

Chapter 13-2 – pages 322-326
KEY CONCEPT

How do scientists make changes to DNA?

Objectives: Students will

- A) Define genetic engineering
- B) List five tools genetic engineers use to manipulate DNA
- C) Summarize how each tool is used

Obj. A) Define genetic engineering
 Scientists use several techniques to

- _____, _____, and _____ are used to work with DNA.
- Scientists use these tools in _____, _____ and _____ = all part of _____



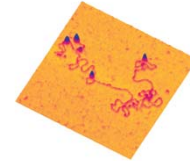
Obj. B) List five tools genetic engineers use to manipulate DNA

- 1.
- 2.
- 3.
- 4.
- 5.

Obj. C) Summarize how each tool is used

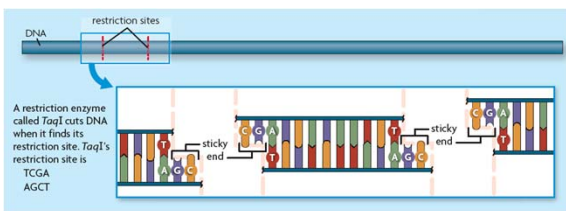
_____ = Tool #1

- Restriction enzymes act as “_____”
 - come from various types of _____
 - allow scientists to more easily study and _____ genes
 - _____ DNA at a specific _____ sequence called a _____ site



Obj. C) Summarize how each tool is used

- some cut straight across and leave “_____”
- some make staggered cuts and leave “_____”



Obj. C) Summarize how each tool is used

Restriction maps _____

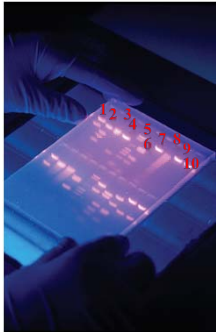
_____ (Tool #2) is used to _____ DNA fragments by _____.

- A DNA sample is cut with _____.
- Electrical current pulls DNA fragments through a _____.
- What is the charge on DNA?



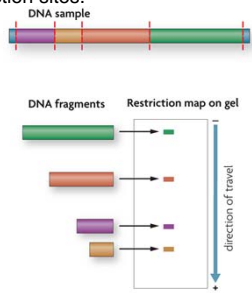
Obj. C) Summarize how each tool is used

- Smaller fragments move _____ and travel _____ than larger fragments.
- Fragments of different _____ appear as bands on the gel.
- Which two strands contain the smallest DNA fragments?



Obj. C) Summarize how each tool is used

- A restriction map shows the _____ of DNA fragments between restriction sites.
- only indicate _____, not DNA sequence
- useful in _____
- used to study _____



Obj. C) Summarize how each tool is used

_____ - Tool #3

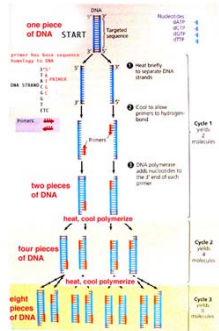
- Shows the order of DNA _____ = used in _____ to definitively identify criminals
- Every person has their own unique order of _____
- Single stranded DNA is put in test tubes with _____
- Nucleotides are _____
- One nucleotide is tagged with a _____
- When that nucleotide is added, DNA strand is terminated
- Fragments are put in a gel, and the order can be read by looking at the _____.

Obj. C) Summarize how each tool is used

_____ =

Tool #4

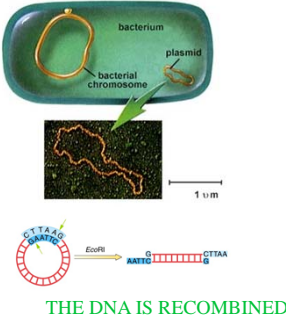
- _____ DNA in a test tube
- Allows a tiny sample of DNA to be "amplified" - _____ of new _____ copies are produced
- Allows Biologists to study _____



Obj. C) Summarize how each tool is used

TOOL #5 = _____ = _____ DNA

- Plasmids are _____ pieces of DNA inside _____
- Easily _____ between bacteria allowing for _____
- _____ splice open plasmids and allow _____ of new _____ from other _____.
- **Genetic markers** - _____



EXIT TICKET

- Write down at least three out of the five tools discussed today in manipulating DNA.
- Which tool is used to make new DNA from two different sources?
- Which tool allows scientists to copy DNA?
- Which tool separates DNA by its fragment size?