

# Controlling Energy Transfer

Year 9, Lesson 1

Week commencing 26th March 2012

# Title: Controlling Energy Transfer

**Objective:** to describe and apply ways in which heat transfer can be controlled

- I must be able to describe 3 ways in which energy transfer can be controlled
- I should be able to apply this to some animals and every day objects

What do these two things have in common?



An elephant's ears



The fins of a motorbike engine

- They have a large surface area to maximise contact with the air
- This increases the rate of energy (heat) transfer
- The elephant has big ears as an **adaptation** to keep it cool in its environment.
- Desert foxes also have big ears but Arctic foxes have very small ears. Both of these examples are also **adaptations**.

# We've now learnt that:

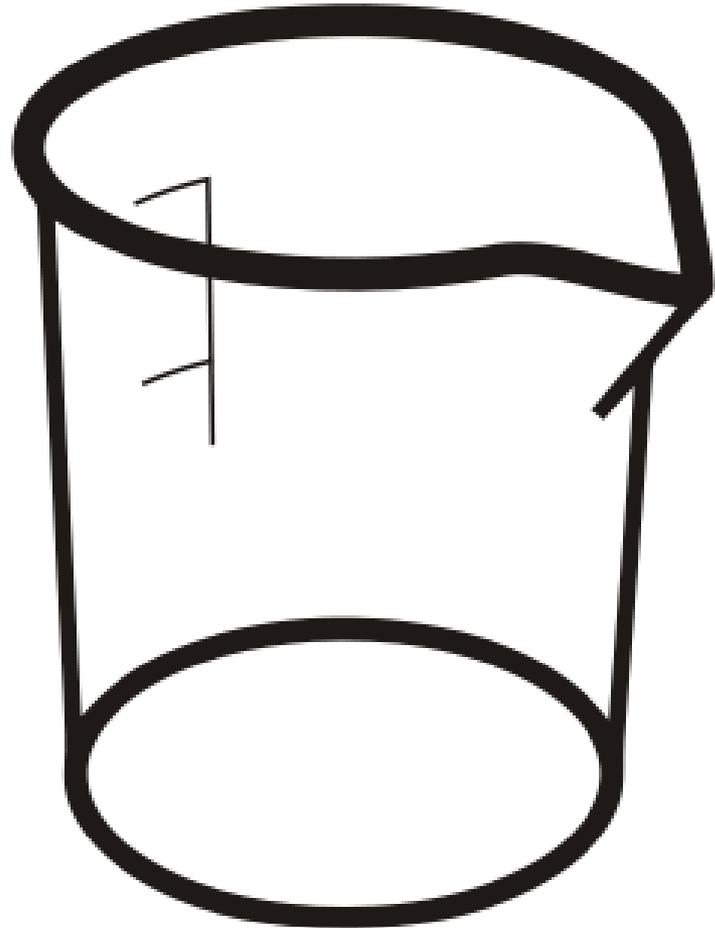
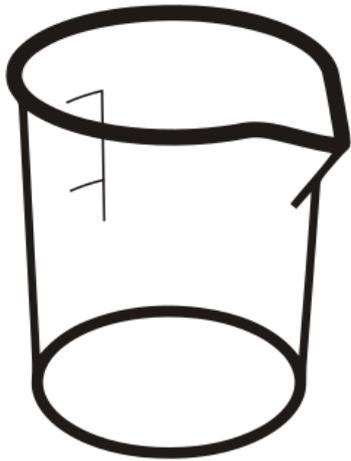
- Conduction is.....
- Convection is.....
- Evaporation is greatest when .....

Energy transfer (in this case – heat loss) depends on:

What do you think?

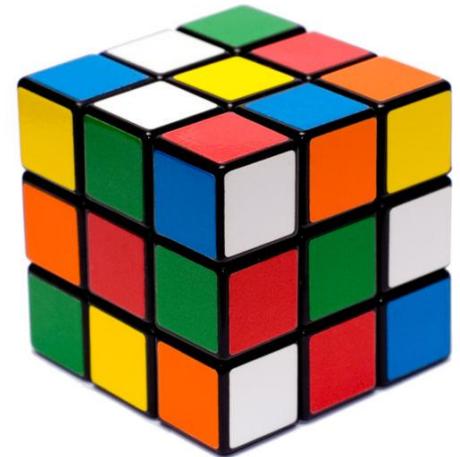
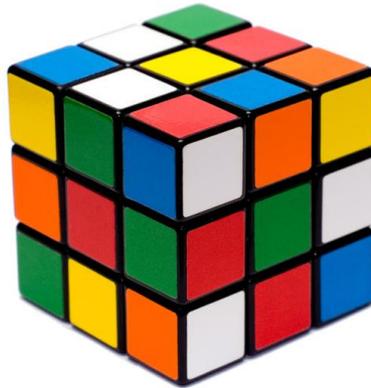
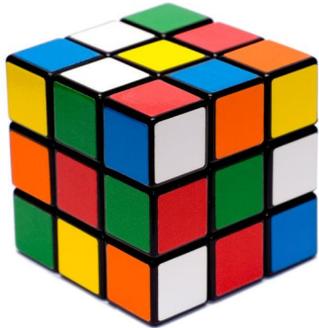
- Shape of surfaces (incl. surface area)
- Type of materials (think about metals)
- The temperature difference between the object and its surroundings

Which of these beakers has a larger surface area compared to its volume?



# Let's illustrate with some cubes

Work out the surface area to volume ratios for a 1X1X1 cm cube, a 2X2X2 cm cube and a 3X3X3 cm cube.



# Practical – measuring heat loss

- You have 2 beakers (one large and one small), two thermometers and 2 stop watches.
- How would you design an experiment to measure the heat loss from the two cups.
- What is your hypothesis?
- What are the independent and dependent variables?
- What do you need to control?
- Write a hypothesis, method, results and conclusion.

# What you need to do:

- Measure temperature of each beaker of water every 30 seconds for 5 minutes
- Roles within group:
  - Measurer 1– measure temp. of small beaker
  - Measurer 2– measure temp. of large beaker
  - Writer – write down the temperatures that 1 and 2 call out to you.
- When you have finished **evaluate** how the experiment could have been more **accurate** and **precise**.

# Plenary – Answer in books.

1. In a car, there is a cooling system whereby heat is transferred from the engine to the radiator. The radiator is black and has a large surface area. Why is this?

2. Describe some ways in which you think this Brahman cow might be adapted the climate it lives in.

