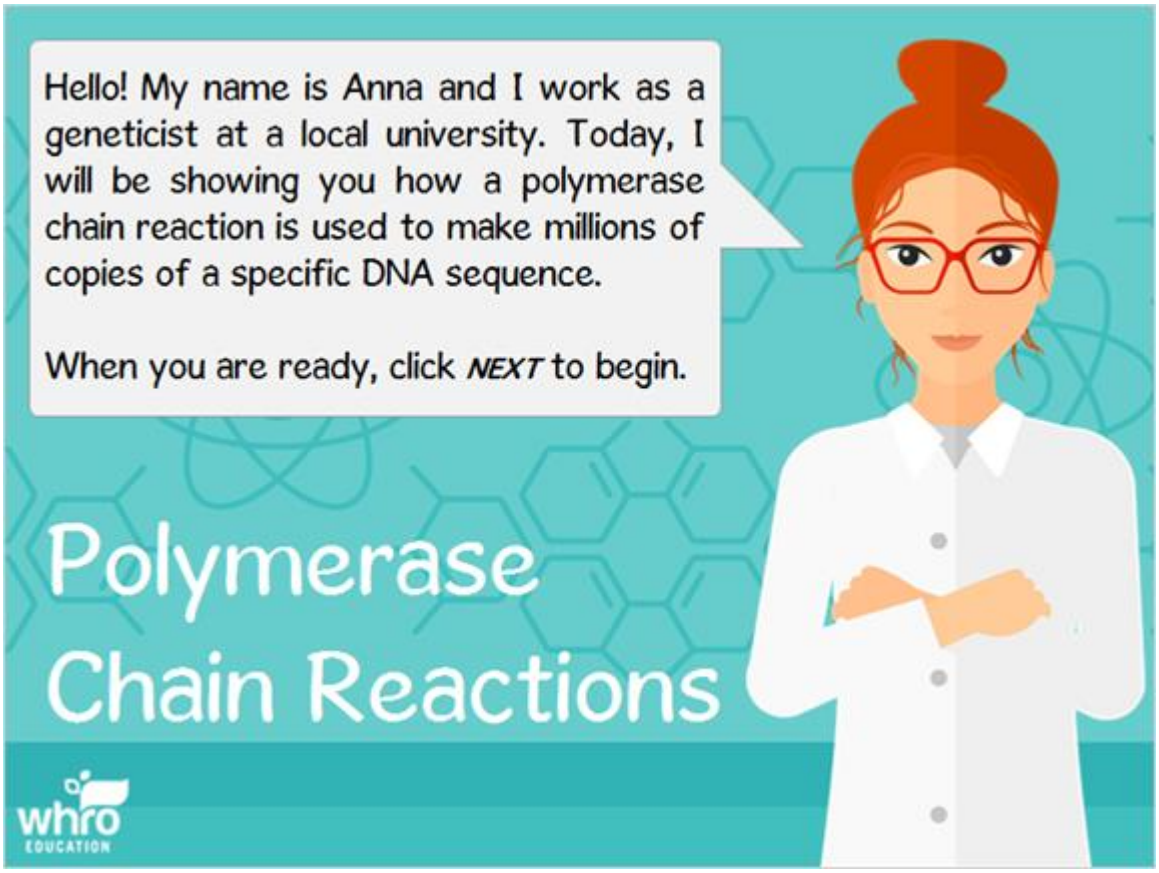
Module 6: DNA, RNA, and Molecular Genetics
Topic 5 Content: Polymerase Chain Reactions Notes



Hello! My name is Anna, and I work as a geneticist at a local university. Today, I will be showing you how a polymerase chain reaction is used to make millions of copies of a specific DNA sequence. When you are ready, click ***NEXT*** to begin.

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Why are polymerase chain reactions conducted in the lab? This technique can be used to detect diseases, and to create DNA fingerprints to identify victims and suspects in criminal investigations.

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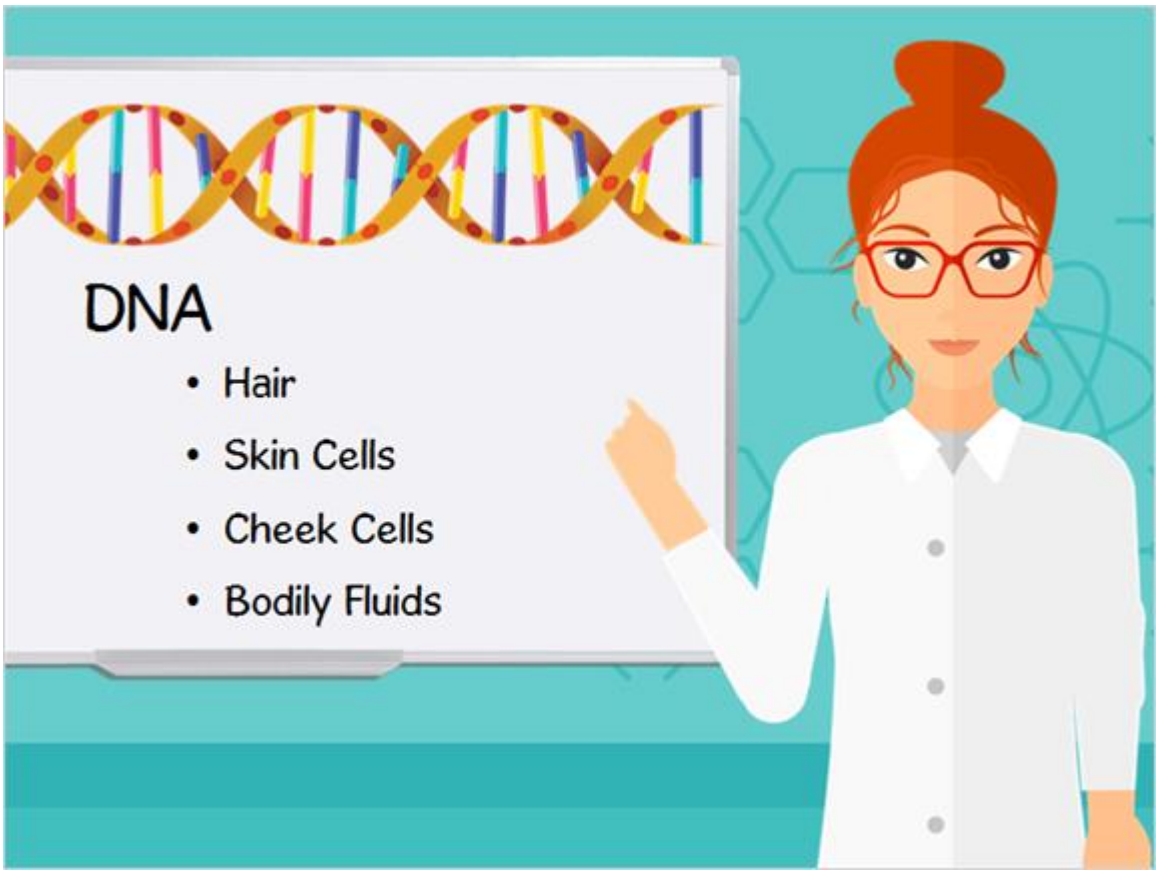
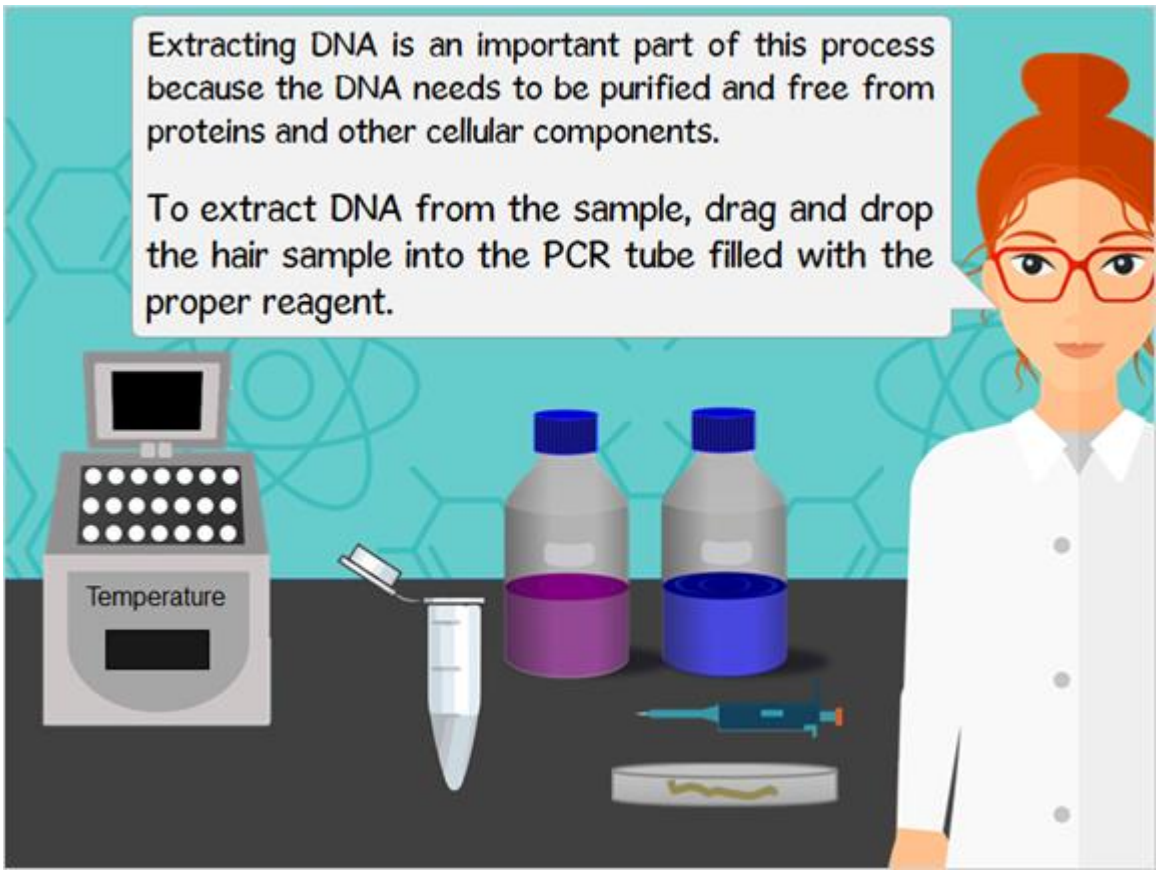


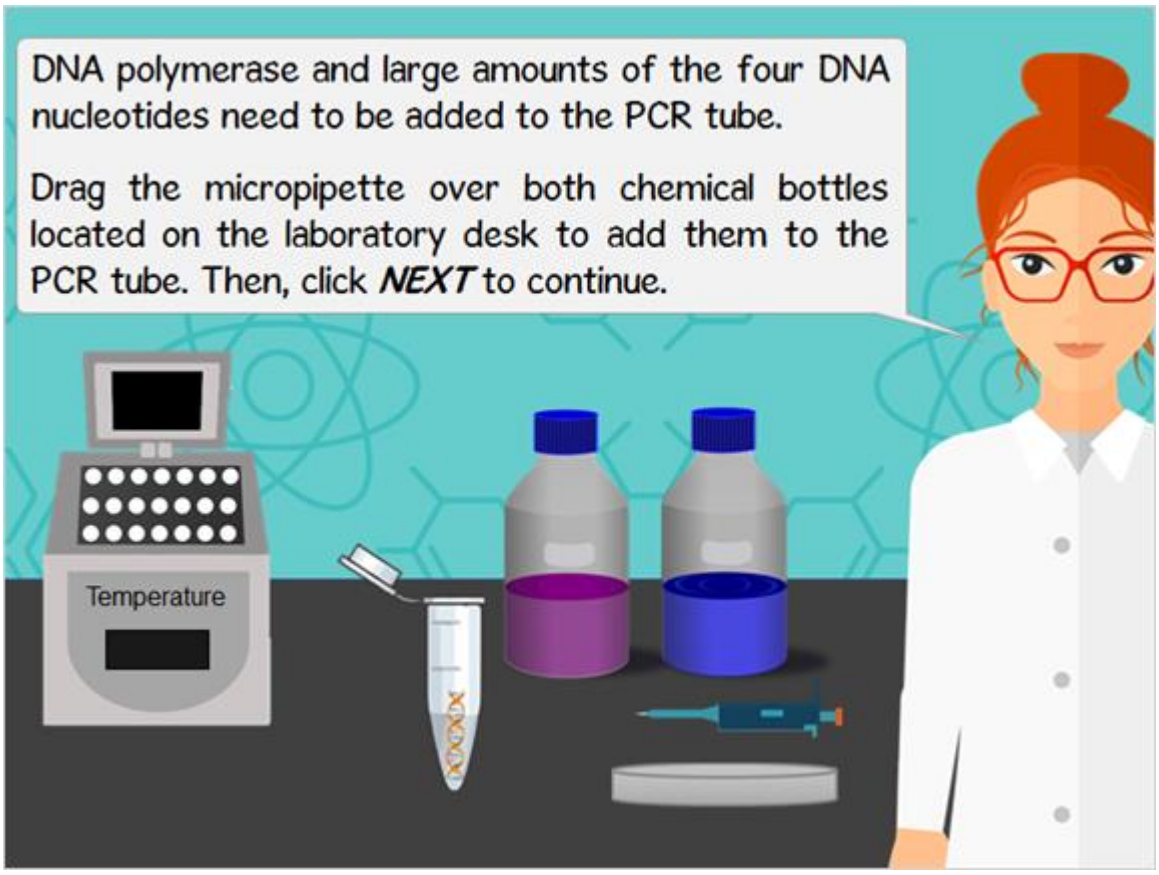
Before you can begin a polymerase chain reaction, you need to acquire a sample of DNA. In order to do this, scientists need to collect some cells. Luckily, DNA is everywhere. Scientists can get DNA samples from hair, skin cells, cheek cells, and many kinds of bodily fluids.



Once the DNA sample is collected, a scientist will extract the DNA in the laboratory. Extracting DNA is an important part of this process because the DNA needs to be purified and free from proteins and other cellular components.

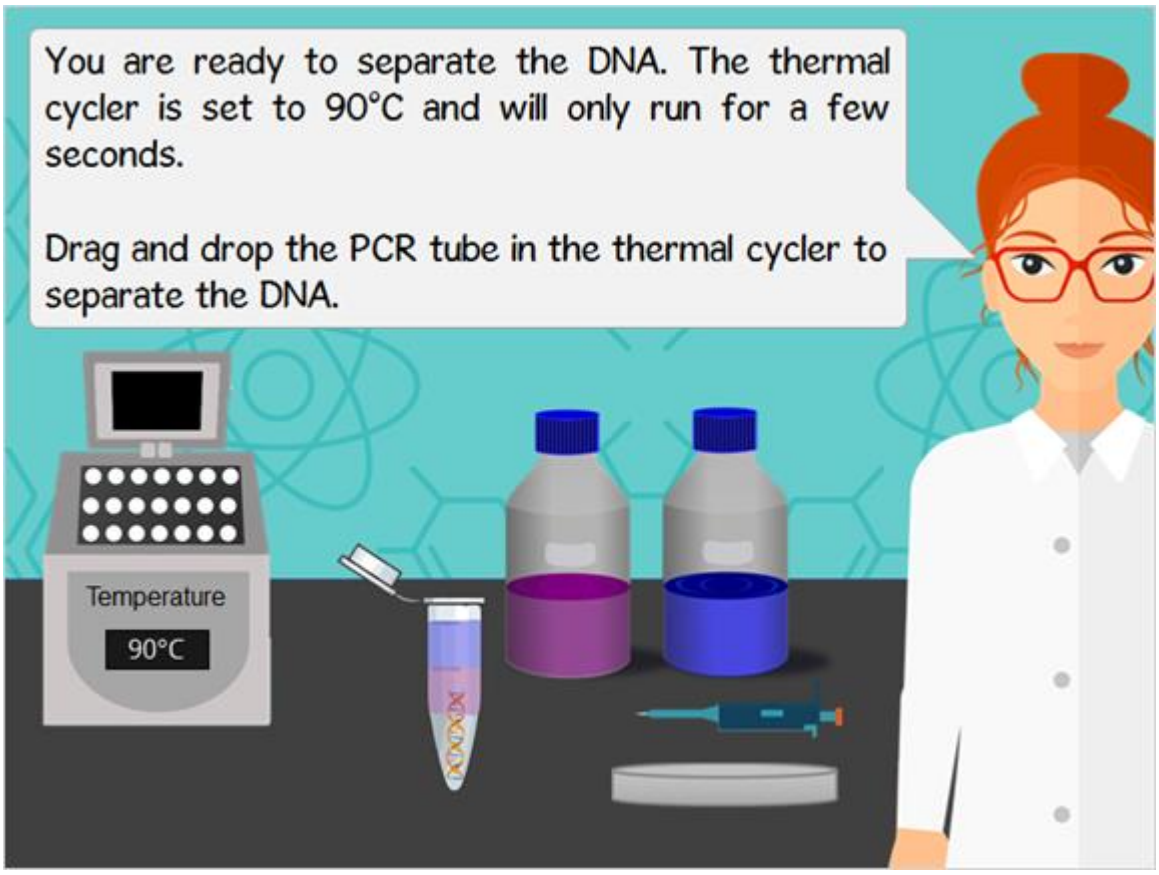
To extract DNA from the sample, drag and drop the hair sample into the PCR tube filled with the proper reagent.

Excellent! The DNA is now separated. Click ***NEXT*** to continue.

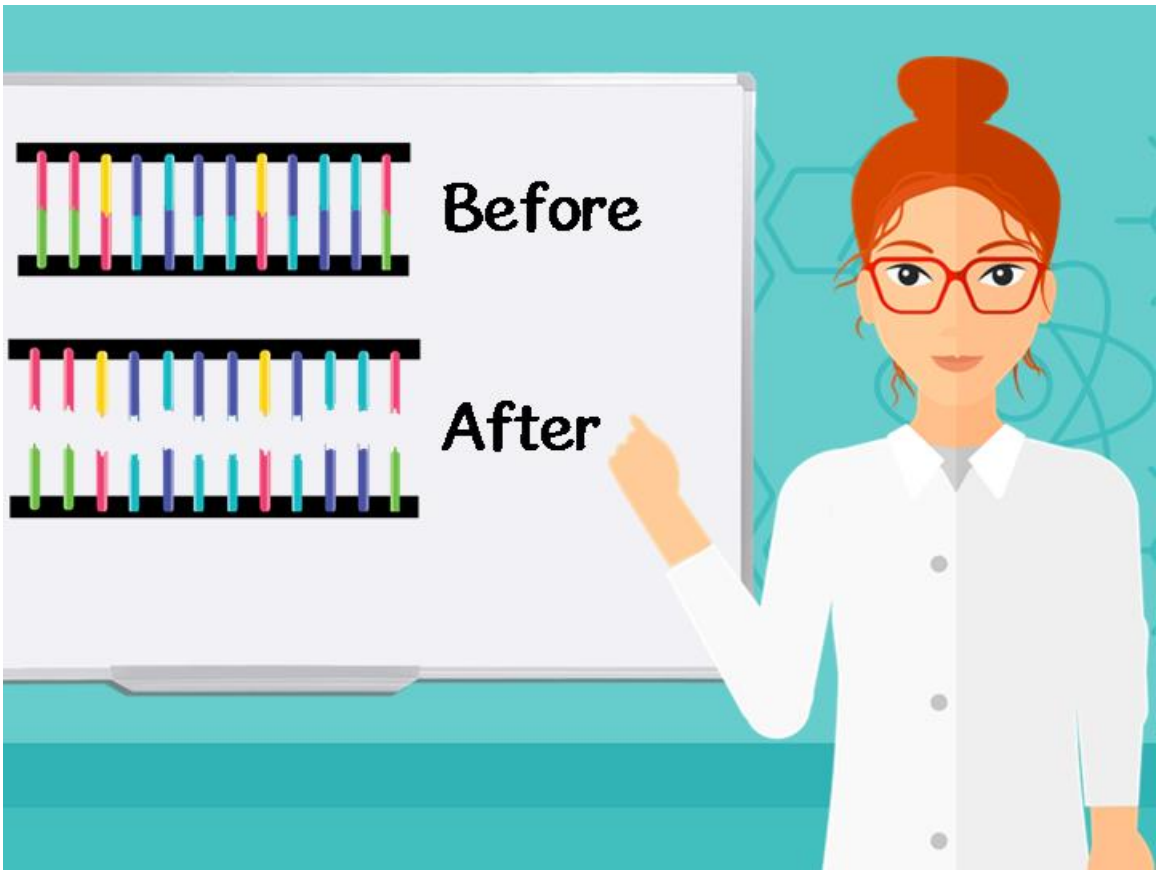


Great! Now that the DNA is extracted, DNA polymerase and large amounts of the four DNA nucleotides need to be added to the PCR tube.

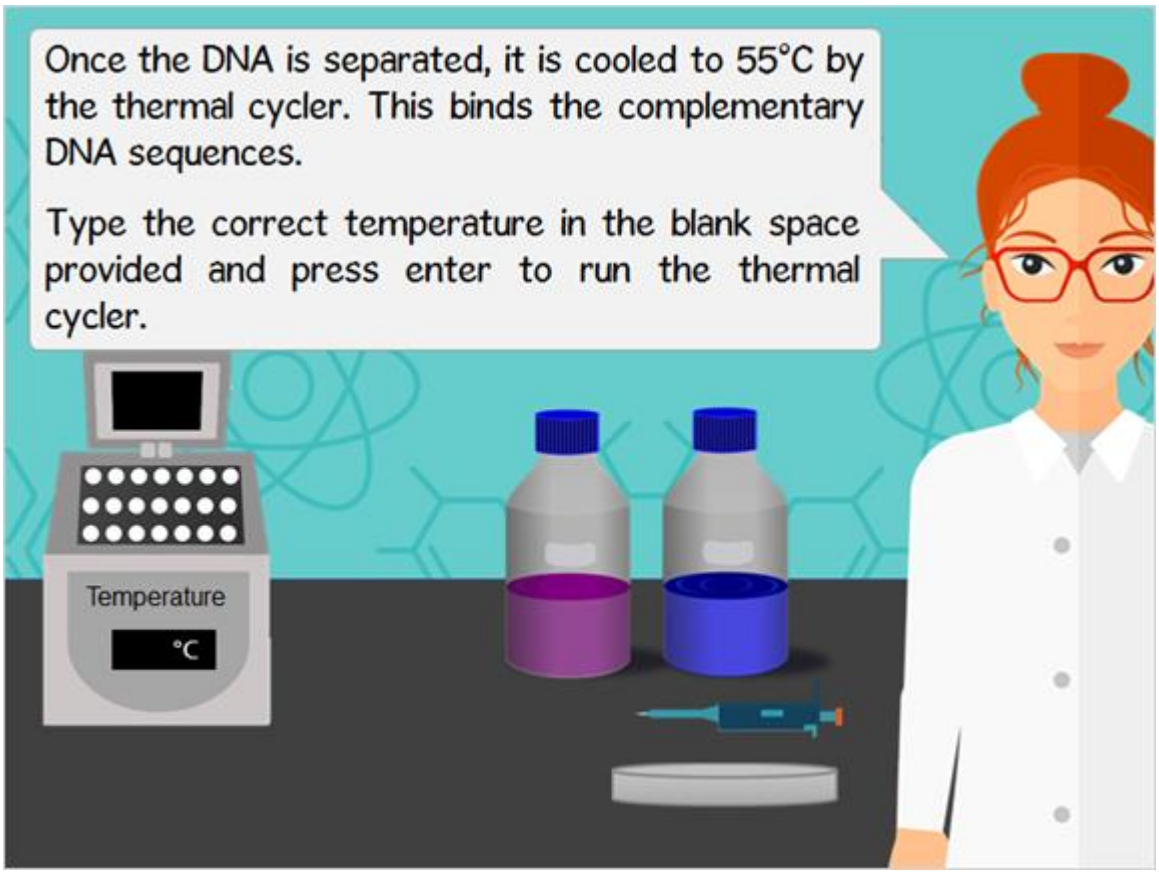
Drag the micropipette over both chemical bottles located on the laboratory desk to add them to the PCR tube. Then, click ***NEXT*** to continue.



You are ready to separate the DNA. The thermal cycler is set to 90°C and will only run for a few seconds. Drag and drop the PCR tube in the thermal cycler to separate the DNA.

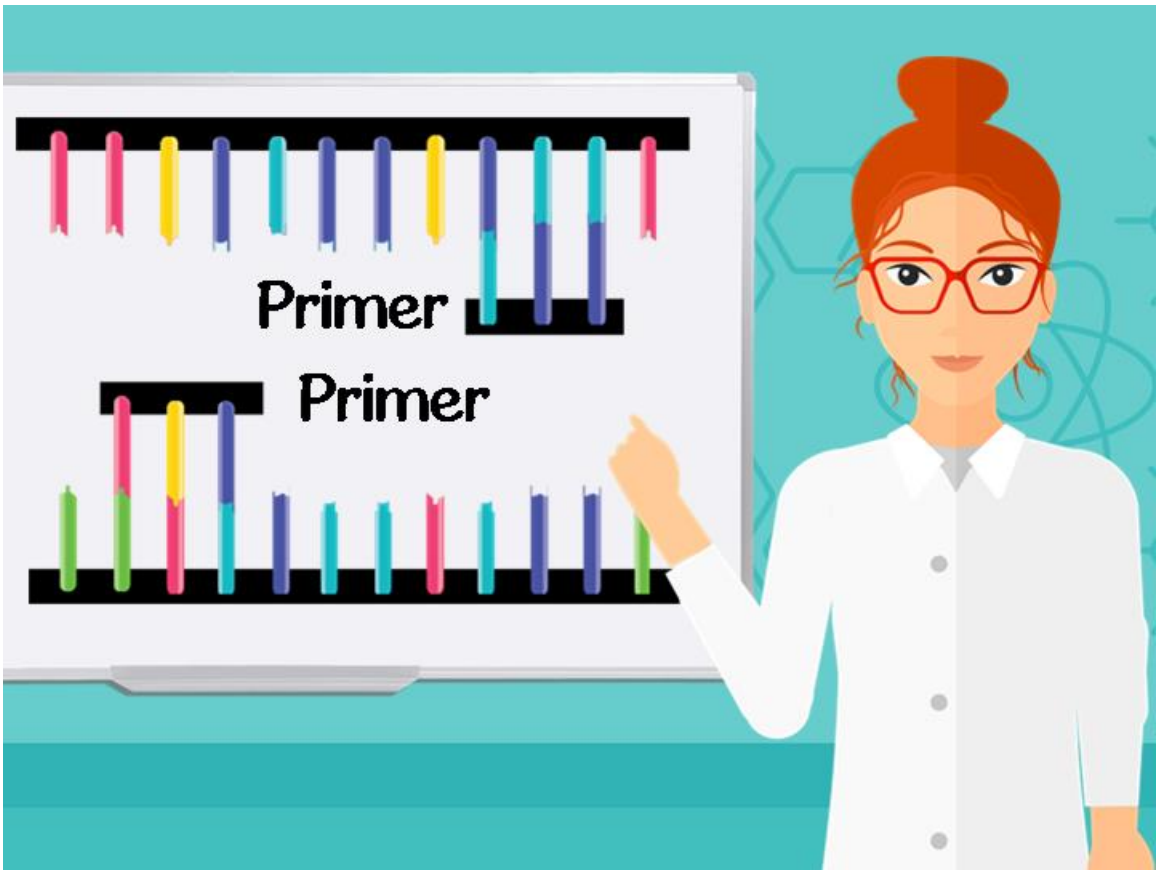


You have successfully separated the DNA using the thermal cycler. You can see that the DNA is now in two separated strands and is ready for binding. Click ***NEXT*** to continue.

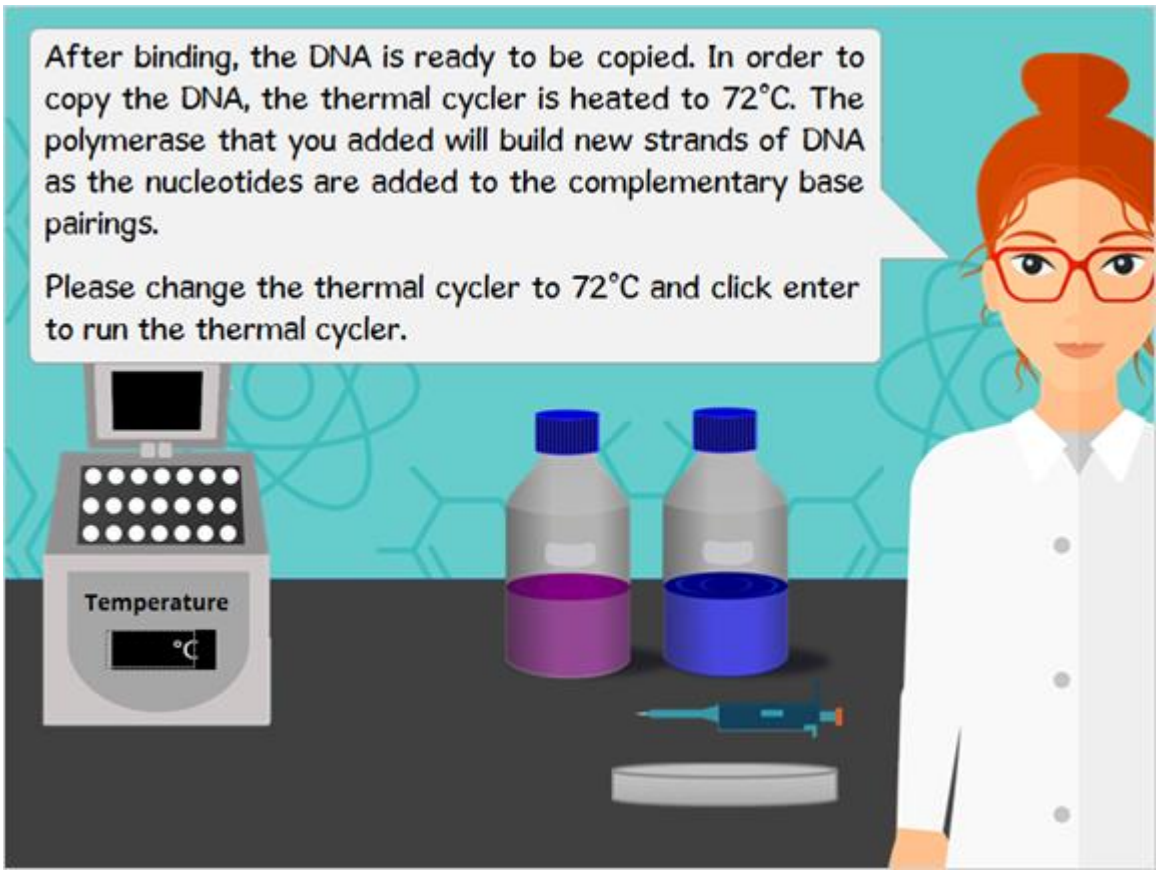


Once the DNA is separated, it is cooled to 55°C by the thermal cycler. This binds the complementary DNA sequences.

Can you please set the thermal cycler to begin the binding process? Type the correct temperature in the blank space provided, and press enter to run the thermal cycler.

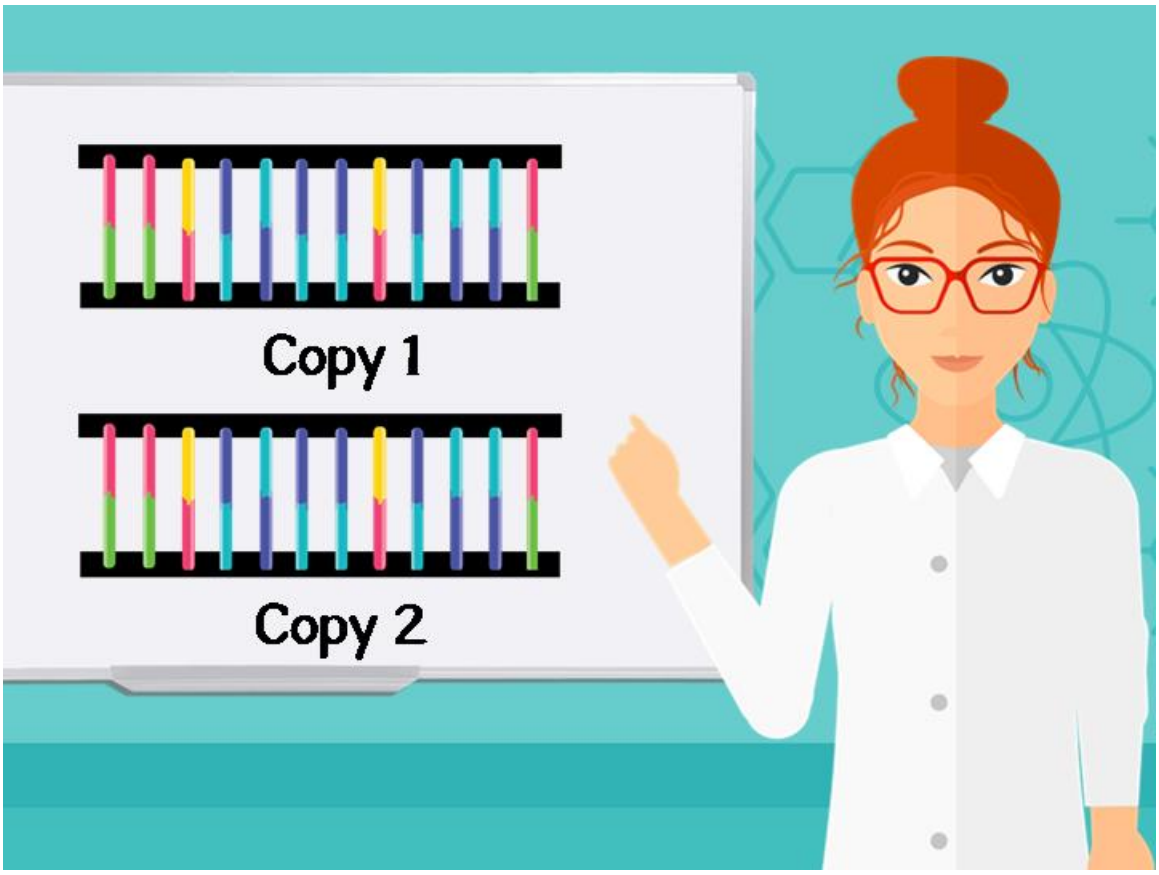


Thanks! The DNA primers have started to bind to the separated DNA strands. The primers are short segments of DNA that will act as a new strand. Click ***NEXT*** to continue.

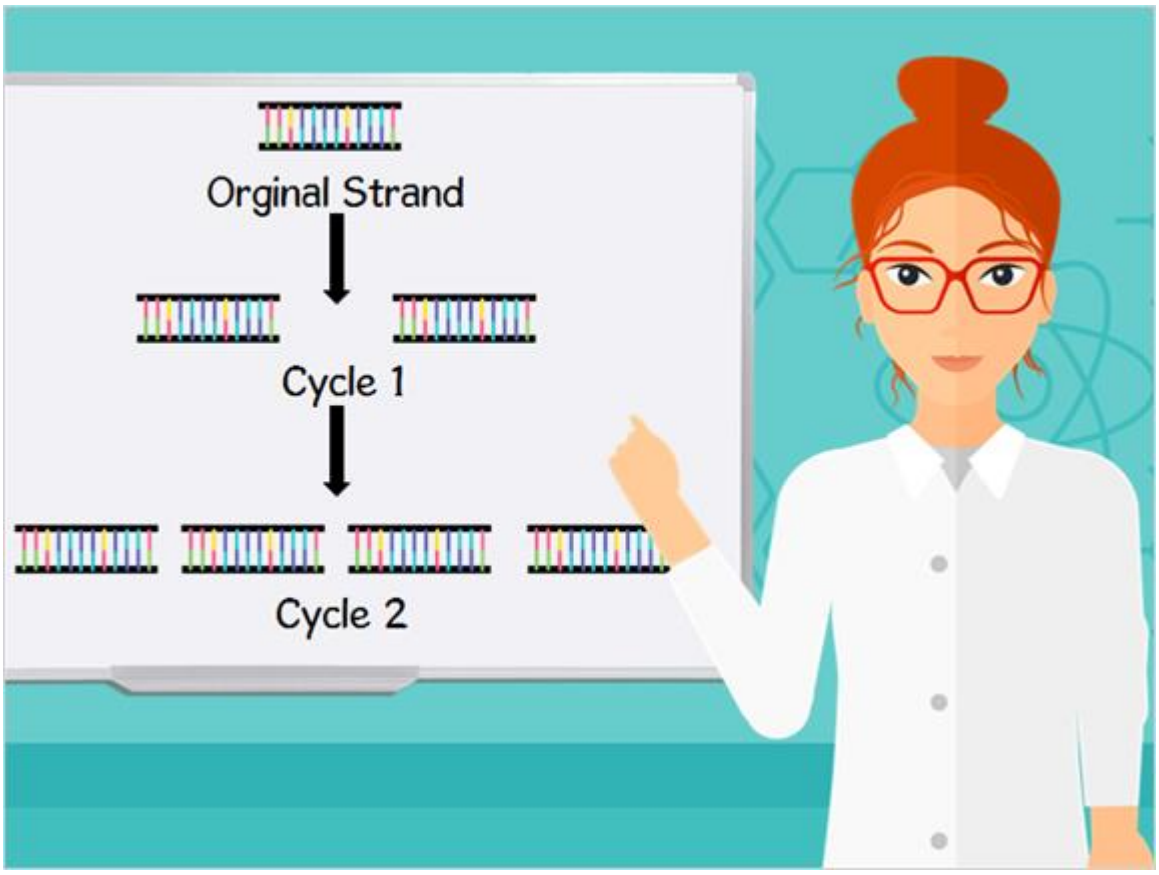


After binding, the DNA is ready to be copied. In order to copy the DNA, the thermal cycler is heated to 72°C. The polymerase that you added will build new strands of DNA as the nucleotides are added to the complementary base pairings.

Please change the thermal cycler to 72°C and click enter to run the thermal cycler.



The copying process is now completed, and two identical stands of DNA exist. Click ***NEXT*** to continue.



Each time the copying process is repeated, the number of DNA copies doubles. After 30 cycles, over a billion copies of identical DNA strands exist.


Great job today! You have learned how polymerase chain reactions are conducted in the laboratory.
Click RESTART to view the information again, or click EXIT to close the activity.
RESTART
EXIT