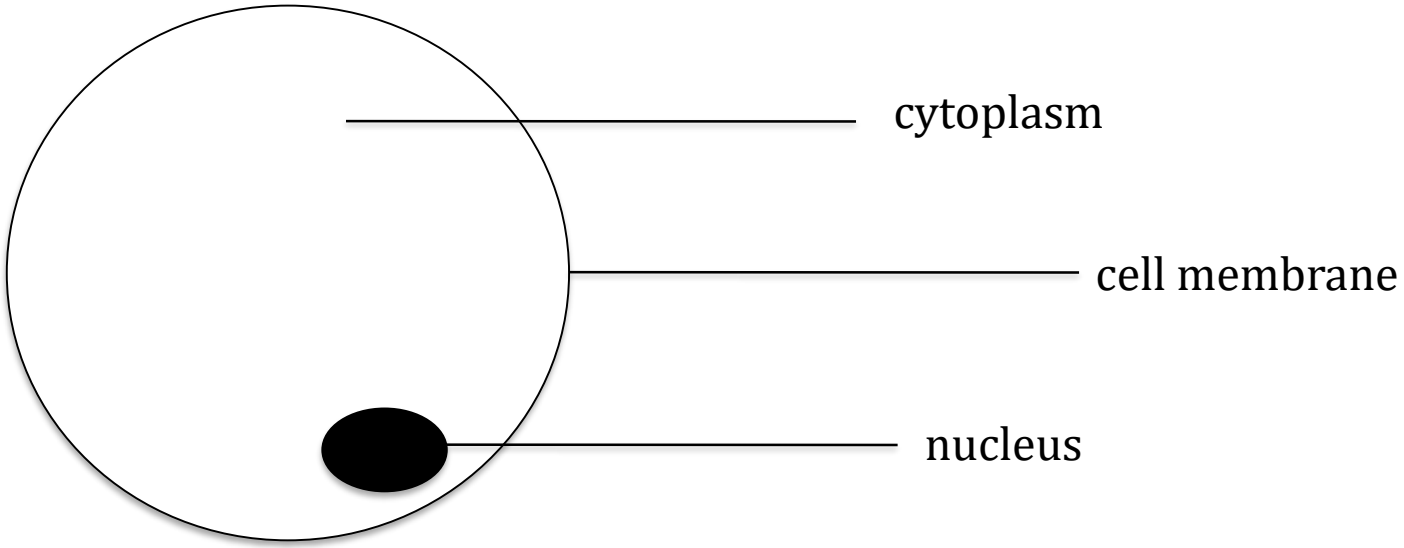
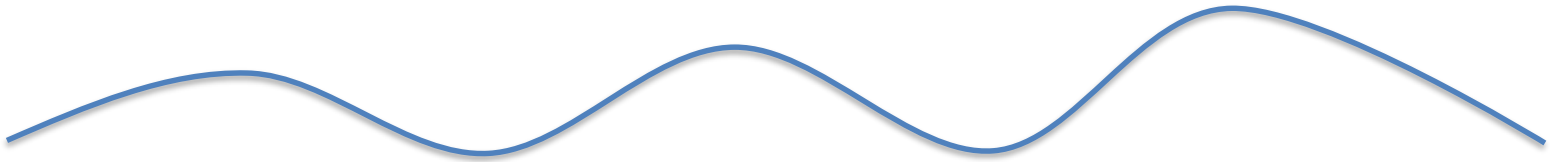
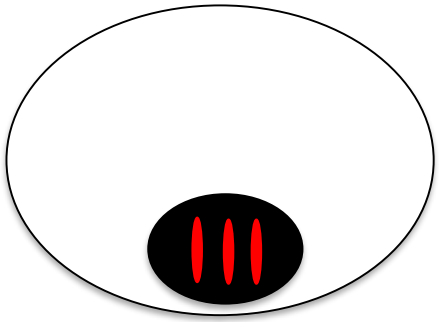
Topic	Organisation of genetic information inside the nucleus	**Level**	Key Stage 3 (or any course for students aged 11-16)
Outcomes	1. To understand the relationship between the nucleus, chromosome, DNA, gene and characteristics.		
Information for teachers	This is a difficult and abstract topic for students to understand. I've spent quite a bit of time thinking about the best way to introduce these abstract ideas and hope this helps! The analogy model is introduced in parallel with the scientific idea which hopefully helps students make sense of the relationships involved. Start by asking students what they would 'see' inside the nucleus of a cheek cell if they had a very powerful microscope. Then introduce the scientific idea and finally the model. Using string to represent DNA, genes and chromosomes may help. Give time for students to work in small groups to talk through and internalise the questions on slide 4 before finally asking them to write their own answers on paper. Using a demo to isolate DNA from fruit may help students to conceptualise what is being taught in this lesson by providing a concrete starting point.		

Imagine if we could reach inside the nucleus of a cheek cell. What would we find?





The scientific idea

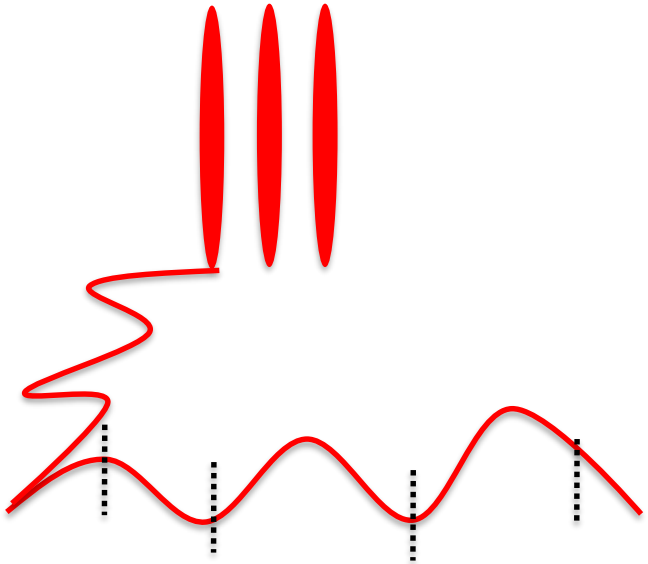


a nucleus

contains

chromosomes

made from



DNA

that make up

Genes

that control

Hair colour

Eye colour

Characteristics

A model to help

a library

contains

cook books

made from

words on paper

that make up

Recipes

that control

What cake is made

County Library

Jamie Oliver

30 Minute Meals

Mary Berry

Cooking for the family

Hello world!

1. *Add 100 grams of flour*
2. *Pour in the milk*
3. *Stir*
4. *Add 100 grams of grated carrot*

Use the picture to answer the following questions.

1. Put the following in order of size - start with the smallest first:
   - nucleus
   - gene
   - chromosome
2. What are chromosomes made from and where do you find them inside a cell?
3. How many chromosomes were in the picture?
4. Each chromosome will carry hundreds of genes. How many genes were in the picture?
5. If a cell had only one chromosome, with five genes, how many characteristics could be inherited?
6. Give one example of a characteristic that is controlled by a gene.
7. How are recipes similar **and** different to genes?
8. Write a paragraph to explain the relationship between genes, chromosomes and characteristics.

Use the picture to answer the following questions.

1. Put the following in order of size - start with the smallest first:
   - gene
   - chromosome
   - nucleus
2. What are chromosomes made from and where do you find them inside a cell? DNA, inside the nucleus
3. How many chromosomes were in the picture? 3
4. Each chromosome will carry hundreds of genes. How many genes were in the picture? 2
5. If a cell had only one chromosome, with five genes, how many characteristics could be inherited? 5
6. Give one example of a characteristic that is controlled by a gene. Eye colour/ ability to roll your tongue.
7. How are recipes similar and different to genes? They both provide information about how to make something specific, there are lots of different recipes, there are lots of different genes. Genes are recipes can change over time. Recipes are made from words, genes are made from DNA – they have a different code.
8. Write a paragraph to explain the relationship between genes, chromosomes and characteristics. Chromosomes are made from DNA that is tightly coiled up. Genes are sections of the DNA that control specific characteristics.