



# TEACHER'S NOTES

## MAKING PROTEINS

### OVERVIEW

Aimed at **key stage 3** pupils:

In this activity, students compare a recipe used to bake a cake with the way their DNA tells their body how to make proteins.

### CURRICULUM LINKS

- KS3: Life processes are supported by the organisation of cells into tissues, organs and body systems

### LEARNING OBJECTIVES

- DNA tells the body how to make different proteins.
- Small differences in DNA can have large consequences, such as causing medical conditions.

### PREPARATION

- Print worksheets

### Activity

- If possible, show **What "genes" means** animation from Genes Are Us website. Otherwise, use the recipe analogy to explain that DNA codes for proteins.
- Explain that mistakes in the DNA can lead to mistakes in the body.
- Class complete worksheet.
- This could link with the **Nature and Nurture** activity on the Genes Are Us website.

### ANSWERS 1. Circle the 5 mistakes in the second recipe:

Legs (eggs), Flower (flour), Litre (little), 50 (20), Ham (jam)

#### 2. Do you think both cakes would taste good?

No – the second recipe would taste pretty disgusting

#### 3. In your own words – what is a gene?

It's a section of DNA that encodes a protein. It is an instruction that helps tell your body grow, develop and function. Genes determine inherited characteristics, such as eye colour. A gene is like a recipe telling your body how to make proteins.

#### 4. Explain why changes to a gene can cause a medical condition?

Pupils should convey the idea that DNA codes for

proteins just like the recipe codes for a cake. If there is a mistake in the recipe, such as using ham instead of jam, the whole cake could be affected, therefore the whole protein could be affected.

#### 5. Do all changes to genes lead to problems?

No – the majority of gene changes do not cause problems. They lead to the small differences between individuals, such as blood type, shape of nose, hair colour.

#### 6. List at least 3 inherited characteristics (eg. eye colour)

Simple examples include hair and skin colour, shape of facial features etc.

Many characteristics, such as height, are influenced by environmental factors, but do have a genetic component.

### FURTHER INFORMATION

The analogy of a recipe is used to explain the idea of DNA coding for proteins, just as a recipe tells you how to make a cake or gingerbread man. If there is a mistake in the recipe (DNA), it might mean that the cake (protein) will not be made properly.

Variations in the genetic code can result in a disorder, for example Connor (in the film from Genes Are Us website) has Duchenne Muscular Dystrophy. However, it is important to point out that not all changes are harmful, for example differences in DNA sequence determine which colour eyes and hair a person has.

FOR MORE RESOURCES LIKE THESE, AND TO SIGN UP FOR JEANS FOR GENES DAY, VISIT US AT [WWW.JEANSFORGENES.COM](http://WWW.JEANSFORGENES.COM)

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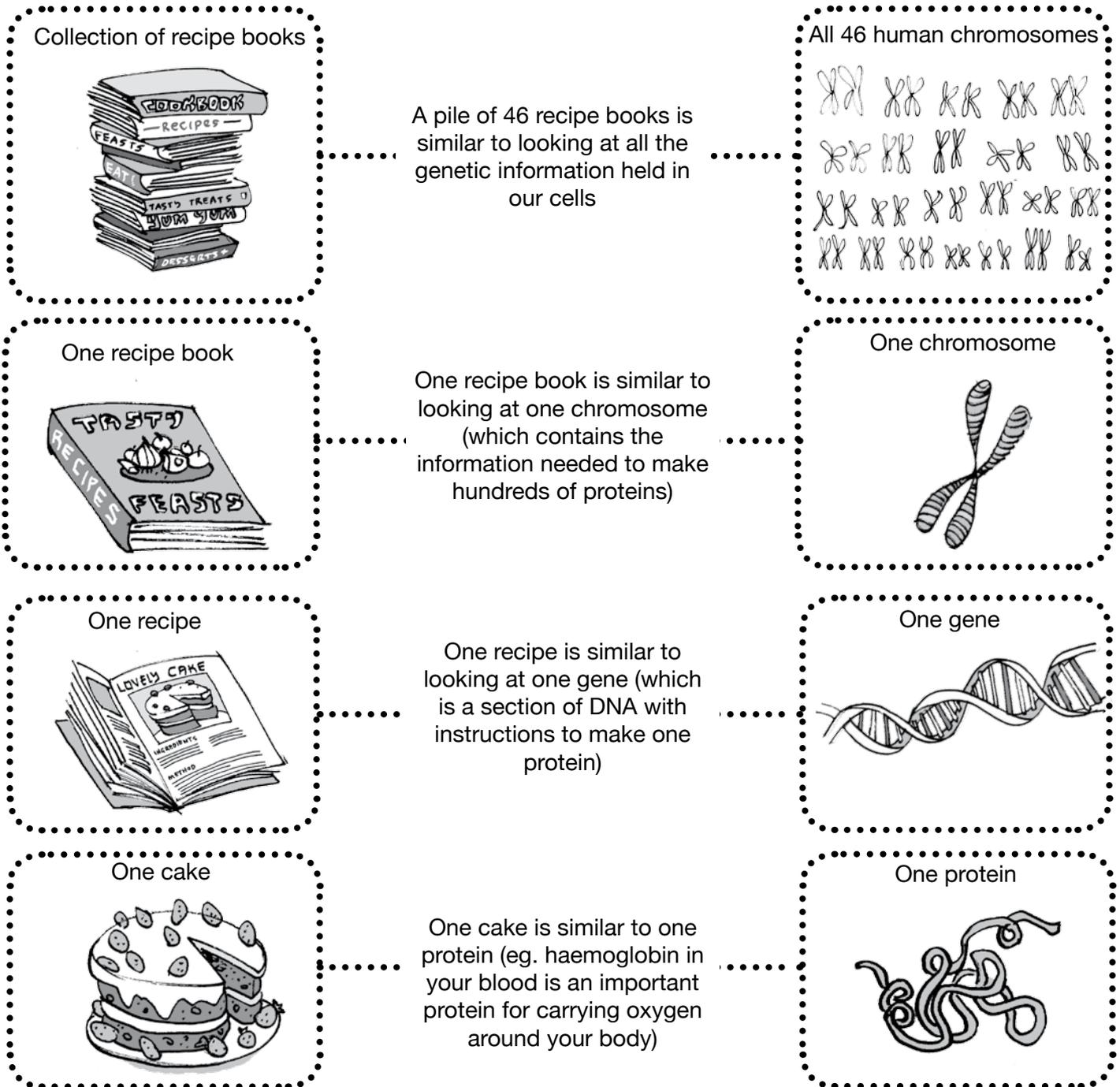


# MAKING PROTEINS

DNA contains the genetic information to help your body grow, develop and function.

Your body can read DNA to give it instructions. It is similar to the way you would read a recipe to help you bake a cake. DNA provides the information to tell your body how to make different proteins.

The diagram below compares a set of recipe books to the chromosomes and DNA inside you.



If there is a mistake in a recipe, the cake may not taste how you expect it to.

If there is a mistake in a gene, the protein may not form properly.

# MAKING PROTEINS

Here is a recipe for baking a cake:

Cream the butter and the sugar together until pale, light and fluffy. Beat the eggs into the mix a little at a time. Sieve the flour and fold into the mix using a large metal spoon. The mixture should be of a dropping consistency – if it isn't, add a little milk. Divide the mixture between the two tins and gently spread out with a spatula. Bake for 20 minutes. Allow to stand for five minutes before turning on to a wire rack to cool. Sandwich the cakes together with jam and cover with caster sugar.



Cream the butter and the sugar together until pale, light and fluffy. Beat the legs into the mix a little at a time. Sieve the flower and fold into the mix using a large metal spoon. The mixture should be of a dropping consistency – if it isn't, add a litre milk. Divide the mixture between the two tins and gently spread out with a spatula. Bake for 50 minutes. Allow to stand for five minutes before turning on to a wire rack to cool. Sandwich the cakes together with ham and cover with caster sugar.

- 1 Circle the 5 mistakes in the second recipe:
- 2 Do you think both cakes would taste good?
- 3 In your own words – what is a gene?
- 4 Explain why changes to a gene can cause a medical condition?
- 5 Do all changes to genes lead to problems?
- 6 List at least 3 inherited characteristics (eg. eye colour)



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