

## Recombinant DNA LAB - Making Paper Plasmids

Standard: 5c

Objective:

To understand how genes can be inserted into another DNA - "recombine"

To conceptualize "restriction enzymes" and recognition of specific sites

Students will model the process of using restriction enzymes and plasmids to form recombinant DNA.

The "Recombinant DNA Lab" activity can help you see how genes may be manipulated for genetic research, namely, gene cloning/genetic engineering. This activity will help you conceptualize the mechanics involved in cutting and ligating DNAs into a plasmid vector with "sticky ends" of complementary DNA base pairs.

### Background Information

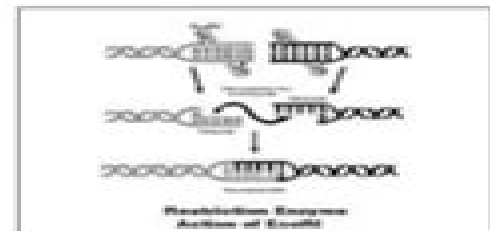
Recombinant DNA technology is one of the new techniques of biotechnology. Biotechnology uses living organisms to carry out chemical processes or to produce substances, combining biology with chemistry and science with industry. Biotechnology includes the field of **genetic engineering**, which is the science of directly manipulating genes to produce recombinant DNA. Genetic engineering techniques are used in a variety of industries, in agriculture, in basic research, and in medicine.

Through genetic engineering, there is great potential for the development of useful products. Researchers have already developed sources of interferon, human growth hormone, insulin, and resistant fruits and vegetables. A gene coding for a particular protein is transferred into a host organism. The host organism reproduces and the population produces the desired protein in volume. For example, the gene that codes for the production of human insulin has been inserted into the common bacterium *E. coli*. Then the bacteria can be grown in huge containers and large amounts of insulin can be collected.

As an introduction to recombinant DNA technology, the exercise that follows illustrates on paper some of the steps of recombinant DNA experiments done in laboratories.

### Steps to Recombination

1. Scientists must first **identify the gene** that codes for the production of the protein they want to manufacture.
2. Next scientists must **isolate the desired gene**. Restriction enzymes from bacterial cells are important in this step. Each **restriction enzyme** recognizes and cleaves (cuts) a very specific sequence of DNA called a **restriction site**. Some restriction enzymes make a staggered cut of the DNA producing **sticky ends** or single strands of unpaired nucleotide bases capable of binding with complementary sticky ends. By using restriction enzymes that will cut the DNA on either side of the gene, the desired gene can be clipped out of the DNA strand.
3. Once the desired gene has been isolated scientists must then **insert the gene into a plasmid**. **Plasmids** are small circular pieces of DNA found naturally in most bacteria. The plasmid must be removed from a bacterium and cleaved with the same restriction enzyme used to isolate the gene. This way the sticky ends of the plasmid will match those of the gene.



# Recombinant Dna Paper Lab Answers

**McDougal Littell Incorporated**



## Recombinant Dna Paper Lab Answers:

*Chapter Resource 11 Gene Technology Biology* Holt Rinehart & Winston, Holt, Rinehart and Winston Staff, 2004      **The American Biology Teacher**, 1998      *Chapter-wise NCERT + Exemplar + PAST 13 Years Solutions for CBSE Class 12 Biology 7th Edition* Disha Experts, 2020-06-20 The book provides Step by step Chapter wise Solutions to the 3 Most Important requirements of the students NCERT Solutions Exemplar Solutions Solved Papers Past 13 years for CBSE Class 12 The 7th Edition of the book is divided into 3 sections Section 1 NCERT Exercise consists of solutions to all Intext and chapter exercises Section 2 Past Year Questions of Past 13 years with Solutions Section 3 Exemplar Problems Solutions to select NCERT Exemplar problems      *Super 10 CBSE Class 12 Biology 2021 Exam Sample Papers 3rd Edition* Disha Experts, 2020-09-04      **Annot Inst Edit Lab Man Biol 3e /Campbell** Benjamin-Cummings Publishing Company, Judith Giles Morgan, 1994-02      **Prentice Hall Science** Anthea Maton, Jill D. Wright, Jean Hopkins, Susan Johnson, David Lahart, Maryanna Quon Warner, 1994      **Biology Class 12 CBSE Board 8 YEAR-WISE (2013 - 2020) Solved Papers powered with Concept Notes** Disha Experts, 2020-07-04      **EPA Publications Bibliography** United States. Environmental Protection Agency, 1995      **Biology Class 12 CBSE Board 10 YEAR-WISE (2013 - 2022) Solved Papers Powered with Concept Notes 2nd Edition** Disha Experts, 2022-06-15 The latest updated 2nd Edition of the book Biology Class 12 CBSE Board 10 Year wise 2013 2022 Solved Papers powered with Concept Notes is a must have book for aspirants who are looking for better score in exams The Book contains the Past 10 Year Solved Authentic CBSE Board Papers of Class 12 Physics In all the Book contains 18 Papers including the 2021 CBSE Sample Paper This paper has been included as this year the Board exams were cancelled The USP of the book is the inclusion of Concept Notes highlighting Tips Tricks Alternate solutions Points to Remember in various solutions Trend Analysis of 17 Papers 2013 2022 is provided to understand Question trend The Notes will help the students in further revision of syllabus 17 Authentic Papers CBSE All India CBSE Delhi with detailed solutions are provided Errorless Solutions with step by step marking scheme on the lines of CBSE Board and written in a way that any student can understand easily      **EPA Publications Bibliography Quarterly Abstract Bulletin** United States. Environmental Protection Agency, 1995-04      *Modules* McDougal Littell Incorporated, 2005

*Teacher's Wraparound Edition: Two Biology Everyday Experience* Albert Kaskel, 1994-04-19      **God and Gaia** Michael S Northcott, 2022-12-22 God and Gaia explores the overlap between traditional religious cosmologies and the scientific Gaia theory of James Lovelock It argues that a Gaian approach to the ecological crisis involves rebalancing human and more than human influences on Earth by reviving the ecological agency of local and indigenous human communities and of nonhuman beings Present day human ecological influences on Earth have been growing at pace since the Scientific and Industrial Revolutions when modern humans adopted a machine cosmology in which humans are the sole intelligent agency The resultant imbalance between human and Earthly agencies is degrading the species diversity of ecosystems causing local

climate changes and threatens to destabilise the Earth as a System Across eight chapters this ambitious text engages with traditional cosmologies from the Indian Vedas and classical Greece to Medieval Christianity with case material from Southeast Asia Southern Africa and Great Britain It discusses concepts such as deep time and ancestral time the ethics of genetic engineering of foods and viruses and holistic ecological management Northcott argues that an ontological turn that honours the differential agency of indigenous humans and other kind and that draws on sacred traditions will make it is possible to repair the destabilising impacts of contemporary human activities on the Earth System and its constituent ecosystems This book will be of considerable interest to students and scholars of the environmental humanities history and cultural and religious studies

**EPA Publications Bibliography** ,1995      Molecular Biology of the Cell ,1994 MBC online publishes papers that describe and interpret results of original research concerning the molecular aspects of cell structure and function      Abstract Bulletin of the Institute of Paper Chemistry ,1987      SPAA '95 ,1995      **Teaching Secondary School Science** Leslie W. Trowbridge,Rodger W. Bybee,1996 This market leading book has been updated to reflect the latest in learning theory science reform and professional development Includes complete chapters on incorporating educational technology into the science classroom classroom management and conflict resolution and teaching science for cultural and gender differences For Educators and School Administrators for Secondary Science      **Report of the Research Laboratories of Kirin Brewery Co., Ltd** ,1986      **Science for the People** ,1977

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