**Genetics and Probabilities**

**1st Teaching period**

**1st Activity**

Time: 10' min

Type of activity: Warm up, watching the video, keeping notes and discussion on the content of the video and reasoning about it.

Class organisation: In pairs, in small groups and in whole class.

**Actions/Tasks:** Teacher gives to the students a worksheet (Worksheet\_ 1) [TedEdLessonCreator](https://ed.ted.com/editor/2043311), with questions on the content of the video. The students work in pairs or in small groups reading and keeping notes. In plenary they discuss on the content of the video.

The aim of the activity is to introduce the students into the idea that each father and mother pass down traits to their children, who inherit combinations of their alleles. This video explains how Gregor Mendel studying pea plants revealed to understand today why you may have blue eyes.

[](https://www.youtube.com/watch?v=Mehz7tCxjSE&authuser=0" \t "_blank)

[How Mendel's pea plants helped us understand genetics - | TED-Ed](https://ed.ted.com/lessons/how-mendel-s-pea-plants-helped-us-understand-genetics-hortensia-jimenez-diaz#watch)

**2nd Activity**

Time: 10' min

Type of activity: Watching the video, keeping notes and discussion on the content of the video and answer the worksheet.

Class organisation: In pairs, in small groups and in whole class.

**Actions/Tasks:** Teacher gives to the students a worksheet (Worksheet\_2) with questions related on the content of the video. Students work in pairs or in small groups reading and keeping notes. In plenary they discuss on the content of the video. The aim of the activity is to learn how to use Punnett squares and to describe the expected outcomes of monohybrid crosses involving dominant and recessive alleles and to calculate probabilities of different phenotypes. Students watch the video until 4.45΄min. Video Created by Sal Khan.

[Worked example: Punnett squares (video) | Khan Academy](https://www.khanacademy.org/science/ap-biology/heredity/mendelian-genetics-ap/v/punnett-square-fun?playlist=Biology)

**3nd Activity**

Time: 20΄min

**Type of activity:** Watching the video, keeping notes and discussion on the content of the video and answer the worksheet.

**Class organisation:** In pairs / in small groups and in whole class.

**Actions/Tasks:** Students watch the video from 12.18’ min to 24.55’ min. Then ask the Worksheet\_3. Students work in pairs or in small groups while watching the video and they are keeping notes. In plenary they discuss on the content of the video. The aim of the activity is to learn how to use Punnett squares to calculate probabilities of different phenotypes. The video includes worked examples of dihybrid crosses. Created by Sal Khan.

[Worked example: Punnett squares (video) | Khan Academy](https://www.khanacademy.org/science/high-school-biology/hs-classical-genetics/hs-introduction-to-heredity/v/punnett-square-fun)

High school biology [UNIT 5: LESSON 1](https://www.khanacademy.org/science/high-school-biology/hs-classical-genetics/hs-introduction-to-heredity) Introduction to heredity

**Homework:**

The students asked to make a survey in their family for the presence of the above two traits and then to make a funny sketch of their faces.

**Additional Resources for students to explore:**

[Introduction to heredity (video) | Heredity | Khan Academy](https://www.khanacademy.org/science/ap-biology/heredity/mendelian-genetics-ap/v/introduction-to-heredity)

[Genetics | Biology OER (cuny.edu)](https://openlab.citytech.cuny.edu/bio-oer/genetics/)

**2nd Teaching period**

**1st Activity**

Time: 10' min

Type of activity: keeping notes and discussion on the questions posed on the activity one and reasoning about it.

Class organisation: In pairs, in small groups and in whole class.

Prerequisite knowledge; The basic definitions on Probabilities such as sample space , event, the probability of an event.

**Actions/Tasks** The teacher gives the students a worksheet (Worksheet\_ 4) with questions on a genetic crossing that refers to the eye colour. The students work in pairs or in small groups reading, keeping notes , making calculations and justify their answers. In plenary they present their thoughts.

The aim of the activity is the students to calculate the probability of an event and recognize the notion of independent events.

**2nd Activity**

Time: 10' min

Type of activity: keeping notes and discussion on the questions posed on the activity two and reasoning about it.

Class organisation: In pairs, in small groups and in whole class.

**Actions/Tasks** The teacher gives the students a worksheet (Worksheet\_ 4) with questions on a genetic crossing that refers to the eye colour. The students work in pairs or in small groups reading, keeping notes , making calculations and justify their answers. In plenary they present their thoughts.

The aim of the activity is the students to recognize when an event in Probabilities is called impossible or certain and calculate their probability of occurrence.

**3rd Activity**

Time: 15' min

Type of activity: keeping notes and discussion on the questions posed on the activity three and reasoning about it.

Class organisation: In pairs, in small groups and in whole class.

**Actions/Tasks** The teacher gives the students a worksheet (Worksheet\_ 4) with questions on a genetic crossing that refers to the eye colour. The students work in pairs or in small groups reading, keeping notes , making calculations and justify their answers. In plenary they present their thoughts.

The aim of the activity is for students to transform the language of genetics into a symbolic language and intuitively arrive at the concept of conditional probability.

**4th Activity**

Time: 10' min

Type of activity: keeping notes and discussion on the questions posed on the activity four and reasoning about it.

Class organisation: In pairs, in small groups and in whole class.

**Actions/Tasks** The teacher gives the students a worksheet (Worksheet\_4) with questions on a genetic crossing that refers to the dihybrid crosses. The students work in pairs or in small groups reading, keeping notes , making calculations and justify their answers. In plenary they present their thoughts.

The aim of the activity is the students to calculate the probability of given events.

For the Basics of the Theory of Probabilities teacher can use the following OER online textbook.

[https://math.libretexts.org/Bookshelves/Applied\_Mathematics/Book%3A\_College\_Mathematics\_for\_Everyday\_Life\_(Inigo\_et\_al)/03%3A\_Probability/3.01%3A\_Basic\_Probabilities\_and\_Probability\_Distributions\_Three\_Ways\_to\_Define\_Probabilities](https://math.libretexts.org/Bookshelves/Applied_Mathematics/Book%3A_College_Mathematics_for_Everyday_Life_%28Inigo_et_al%29/03%3A_Probability/3.01%3A_Basic_Probabilities_and_Probability_Distributions_Three_Ways_to_Define_Probabilities)