Welcome to this lesson today on meiosis. Today we will be discussing how meiosis produces new combinations of genes and therefore genetic variability. So meiosis is the cell division that occurs in sex cells. So it's a type of cell division that occurs in sex cells.

And the goal of meiosis is to reduce the parental number of chromosomes by half, so we call this haploid. So the parental number of chromosomes will be cut in half so that the resulting cells are going to be haploid, meaning they will contain 23 chromosomes each. And the importance of this, if they have 23 chromosomes, is that when the sperm cells and the egg cells combine, the resulting cell will have a total of 46 chromosomes, which is the normal number of chromosomes for your body cells. So meiosis is cell division in sex cells. It produces gametes, such as sperm and egg cells, that are haploid so that when they combine, they form a cell that has 46 chromosomes.

So spermatogenesis is meiosis in sperm cells. And it produces four daughter cells. So we can kind of see what's happening in this process. We have our germ cell that'll go through the process of meiosis I. And then it'll go through a second division, called meiosis II, which is where it will end up producing our gametes or our sperm cells.

So it's going through two rounds of cell division. And it's producing haploid male gametes. So you can see that our gametes here have half as many chromosomes as the germ cell we started out with.

So disjunction. Disjunction occurs in meiosis II when homologous chromosomes are separated so that gametes can receive a haploid set of chromosomes. So our gametes receive these haploid set of chromosomes when those homologous chromosomes in meiosis II are separated.

And then oogenesis is meiosis that occurs in the female egg cells. So you can see we have our germ cell here. It's going to go through two rounds of cell division as well. And then we're going to end up with an egg cell that is haploid. So again, it contains 23 chromosomes.

So we also will end up with something called a polar body. So in males, we end up with four sperm cells from this one germ cell. But in oogenesis, we start with our germ cell and we'll end up with one egg cell or one ovum which is haploid and also a polar body.

So in meiosis I we end up with the first polar body. And in meiosis II we end up with the second polar body. And these polar bodies will basically just disintegrate later. They just contain extra genetic information. So in oogenesis we end up with one ovum which is haploid.

So let's take a look at how meiosis can then produce genetic variability. So we just talked about the process of meiosis and how it occurs in females and males. And now we're going to talk a little bit about how it can produce genetic variability.

So there's two main ways in which it produces genetic variability. The first way is with crossing over. So let's take a look at how this happens. I'm going to drive two examples of chromosomes here. Here's one chromosome. And here's another.

So crossing over, basically what happens is that we'll have our chromosomes. And they are going to end up swapping genetic information during meiosis. So crossing over only happens during meiosis. It doesn't happen during mitosis. So it's something that only happens in meiosis to produce genetic variability.

So we'll have a portion of a chromosome here that will switch places with another chromosome. So these chromosomes are containing the same information. They're just swapping these pieces here, which will increase the genetic variability. So it allows for more combinations of genes and more variations. So crossing over is one way in which meiosis produces genetic variability.

Meiosis also produces genetic variability by the random sorting of chromosomes. So chromosomes are sorted into gametes randomly. And by being sorted into gametes randomly, it produces a wide range of combinations of those gametes. So you're not going to have gametes that are exactly the same because of this random sorting. It produces this wide range, thus increasing the genetic variability.

So this lesson has been an overview on meiosis and how meiosis produces new combinations of genes.