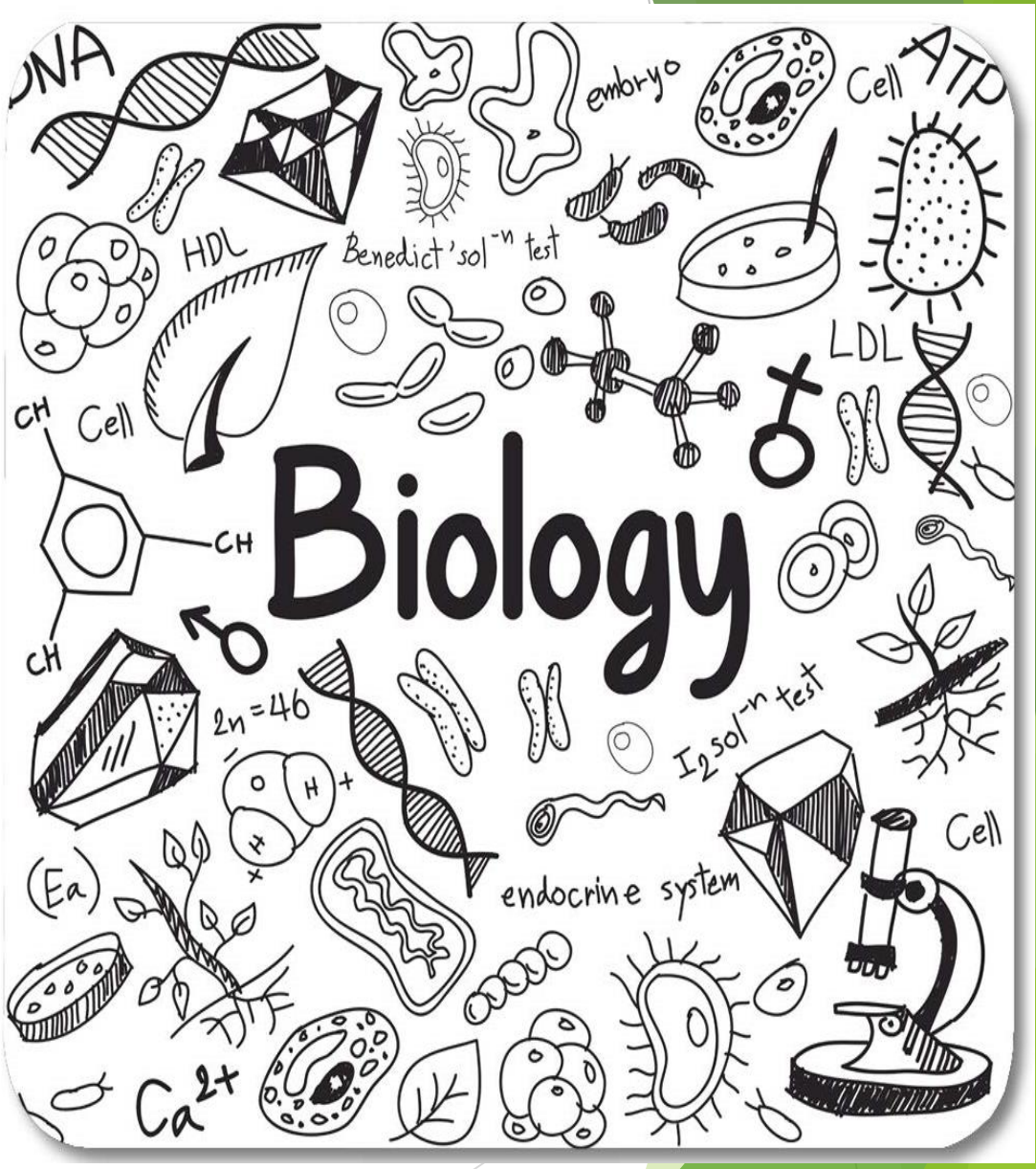
The National Orthodox School Shmaisani

Lesson: Dominant & Recessive genes

Scholastic Year: 2022-2023

Grade: 8 CS



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Objective : Use ideas about dominant and recessive genes to predict the characteristics offspring will inherit .

Resources : Student book pages 214 – 215

Workbook page 92

Power point

Video https://www.youtube.com/watch?v=rdJzAbRMC2o allele 1

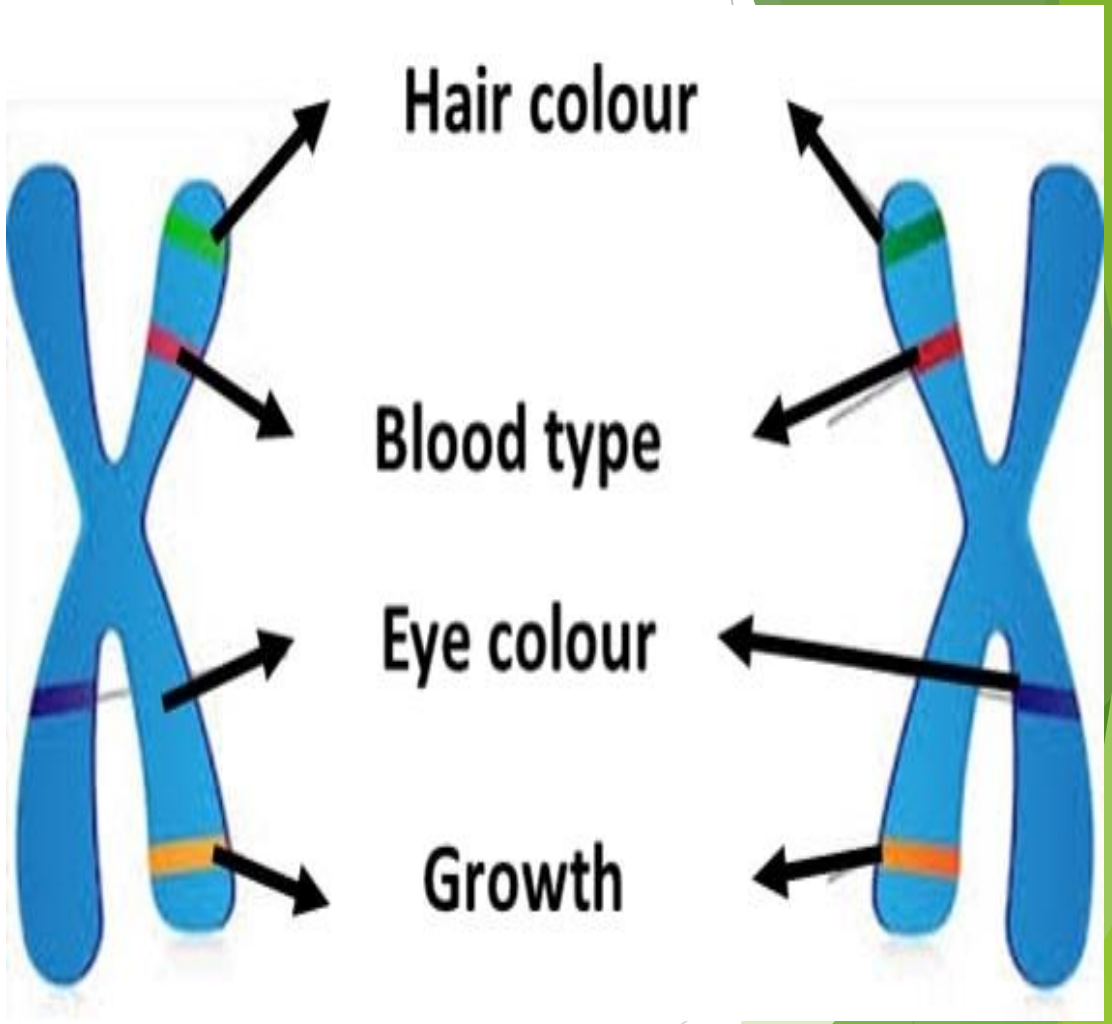
https://www.youtube.com/watch?v=F09kUKWSvAQ allele 2

https://www.youtube.com/watch?v=G-_fwABa2BU dominant & recessive

Allele

An **allele** is one of a pair of genes that appear at a particular location on a chromosome and control the same characteristic, such as blood type or eye color.

Alleles are different forms of the same gene .



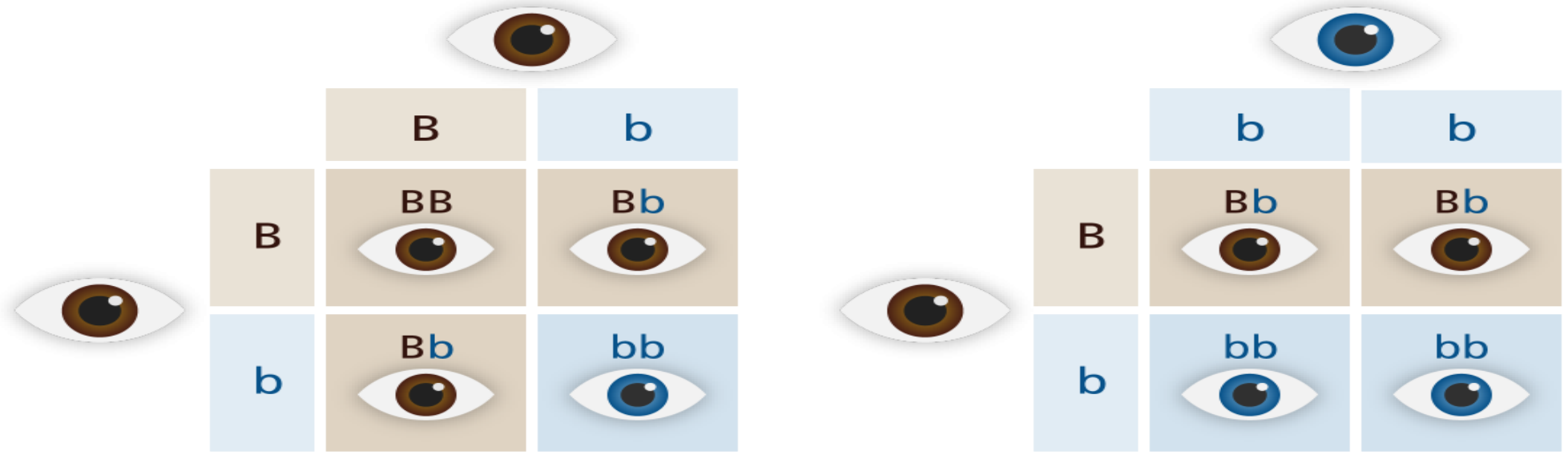
Dominant and Recessive genes .

Dominant refers to the relationship between two versions of a gene.

Individuals receive two versions of each gene, known as **alleles,** from each parent. If the alleles of a gene are different, one allele will be expressed; it is the **dominant** gene. The effect of the other allele, called **recessive**, is masked.

Dominant and Recessive genes

Example:



B – dominant brown eye allele

b – recessive blue eye allele

BB brown eyes

Bb brown eyes

bb blue eyes

17.4

Investigating inheritance

Objective

- Use ideas about dominant and recessive genes to predict the characteristics offspring will inherit

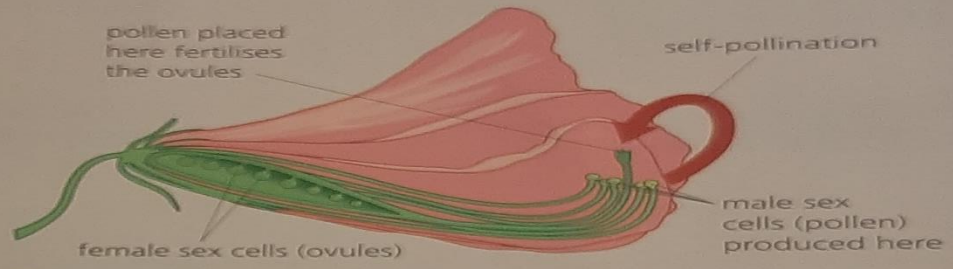
Gregor Mendel

A monk called Gregor Mendel used creative thinking to explain inheritance 150 years ago – before genes were discovered.

Mendel worked with tall and short pea plants. Each pea flower makes male and female sex cells, so they can self-pollinate and produce tall or short offspring identical to the parent plant.

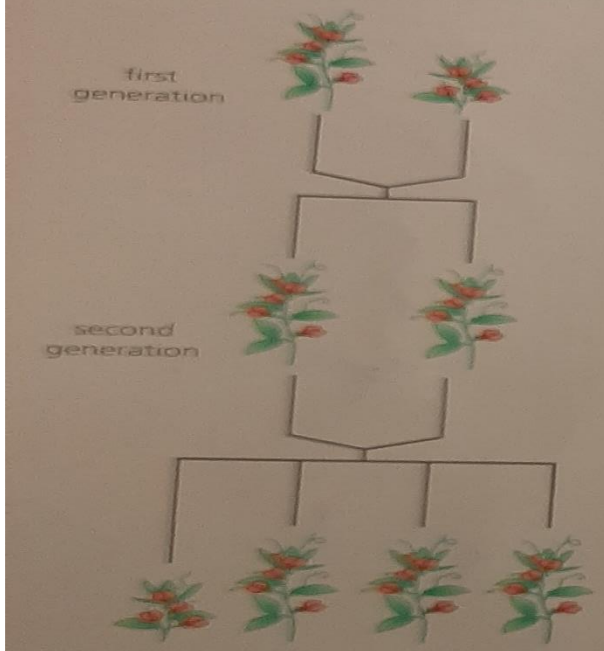
Mendel's work helped to explain how characteristics are inherited.

Mendel stopped flowers self-pollinating by taking away their anthers. Then he used a brush to transfer pollen from his chosen type of pea plant to fertilise the flowers. All the offspring of the cross between tall and short pea plants were tall.



Mendel prevented self-pollination so that he could control which pea plants produced offspring.

When these tall plants in the second generation fertilised each other, some of the third generation were short.



There were no short plants in the second generation, but some appeared in the third generation.

Mendel's theory

Mendel's theory was that two 'factors' control each feature – one factor from each parent. These 'factors' are now called genes.

The genes in a pair can be the same or different. One gene makes peas tall; another makes them short. When peas have one of each, they are always tall.

Genes that stop other genes having an effect, like the gene for tall pea plants, are called **dominant** genes.

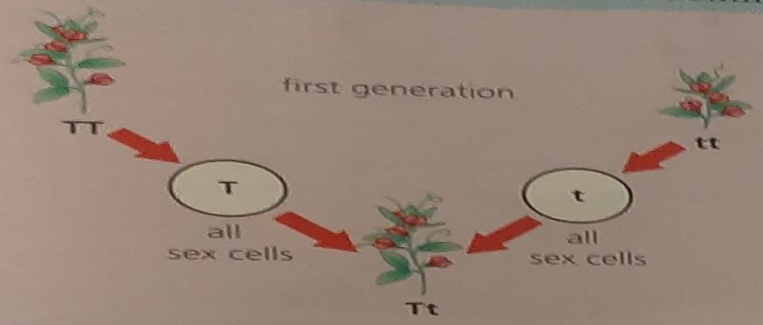
Dominant and recessive genes

So where did the short plants come from in the third generation?

Mendel invented a code to explain what happens. In the diagram **T** shows the dominant gene and **t** shows the version that makes plants short. This is called a **recessive** gene because it does not show up when there is a dominant gene with it.

In the first generation, the tall plants have two **T** genes, so all their sex cells (pollen and ovules) have one. The short plants have two **t** versions, so all their sex cells have a **t** gene.

The second generation plants inherit a gene from each parent so they have both sorts: **T** and **t**. The **T** version is dominant so the pea plants are all tall.

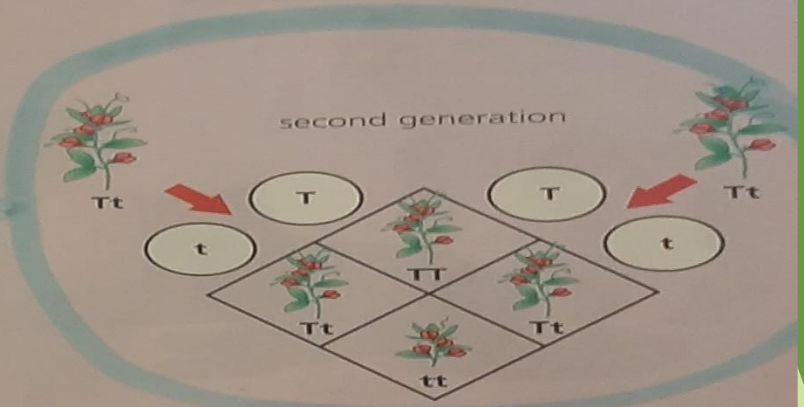


All the 2nd generation are tall because they inherit one of the dominant genes

Each of the second generation plants makes two sorts of sex cells. On average, half carry **T** and half carry **t**, so many of the offspring will have **Tt** again. But male sex cells carrying **T** or **t** could fertilise female sex cells with the same gene. So plants with **TT** or **tt** genes could also be made.

The **TT** and **Tt** plants are tall. But the **tt** plants are short because they don't have the dominant **T** gene. In a cross like this where both parent plants have one of each gene, there is a 1 in 4 chance that their offspring will be short.

Mendel found six other pea features that were inherited in the same way as tallness. Breeding experiments prove that other organisms can inherit different versions of genes in the same way as pea plants.



There is a 1 in 4 chance that the peas in the third generation will inherit two recessive genes and be short.

Q

1. Did Mendel's second generation pea plants inherit their parents' features?
2. How did Mendel make his tall and short plants fertilise each other?
3. How can you tell that the gene that makes peas tall is a dominant gene?
4. Why are the second-generation plants all tall?
5. Explain why some of the third-generation plants are short.
6. Draw a diagram to show what would happen if a tall pea plant with **Tt** genes was crossed with a short plant.

- Our features are influenced by the genes we inherit.
- Genes come in pairs and organisms can inherit two different versions of a gene.
- When one gene of a pair is dominant, it controls a characteristic.

Workbook page 92 / Questions 2,3,4

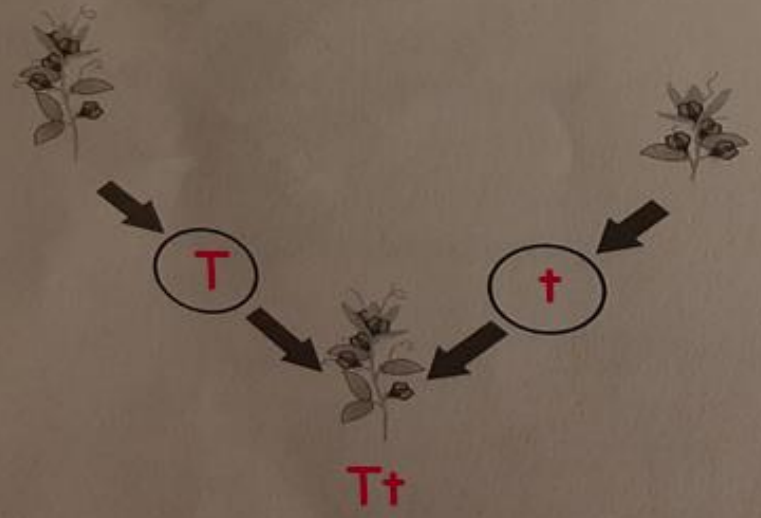
2 Mendel's 'factors' are now called *genes*, but we still use the code he invented to explain how they are inherited. Decide whether plants with the following genes would be 'tall' or 'short'.

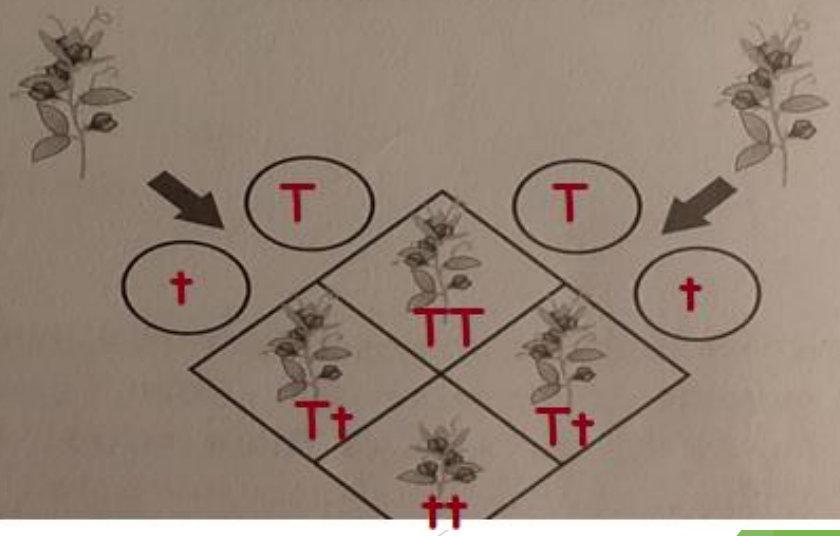
a TT..... Tall .....

b tt..... short .....

c Tt..... Tall .....

3 Label the diagram on the left to show why all the second generation are tall.
Complete the diagram on the right to show why some of the third generation are short.





4 Decide whether these genes are 'dominant' or 'recessive'.

a Shaun has red hair. His wife and child have brown hair. The red hair gene is Recessive

b Seb has two different eye colour genes. His eyes are brown so this gene is Dominant

c Nadira has two versions of a gene. One causes a disease. The other does not. Nadira does not have the disease, so the gene that causes the disease must be Recessive