



Science Objectives

- Students will use a Punnett square simulation to predict phenotypic and genotypic ratios of F1 generation.
- Students will predict parental genotypes.
- Students will explain the relationship between Punnett squares and probability.

Vocabulary

- allele
- dominant
- genotype
- heterozygous
- homozygous
- phenotype
- Punnett square
- recessive

About the Lesson




- This lesson allows students to explore patterns of genetic inheritance through a simulation.
- As a result, students will:
 - Manipulate Punnett squares to model the inheritance of height in pea plants.
 - Predict genotypic and phenotypic ratios of offspring.

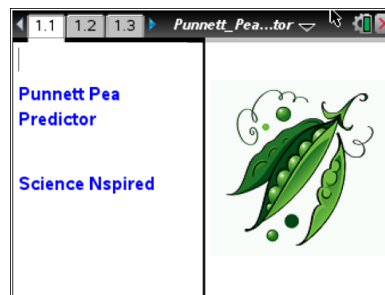


TI-Nspire™ Navigator™

- Send out the *Punnett_Pea_Predictor.tns* file.
- Monitor student progress using Class Capture.
- Use Live Presenter to spotlight student answers.

Activity Materials

- Compatible TI Technologies:  TI-Nspire™ CX Handhelds,  TI-Nspire™ Apps for iPad®,  TI-Nspire™ Software



Tech Tips:

- This activity includes class captures taken from the TI-Nspire CX handheld. It is also appropriate for use with the TI-Nspire family of products including TI-Nspire software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at <http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials>

Lesson Files:

Student Activity

- Punnett_Pea_Predictor_Student.doc
- Punnett_Pea_Predictor_Student.pdf

TI-Nspire document

- Punnett_Pea_Predictor.tns

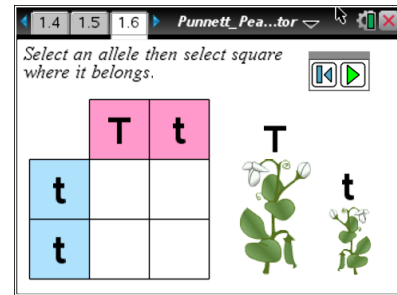




Discussion Points and Possible Answers

1. Have students read the background information stated on their activity sheet and on pages 1.2 - 1.4 of the .tns file.



Move to pages 1.5 and 1.6.

2. Have students read the instructions for the simulation on page 1.4. On page 1.5, students will run the Punnett square simulation several times. Students should select the alleles on the right side of the page in order to drag them into the appropriate squares. You may need to remind them to make sure they put TWO alleles into each square. This would be a good time to review with them the need for two alleles for a trait—one coming from the mother and the other from the father.



Tech Tip: To drag an allele, have students select T or t, then move to the desired square. They should select the square to drop the allele. Have students select  to check the Punnett square. They can, select  to clear and obtain a new Punnett square



Tech Tip: Have students tap or drag an allele, a T or t, then move to the desired square. Tap again to drop the allele. Have students tap play  to check the Punnett square. Then, have them tap  to clear and obtain a new Punnett square.

Teacher Tip: After the students have gone through a couple of simulations, ask them to predict results BEFORE filling in the Punnett square.

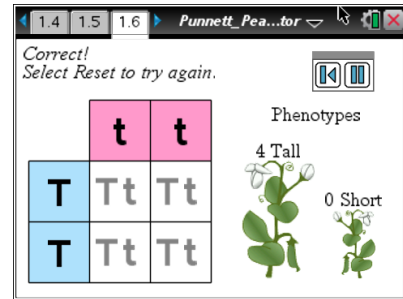
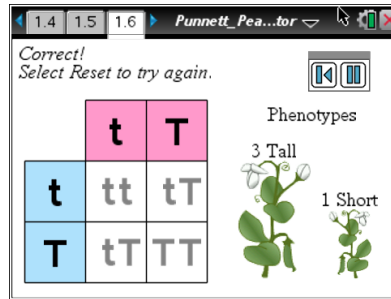
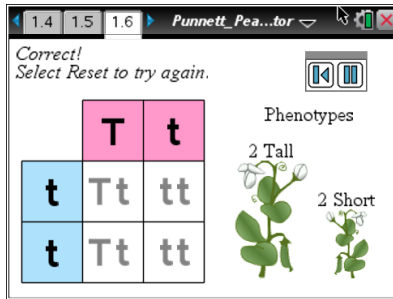


TI-Nspire Navigator Opportunities

Create a new Punnett square and project for the class to see. Have students predict what the results will be before filling in the square. Use the Tech Tip (below) to quickly complete the square and see if students' predications were correct.



Below are some possible results from the Punnett Square simulation.



- Instruct students to repeat the simulation until they recognize the different patterns of height inheritance in pea plants.

Move to pages 1.7 – 1.12.

Have students answer the questions on either the device, on the activity sheet, or both.

- Two tall parent pea plants will produce tall offspring.

Answer: B. sometimes

- Two short parent pea plants will produce short offspring.

Answer: A. always

- One parent pea plant is heterozygous for height. In order to have an equal chance of producing either tall or short offspring, the other parent pea plant must be _____.

Answer: C. homozygous (short)

- One parent pea plant is homozygous tall. In order to have an equal chance of producing tall and short offspring, the other parent pea plant must be _____.

Answer: D. The genotype of the other parent does not matter. There can never be an equal chance.

- How many different parent combinations could lead to an equal chance of tall and short offspring?

Answer: C. 2



Q6. Explain your response to the Question 5.

Answer: The parents have to be Tt and tt to have a chance to have an equal number of tall and short offspring.

Wrap Up

When students are finished with the activity, pull back the .tns file using TI-Nspire Navigator. Save grades to Portfolio. Discuss activity questions using Slide Show.

Assessment

- Formative assessment will consist of questions embedded in the .tns file. The questions will be graded when the .tns file is retrieved by TI-Nspire Navigator. The TI-Nspire Navigator Slide Show can be utilized to give students immediate feedback on their assessment.
- Summative assessment will consist of questions/problems on the chapter test, inquiry project, performance assessment, or an application/elaborate activity.