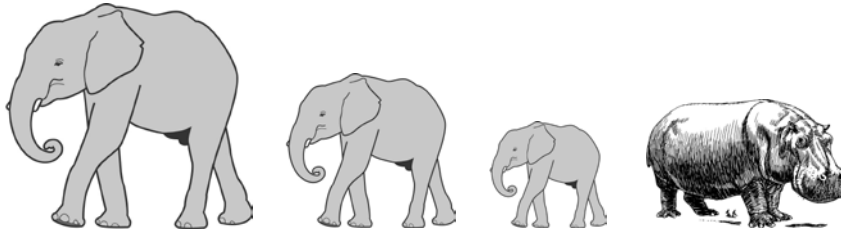


Critical Thinking – Teacher Notes

This can be run as a “Think, Pair Share” activity or as a general class discussion
“Science is just trained and organised common sense”

All Elephants are Grey - Discussion



Statement 1 “All elephants are grey”

Statement 2 “That animal on the right is grey. It must be an elephant!”

This expansion is a simple logical extension of the first statement but is it correct?
Discuss this with your group and write what you think below.

Answers will vary

As scientists we have to reflect on what we know and decide if Statement 2 agrees with what we have already observed and read about. Is there anything we need to know or research before we decide if Statement 2 is true? **Yes. We need to know:**

1. If all elephants really are grey. Actually some Asian elephants are reddish brown.
2. If the grey animal has other important characteristics that it shares with elephants. It doesn't have a trunk, or big ears and it prefers to eat water plants. It is a hippopotamus that happens to be grey!

A good scientist does not make a statement based on only one observation then design an experiment

Hot, Buttered Cats – Discussion

Statement 1 Cats always fall on their feet

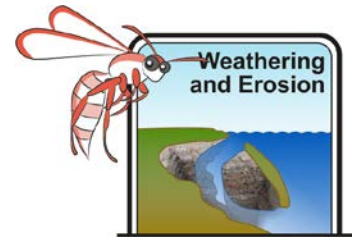
Statement 2 Buttered toast always falls buttered side down.



Does this mean that if you strap buttered toast onto the back of a cat and push it off a high ledge, the cat will not fall? **No. This is too simplistic, although some people would argue that the cat would start spinning in space and never fall to the ground**

Should scientists try this experiment to see what happens? **No. Scientists should be ethical and treat living things with respect. No cats should be damaged to prove or disprove this flawed argument!**

Discuss how you could test the idea put forward in **statement 2** and design an experiment to test this idea.



Critical Thinking – Teacher Notes

Use these headings:

- Aim** (What are you testing?)
- Materials** (What equipment do you need?)
- Method** (What will you do?)
- Observations** (What could you see, feel, smell, and hear and what measurable data did you collect?)
- Conclusion** (What idea could the data collected support)

“But it didn’t work!”

Students may need to be convinced that a negative result is as important as a positive one.

Knowing that a material is useless for writing on will stop others trying to use it.

Knowing which medicines don’t work will save expense and lives and keep researchers looking for a cure.

Students can use **Cows Moo Softly** as a guide. If your school has a canteen, sometimes they will give you old bread to test this. It is a fun experiment and demonstrates well that when there is more than one variable (student size, how the bread is dropped, how far the bread is dropped, if a wind is blowing, not all slices are equal in size and equally buttered etc.) a range of results is collected and the experiment has to be repeated several times and the results averaged to get a meaningful result. Whether bread falls butter side down depends on how far it falls and how it is dropped (assuming the students all held the bread at the same height and each slice was the same size).