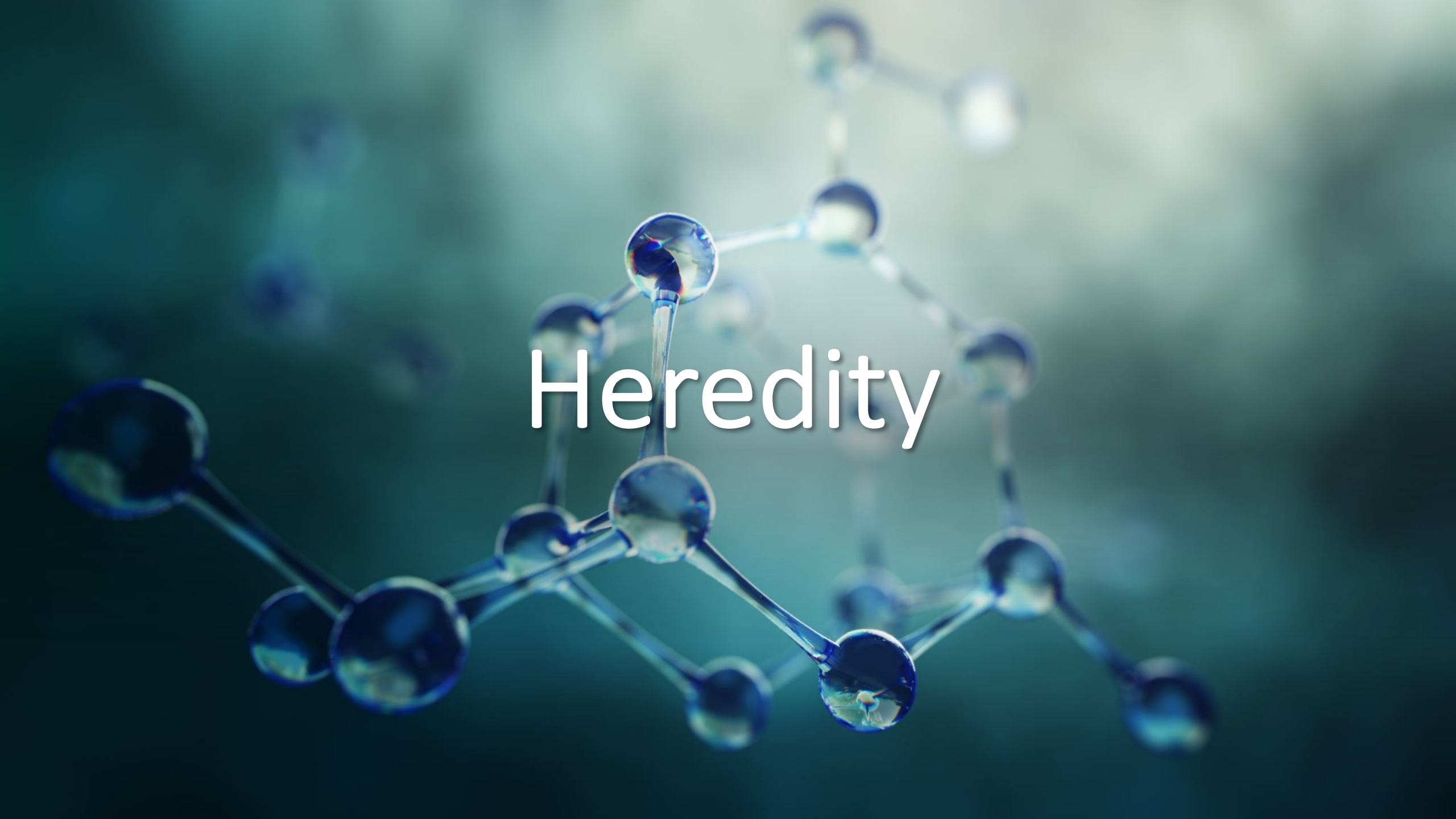
GED Science Day 2


Heredity

Essential Questions

What processes are responsible for life's unity and diversity?

How are traits passed from one organism to its offspring?

GREGOR MENDEL

Gregor Mendel was born in 1822 in Heinzdorf be Odrau, Austria, today part of the Czech Republic. As a young man he studied philosophy and physics. In 1843 he decided to become a monk, and entered the Abbey of St. Thomas. Born Johann Mendel, he took the name Gregor when he began his religious life.

In 1851, Mendel went to study at the University of Vienna and returned to his abbey as a teacher in 1853. Inspired by his professors and colleagues and by his love of plants and nature, Mendel began the plant experiments for which he is known. He grew and tested over 28,000 pea plants. He wanted to discover how traits are passed on from parents to their children. Traits are things such as hair color and eye color or, in the case of pea plants, height.

At the time, it was thought that the traits of offspring were simply blends of their parents' traits. For example, when Mendel bred a tall pea plant with a short pea plant, he might have expected to get medium-sized plants as their offspring. Instead, the offspring were all tall plants. From this, he figured out that each parent must have a unit passed directly to the offspring that determined height. Today we call those units genes.

Next, Mendel bred these hybrid, or combination, plants with each other. He discovered that the hybrid parent plants produced about three tall plants for every one dwarf plant. He figured out that this meant that one gene, the one for tallness, was stronger than the one for shortness. These stronger traits are called dominant traits, and the weaker called recessive. Mendel's experiments with his pea plants laid the foundation for the study of heredity. For this reason, he is called "The Father of Modern Genetics".

VOCABULARY

Look at the text and define these key concepts:

Traits _____

Genes _____

Hybrid _____

Think about your family. What physical traits do you have in common with your mother? What do you have in common with your father? How about your siblings or cousins? List them in the columns below.

Mother

_____

_____

Father

_____

_____

Sisters/Brothers

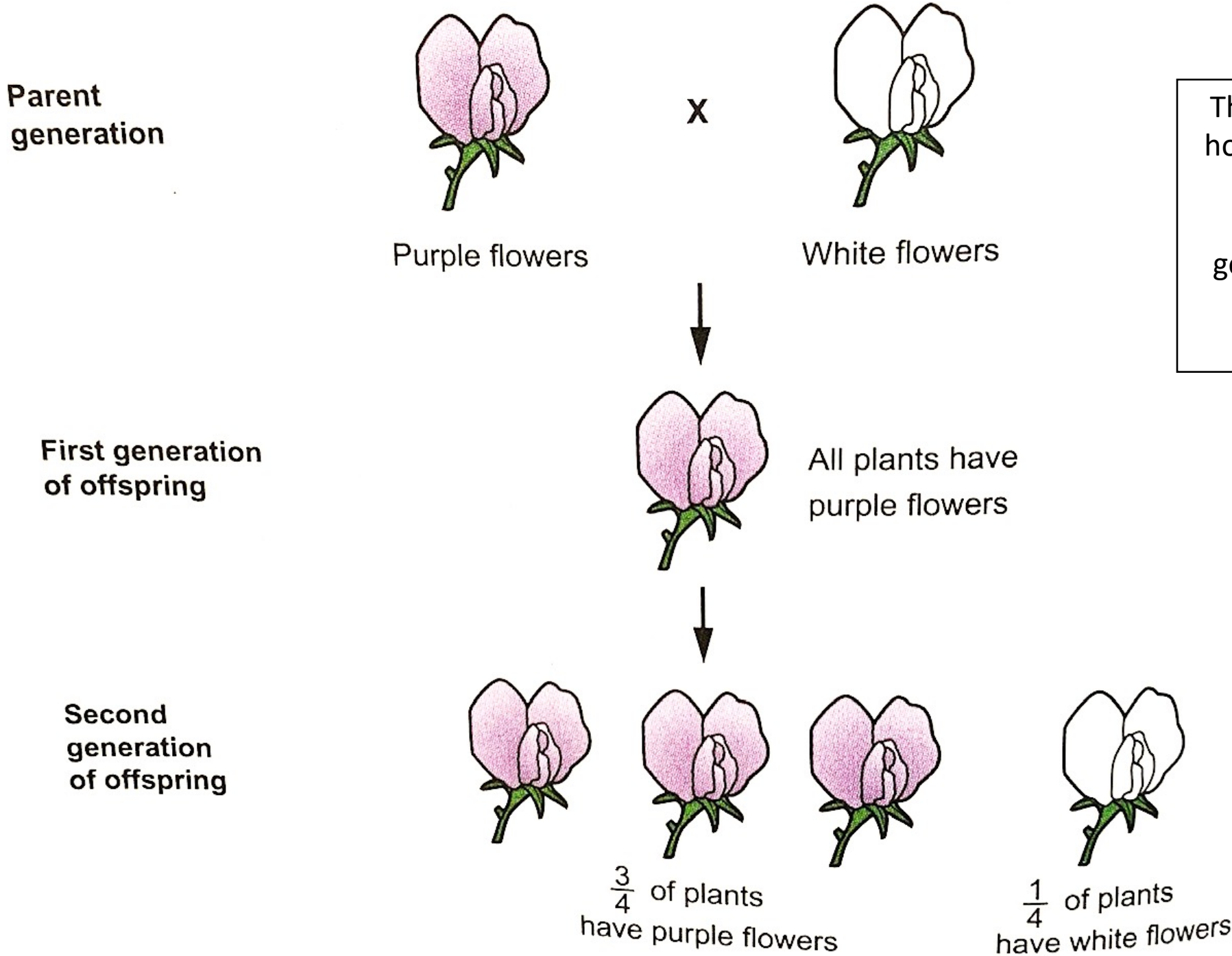
_____

_____

Cousins

_____

_____



This diagram shows how a trait is passed from parents to offspring across generations. In this case, the trait is flower color.

Looking at the diagram of pea plants…

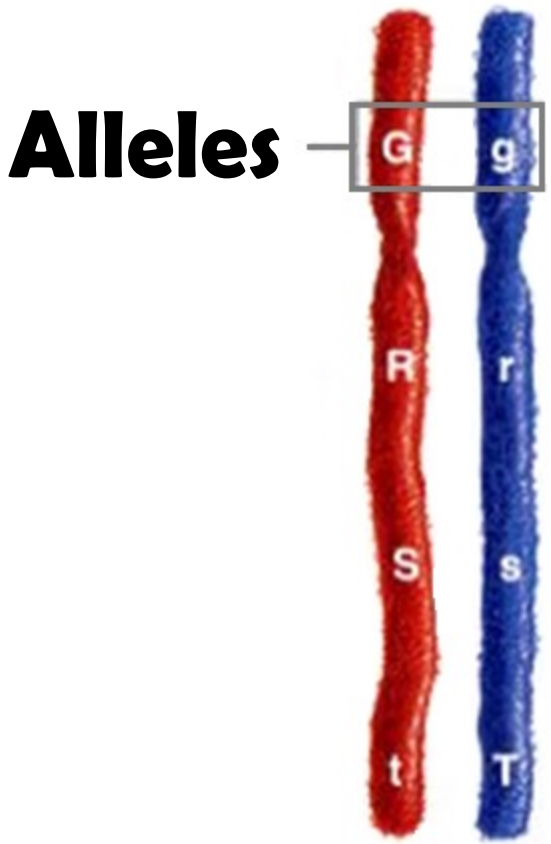
What do the investigation results suggest about the trait of flower color in pea plants?

1. Plants with purple flowers cannot reproduce plants with white flowers.
2. A trait may reoccur even after it does not occur in a generation.
3. Plants with purple flowers are more likely to survive than plants with white flowers.
4. A single offspring shows a blending of the traits of both parents.

GENOTYPE AND PHENOTYPE

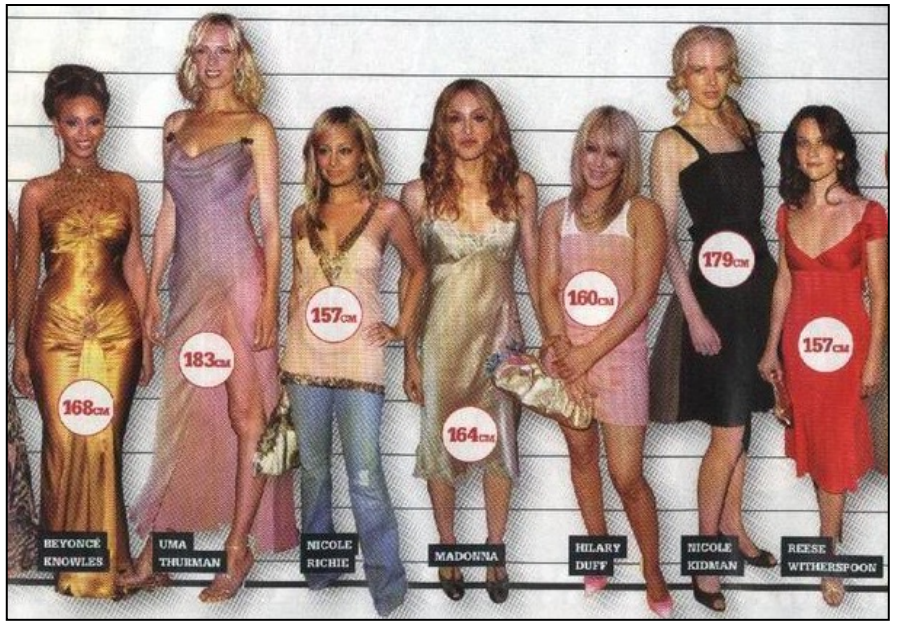
Differing traits, such as different flower colors in pea plants, are related to alleles. Alleles are the two forms of a gene in a gene pair. An organism receives one allele from each parent for each gene. A gene's alleles can be identical or different. Also, alleles can be dominant or recessive. Scientists use symbols such as *PP*, *Pp*, or *pp* to represent the alleles of a gene. A capital letter indicates the dominant allele. If the dominant allele is present, the organism demonstrates the trait associated with that allele. The term *genotype* refers to the makeup of the alleles in a gene pair. The term *phenotype* refers to the observable expression of a particular genotype.

Alleles are usually represented by letters.



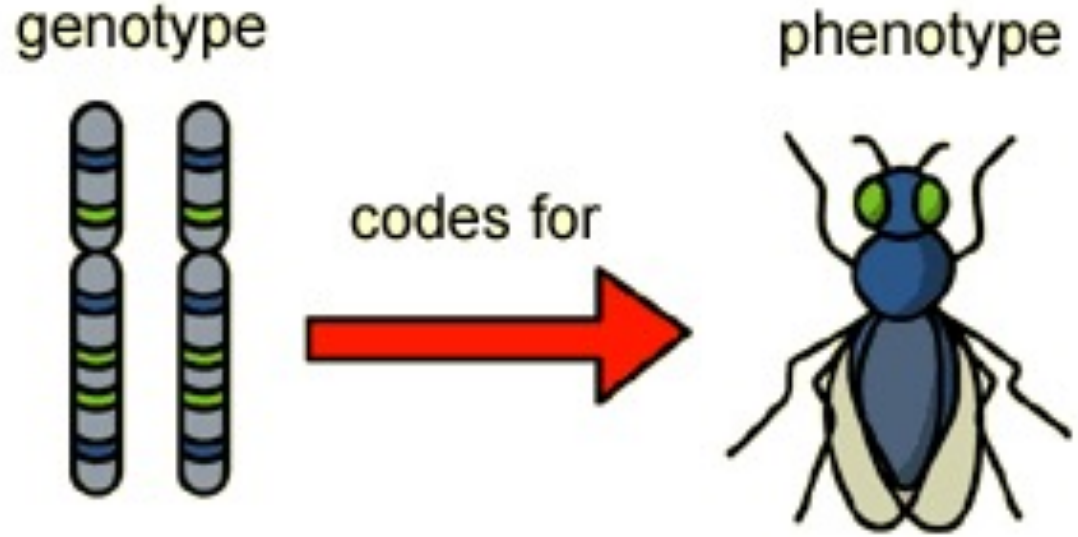
Phenotype

An organism's phenotype describes the physical characteristics that can be observed.

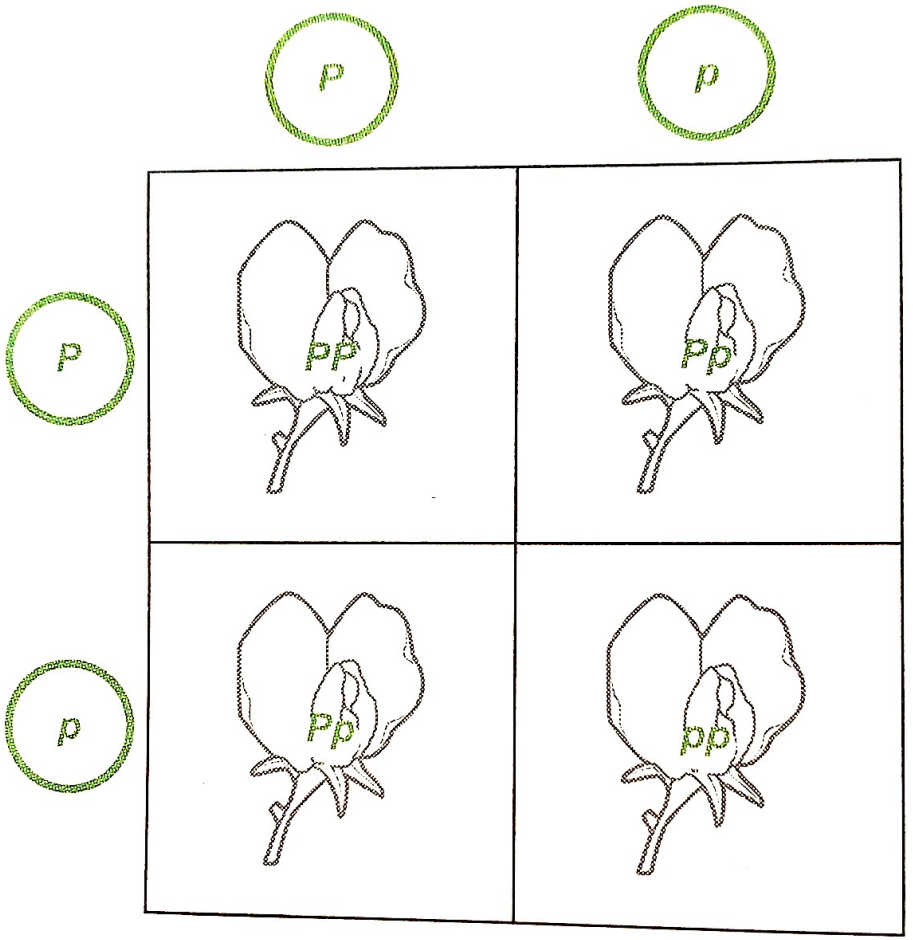


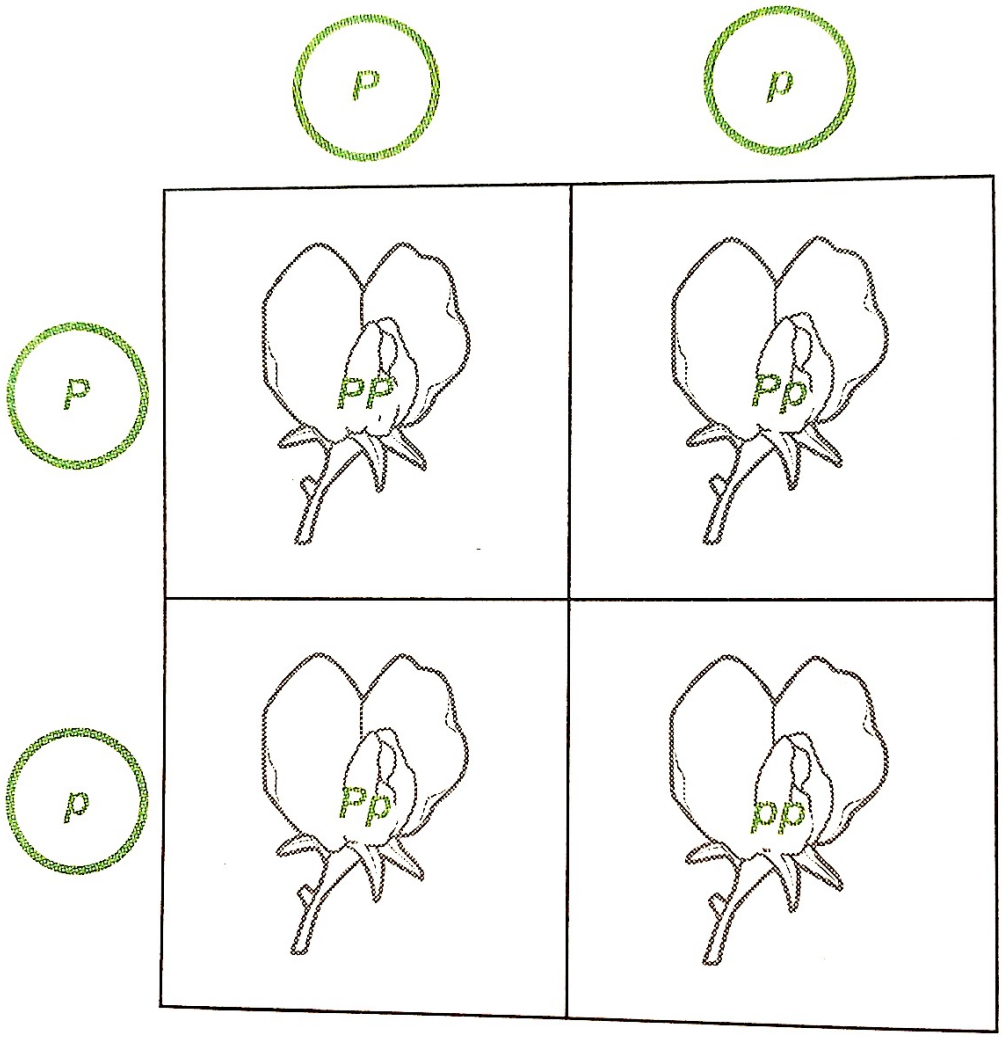
Genotype

An organism's genotype describes the actual genes an organism has. Your genotype is not always obvious from your phenotype.

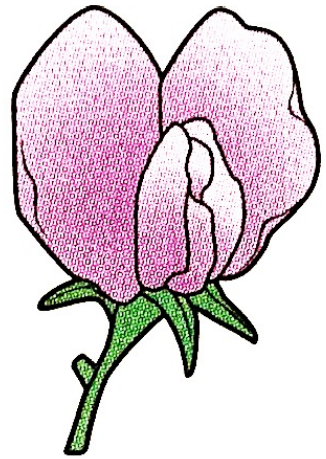


When the genotypes of parents are known, scientists can use Punnett squares to show the potential genotypes of their offspring. On a Punnett square, the genotype of one parent forms column headings, and the genotype of the other parent forms row headings. Each box is filled in with the letters from the corresponding row heading and column heading. The Punnett square below represents the breeding of two pea plants, with *P* representing the allele for purple flower color and *p* representing the allele for white flower color. Scientists can determine the likelihood that two parents will produce offspring with a certain genotype based on the frequency with which that genotype appears in a Punnett square.

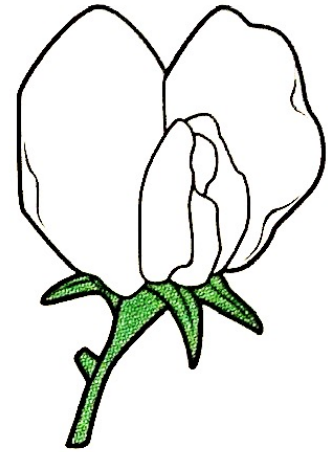




Based on the Punnett square, which phenotype is likely to occur in offspring 75 percent of the time? Mark an *X* on the correct phenotype.



Purple flower color

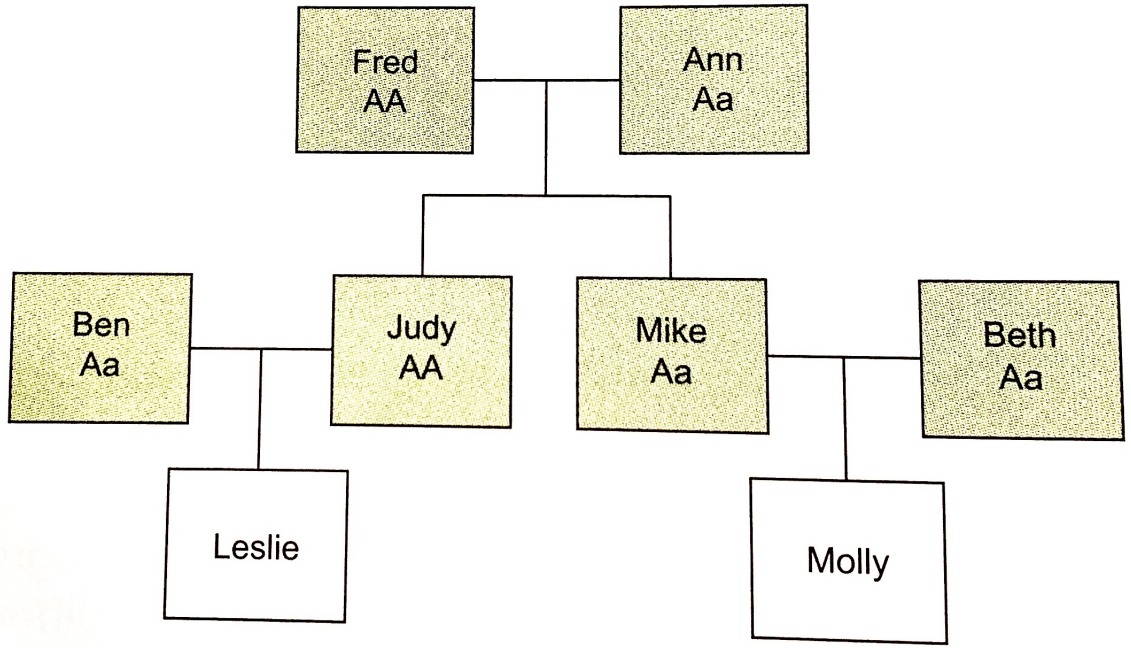


White flower color

Pedigree Chart

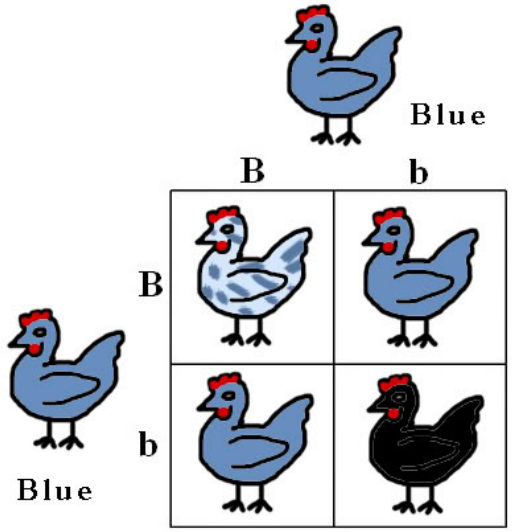
Scientists use various tools to show genetic inheritance. One tool is a Punnett square. Another tool is a pedigree chart. A pedigree chart is useful for tracking traits through multiple generations.

3. In the pedigree chart, *A* represents the allele for long eyelashes, and *a* represents the allele for short eyelashes. Genotypes for the grandchildren of Fred and Ann are not shown. Mark an *X* on the box for any grandchild who could have short eyelashes.



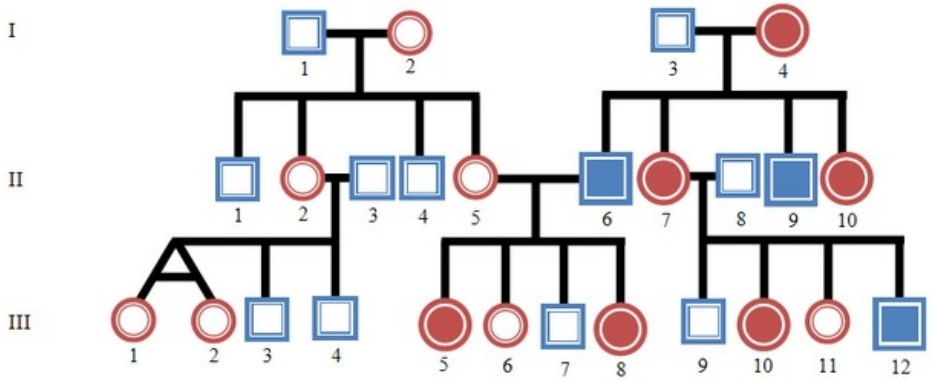
Punnett Square

A Punnett Square illustrates the probability of what could happen concerning a trait when organisms sexually reproduce.

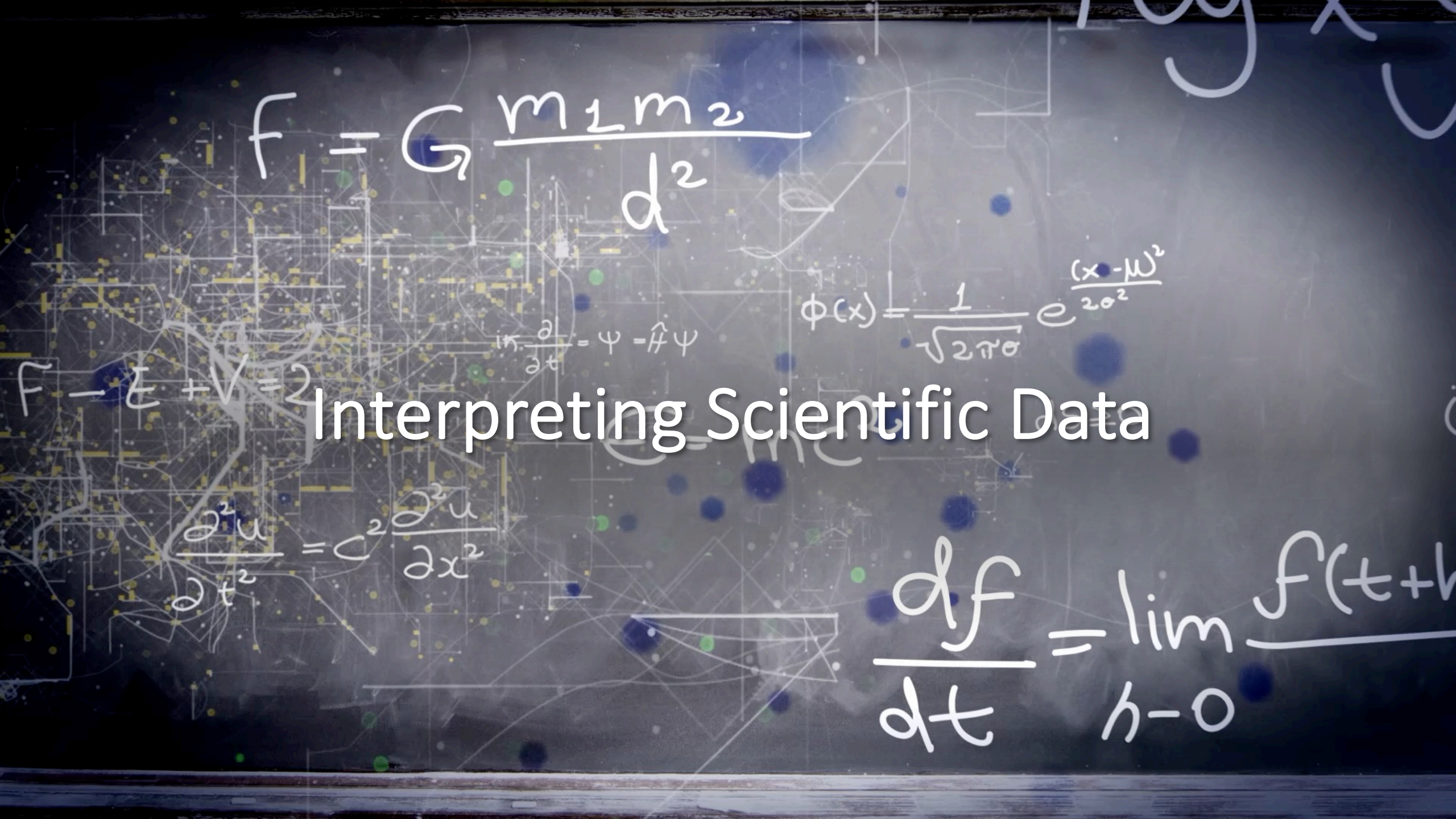


Pedigree

A Pedigree illustrates what has happened during several generations of reproduction related to the same trait.



Break Time!

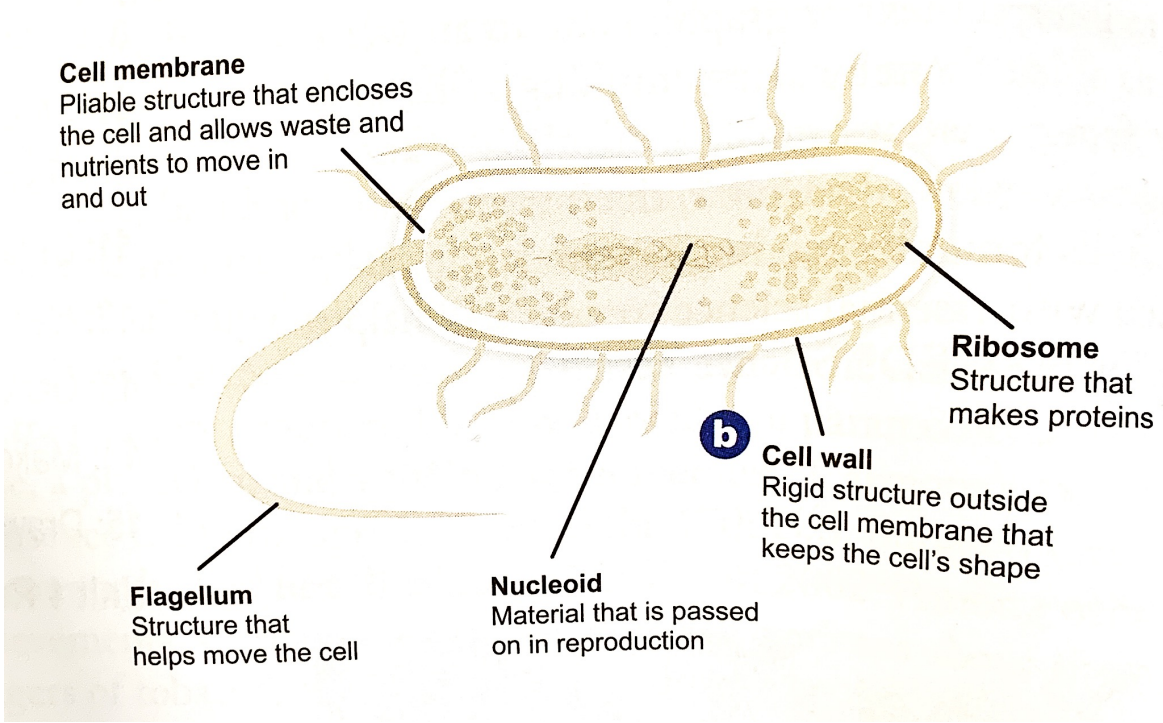

Interpreting Scientific Data

Interpreting Illustrations

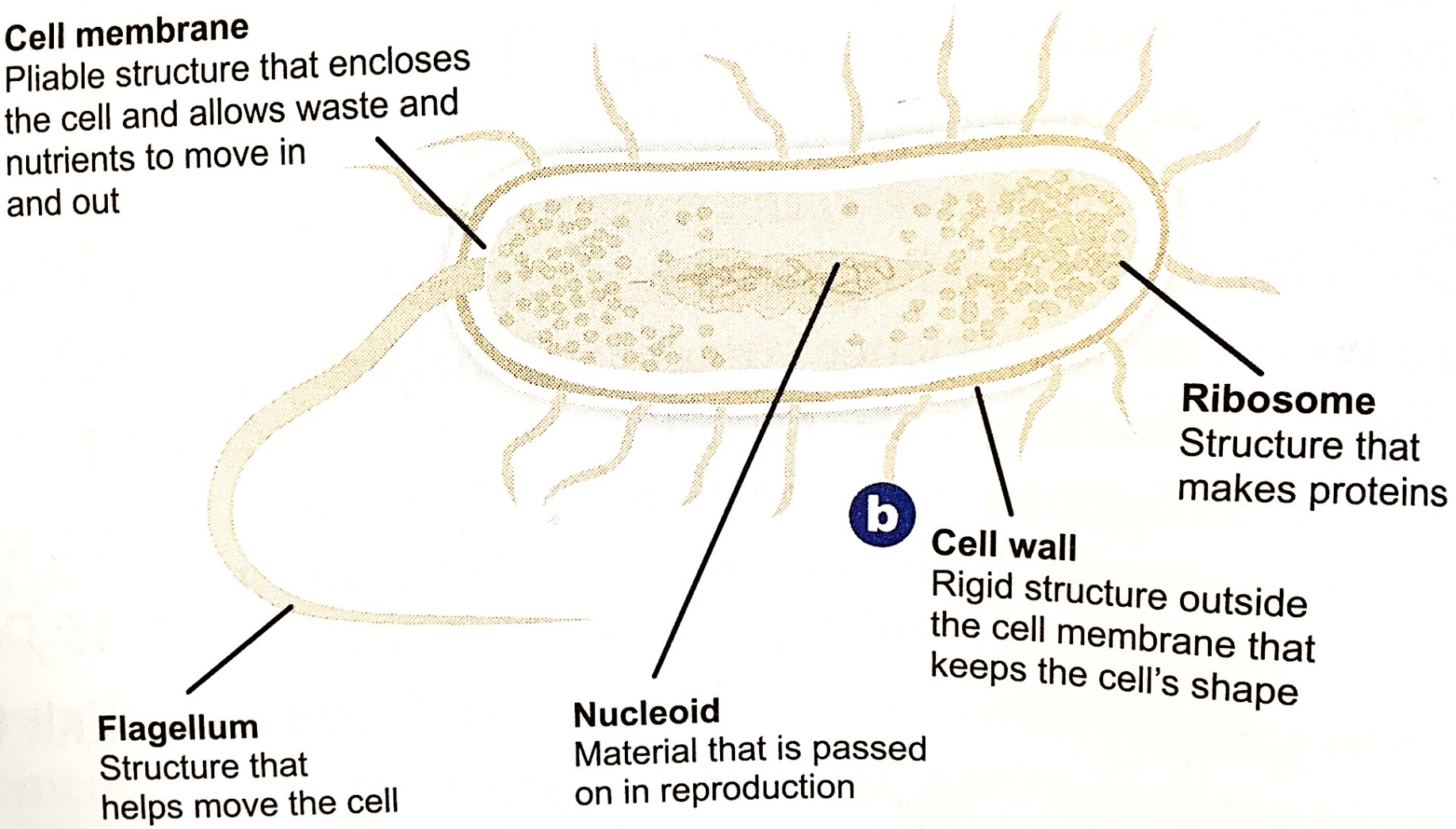
A GED test question may ask you to identify part of an illustration or how parts of an illustration relate to one another. Read the labels and study the illustration to determine the answer to such a question.

Cells

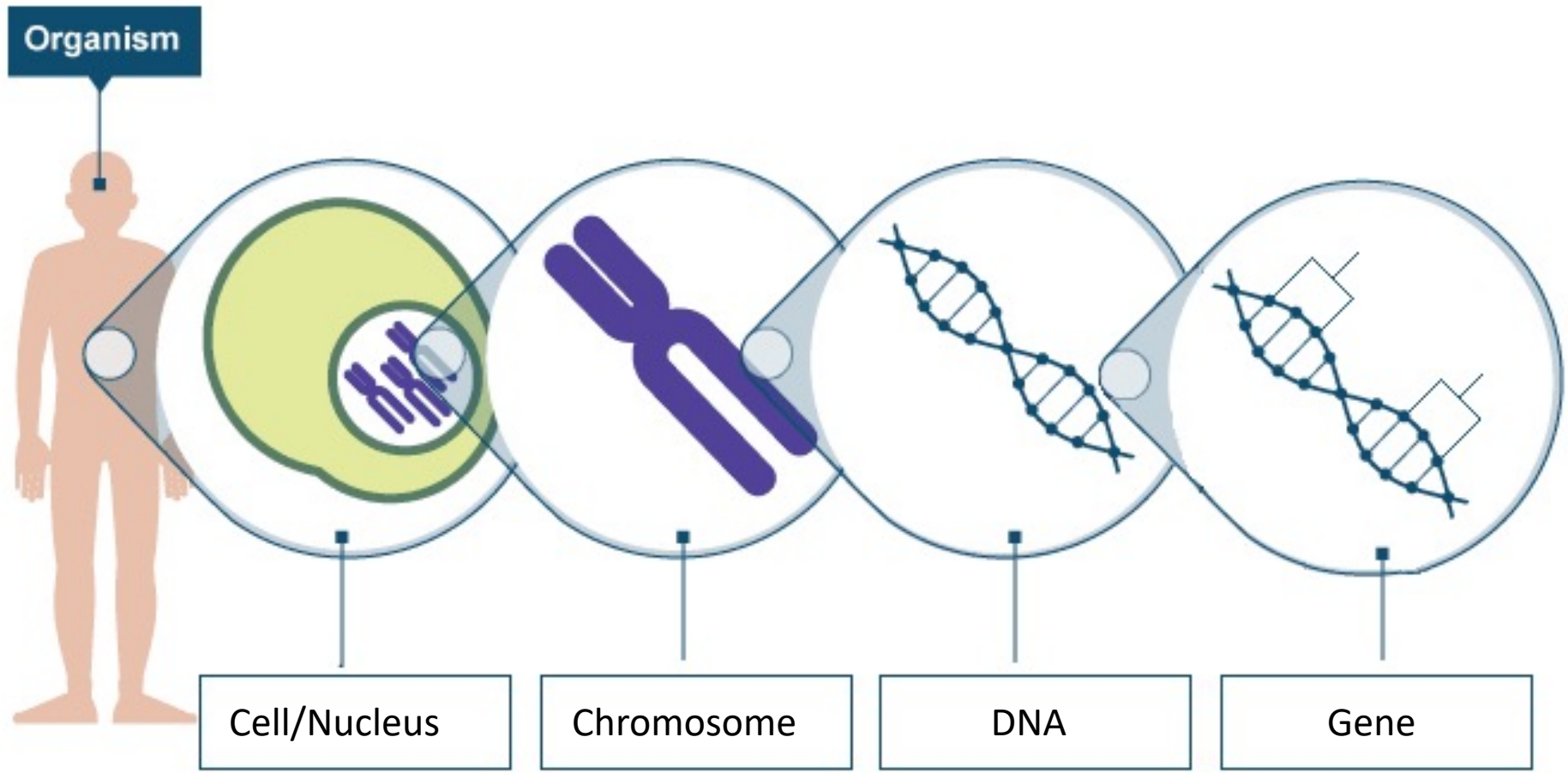
Cells are the smallest units of living things. Some organisms, such as the bacterium shown here, are unicellular. They are made of only one cell. Other organisms, such as humans, are multicellular. Humans are made up of millions of different types of cells.



Which structure of the bacterium cell makes proteins?



A. Cell wall
B. Flagellum
C. Ribosome
D. Cell membrane


Organism
Cell/Nucleus
Chromosome
DNA
Gene

Interpreting Tables

a First, look at a table's title and column and row headings. Here, they tell you the table is about foods that naturally contain B vitamins.

b A column in a table contains information of a single type. The entries under the heading "B Vitamin" are names of different B vitamins.

FOODS CONTAINING B VITAMINS (a)

B Vitamin (b)	Found Naturally In...
Thiamin (vitamin B1)	Brown rice, grits, whole-wheat bread, baked beans, black beans, black-eyed peas, peanuts
Riboflavin (vitamin B2)	Milk, cheese, yogurt, beef, poultry, broccoli, turnip greens
Niacin (vitamin B3)	Meat, poultry, fish, whole-grain breads
Vitamin B6	Pork, liver, kidney, poultry, fish, eggs, whole-wheat bread, brown rice, oatmeal, soybeans, peanuts, walnuts
Vitamin B12	Beef liver, clams, fish, eggs, milk, cheese

c Most tables present information from left to right. The entries in a row contain related information. For example, the first row has information about thiamin, which also is known as vitamin B1.

According to the table, which food contains vitamin B12?

FOODS CONTAINING B VITAMINS [a]

B Vitamin [b]	Found Naturally In...
Thiamin (vitamin B1)	Brown rice, grits, whole-wheat bread, baked beans, black beans, black-eyed peas, peanuts
Riboflavin (vitamin B2)	Milk, cheese, yogurt, beef, poultry, broccoli, turnip greens
Niacin (vitamin B3)	Meat, poultry, fish, whole-grain breads
Vitamin B6	Pork, liver, kidney, poultry, fish, eggs, whole-wheat bread, brown rice, oatmeal, soybeans, peanuts, walnuts
Vitamin B12	Beef liver, clams, fish, eggs, milk, cheese

A. black-eyed peas
B. Eggs
C. Broccoli
D. peanuts

What percent of the offspring will have a double tail?

2 out of 4 squares have a double tail = 50%

What percent of the offspring will have a normal tail?

2 out of 4 squares have a normal tail = 50%

Father shows Double Tail

Mother carries Double Tail but shows Normal Tail (since it's most dominant)

	D	D
D	DD  Shows Double Tail and is a dominant carrier	DD  Shows Double Tail and is a dominant carrier
d	Dd  Shows Normal Tail but carries Double Tail	Dd  Shows Normal Tail but carries Double Tail

Examine the following Punnett Square where B is dominant for brown eyes and b is recessive for blue eyes.

1. Identify the parent alleles. **Bb and bb**

2. Which parent's alleles are homozygous? **Rusty (bb)**

3. Identify the heterozygous alleles?

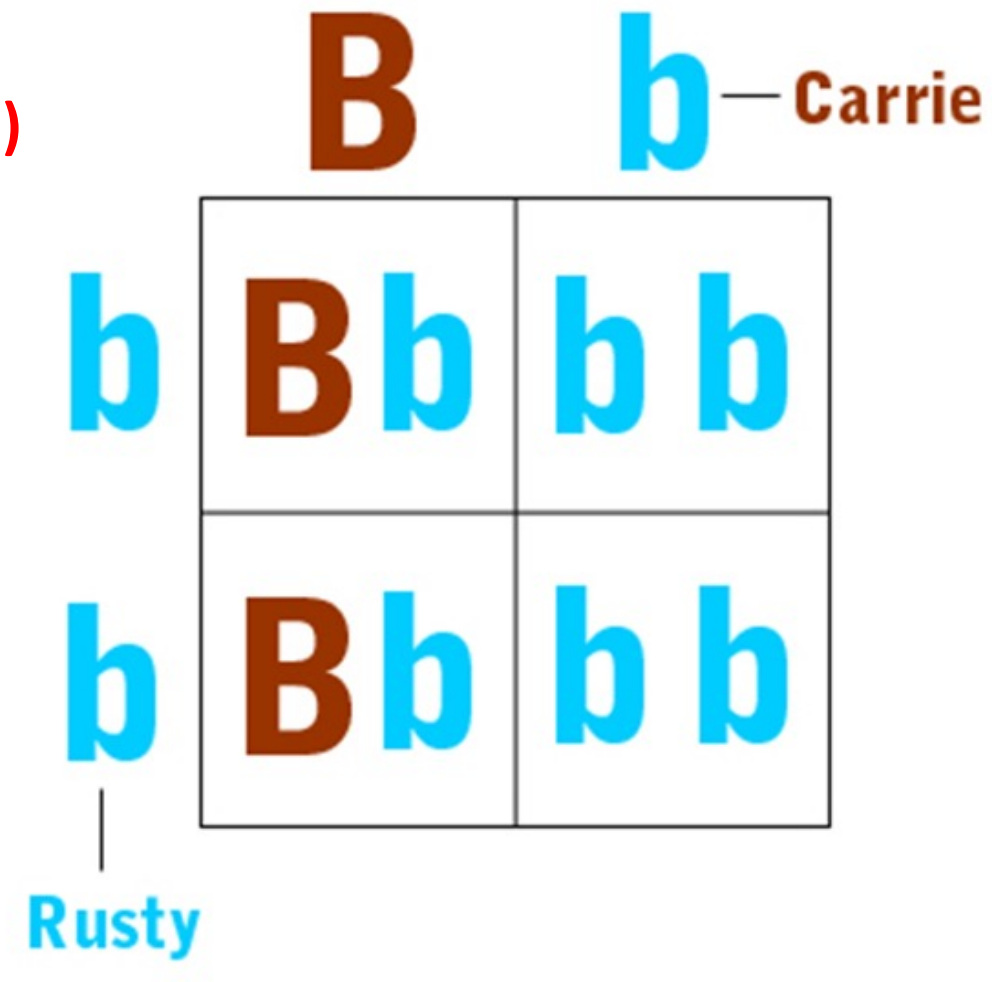
Bb

4. What percent of Rusty and Carrie's offspring will have Brown eyes?

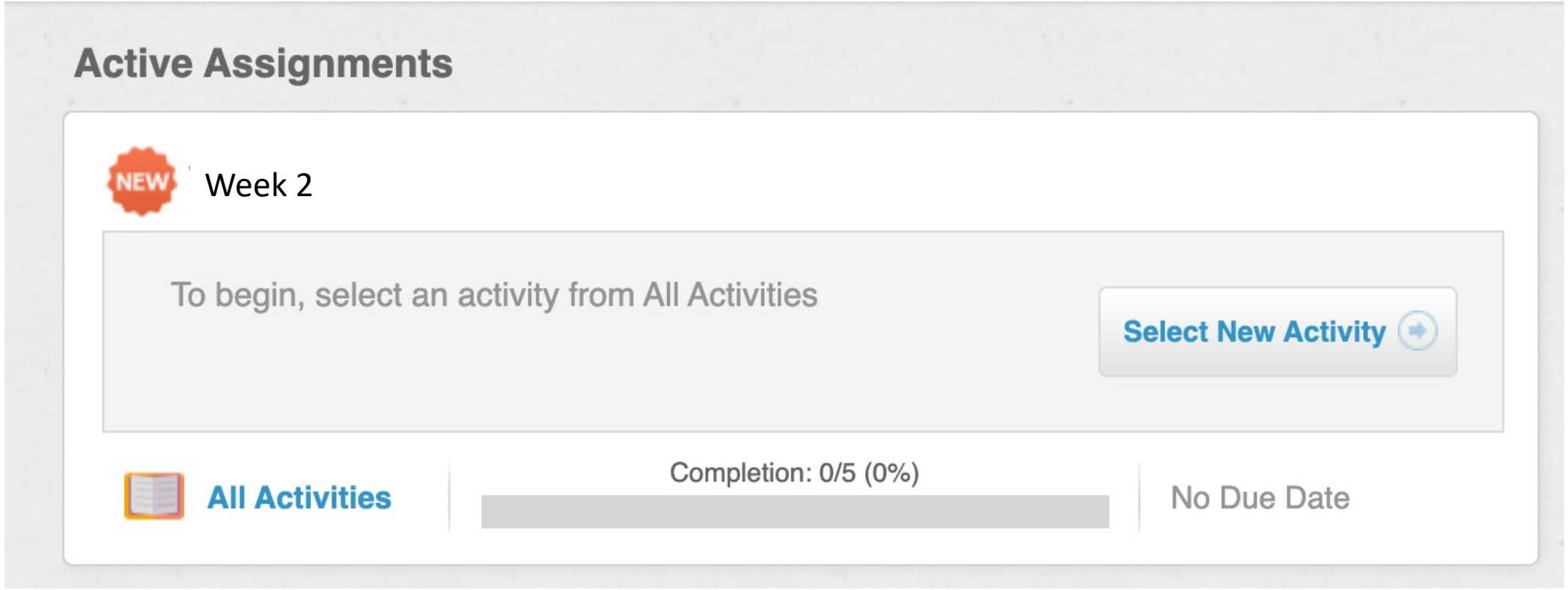
50%

5. What percent of Rusty and Carrie's offspring will have Blue eyes?

50%



Homework!


Active Assignments
NEW
Week 2
To begin, select an activity from All Activities
Select New Activity
All Activities
Completion: 0/5 (0%)
No Due Date