Fair Test & Control Experiments: 1

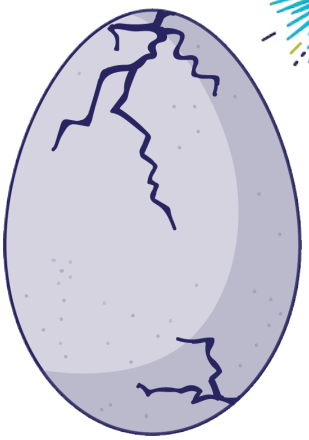
Mr Cleere's class has decided to investigate whether the **flavour of ice cream** affects how quickly it **melts**. Whilst making plans their teacher points out that in order to get reliable results it is really important that they make sure their experiment is a '**fair test**'. They have already decided to test three of their favourite flavours; vanilla, chocolate and strawberry. So, '**flavour'** is the one variable that will be different for each test that they do.

Discuss: **Can you agree on a list of all of the variables that (ideally) should be kept the same as they measure how long it takes for each ice cream flavour to melt?**

Discuss: **Think about each variable on your list and discuss how hard (or easy) it will be to keep it the same in practice. Which variables do think will be the most important, and easiest to keep the same?**

Fair Test & Control Experiments: 2

Sean's class is investigating ways to drop a raw egg out of a first-floor window without cracking the shell as it reaches the ground. Their teacher has challenged them to achieve this using only a very limited amount of equipment. They will only be given 1 raw egg, 2 large sheets of newspaper, 8 paper straws, 1m of string, 1m of sellotape and a pair of scissors. They separate into groups and come up with different plans and designs. They are all given one hour to have their designs ready. They then drop each one out the window to see which solution works the best.



Discuss: **In what ways has their teacher made this engineering investigation a fair test?**

Discuss: **Their teacher says that she will add a "control experiment" for them to compare their designs to. What do you think she plans to do?**

Fair Test & Control Experiments: 3

Zeb's parents always complain that they cannot drink a cup of coffee in the evenings because it stops them from getting to sleep easily. They blame the **caffeine** that is in the coffee. However, Amy's parents drink coffee near bedtime and say they don't have any problems with getting off to sleep at all. This has inspired their class to investigate this in a scientific way and see if they can uncover whether caffeine has a **real** effect on some people's ability to fall asleep or if it is **all in their heads**.

They have come up with an **outline plan** and this is what it looks like:

1. Find 10 adult volunteers who are safe to drink coffee.
2. Provide each volunteer with 3 measured samples of normal instant coffee.
3. Ask them to drink one portion of coffee exactly 1 hour before they go to bed on three separate nights.
4. In the morning they should record any information about how easy it was to fall asleep.
5. They also ask them to pick three other nights where they do not drink the coffee (or any other caffeine drink) and to report on how easy they found it to go to sleep on each of those nights.

Their teacher says that this is a good start and asks them to consider what else they could ask the volunteers to do in order to make this more of a 'fair test'.

Discuss:

Have you any ideas on how to improve this plan? It's not easy to make all the variables exactly the same for each test because people's lives and habits are so complicated and different. What sensible suggestions could make the results of this test more reliable?

In their class discussions Ciara points out that even with these improvements their plans may not properly answer their original question. It is possible that some people may not fall asleep easily simply because **they know they are drinking coffee with caffeine** (like the placebo effect). It would be better if the class could add a "control experiment" to get more information and to be more sure of their results. Their teacher explains that most coffee makers sell a **decaffeinated version** of their coffee and it looks and taste nearly the same.

Discuss:

How do you think that the class could use this decaffeinated coffee in their experiment? Should they tell the volunteers about the use of the decaffeinated coffee before or after the tests?