

LESSON 6 How Is Gender Inherited? =====

Objectives

When students have completed this lesson, they will be able to:

- explain how sex is inherited through the X and Y chromosomes;
- distinguish between the origin of fraternal and identical twins.

Exploring Science / Historical Steps

Of course, gender-related discussions can be controversial in many communities, but this lesson offers a good opportunity to encourage empathy and to display support for adolescents who may be struggling with gender identity issues - while reinforcing the important role of bias (first mentioned in Unit 1, Lesson 3, page 10).

In regards to the inference question, suggest to students that they review page 153, especially the map of the brain.

Heredity and Sex

The large illustration on page 243 continues to use the standard **X** shape of chromosomes. You might want to remind students why this is so, as described on page 220. (Review the comments in this guide for Unit 9, Lesson 1).

Ensure that students are clear that it takes all of the 23 chromosomes from the mother's egg (shown at the top of the diagram) and all of the chromosomes from the father's sperm (shown at the bottom of the diagram) to create the body cells of the individual. In other words, the body cells of the person will have a *pair* of each of the 23 chromosomes, for a total of 46 chromosomes..

A key message of the lesson is the 50 - 50 chance of having an offspring of each gender - every time fertilization occurs. Page 245's Punnett square should help make this point obvious to students.

As students read about the two kinds of twins, you might have them label the illustrations, with the letter **X** for each egg cell shown, and the letter **X** for each sperm cell that produces a female child and the letter **Y** for each sperm cell that produces a male child. Finally, they could label each child **XX** or **XY**, according to whether it is male or female.

To Do Yourself

In this activity, unlike the "To Do Yourself" of Lesson 4, page 236, the results will always be the same - 5 draws will produce 1 red and 1 white bean, and the other 5 draws will produce 2 red beans.

Questions

1. Five of each.
2. Half would be males and half would be females.
3. The chances are 50-50.

Although the activity as written will produce "infallible" results - half male and half females - this does not happen in real families. Hence, you may want to have students try the following modified activity which will more accurately model what happens in the chance meeting of eggs and sperm: Set up the jars as before. But each time that you withdraw a pair of beans, record the result, and then return the beans to the jar. Shake the jar before making the next draw. In this way, the 50-50 chance exists on each draw, and the results will not necessarily be "perfect."

Review

Please note: I have not made the answers available online, on the small chance that a student might discover them. Of course, the answers to these questions will be included in the version of the Teacher's Guide provided to teachers who purchase the text.

Reinforce / Enrich

Videos

The following video is highly recommended for teachers prior to covering Unit 9 Lessons 4, 5, 6 and 7. Of course, it might also be recommended for advanced students.

It is particularly important that teachers view the 5:30 to 6:52 mark prior to teaching Unit 9 Lesson 5 - with its coverage of the topic of blue versus brown eyes. The concern is that teachers be prepared to assure brown-eyed students that, despite it being rare, two blue-eyed parents can actually have a child with brown-eyes.

The 1:09 to 3:40 mark presents a good summary of the key work of Mendel.

The 3:43 to 4:46 mark links the previous segment to DNA and genes - and the human examples of dominant versus recessive genes (such as the brown versus blue-eye color) are introduced at the 4:48 mark. This is followed by the important clarification that in many cases things long thought to be straight-forward dominant and recessive are simply not that common in humans.

The 7:26 to 7:35 mark deals with incomplete dominance.

The 10:28 - 10:44 mark mentions that humans do have a few simple, one-gene traits - such as ear wax.

The topic of sex-linked genes (such as the one for red/green color blindness) is dealt with from the 10:47 to 11:42-mark. This might be helpful to show during Unit 9 Lesson 7 when the sex-linked disease of hemophilia is discussed.

- [Be Smart / \(Almost\) Everything You Learned About Genetics is Wrong](#) [14:22]

For the teacher, the following videos provide a good (“mature”) overview of the topic of genders and sexuality. They certainly include details that some school communities would not permit, so it is vital that they be previewed and cleared with the administration if consideration is being given to sharing them with students.

- Crash Course Biology #48 / [Gender, sex, and sexuality: What’s the difference?](#) [13:37]
- SciShow / [Science proves that there are more than two human sexes:](#) [13:31]