	<i>Temperature start</i>	<i>Temperature finish</i>	<i>Amount that decreased</i>
<i>1</i>	<i>75</i>	<i>56</i>	<i>19 degrease</i>
<i>3</i>	<i>75</i>	<i>60</i>	<i>15 degrease</i>
<i>6</i>	<i>75</i>	<i>65</i>	<i>10 degrease</i>
<i>8</i>	<i>75</i>	<i>68</i>	<i>7 degrease</i>
<i>10</i>	<i>75</i>	<i>72</i>	<i>3 degrease</i>

For better visualisation the results are transferred in to a line graph, (with line of best fit and gradient)

Line graph:

EVALUATION

For my evaluation I found out that my prediction was supported and the more test tubes (penguins) were used the less heat was lost, so they kept warmer if more penguins were huddled.

I found out that penguins intend to huddle each other when the temperature is low, to keep them warm, reducing heat loss.

I have realised that some of the things I did may off affect my results. For example the amount of water I put in each test tube. I was using approximately 50ml. This might off affected the amount of heat, which was lost in the test tubes. To improve next time I will use exactly 50ml.

For the experiment to be right we need to have a fair test, and in order to have a fair test we need some things in the experiment to be fair. For example we need the temperature in the beginning to be constant and the amount of water put in the test tubes. Also the same stop clock and thermometer. We the stop lock to begin at 0.00 and end after 5 minutes.

However, in the experiment because of lack of time I was unable to carry the out all five experiments in one lesson. This may have interfered with the results.