Using the *DNAi Teacher Guide*

The *DNAi* Teacher Guide is broken up into sections for ease of printing and download. There are introductory materials, teacher pages, student worksheets, templates, and correlations to specific curriculum and content standards.

Teacher Pages

The teacher pages carry information and hints for running the activity.

Description of Activity

A general overview of what students will use and be asked to do during the activity.

Learning Outcomes

This section outlines aims and outcomes for the activity.
e.g. Students will:

1. do some stuff
2. learn a few things
3. LIKE it!

Implementing the Lesson

Before class:
This section outlines what should be done prior to class. The tasks may include making photocopies, preparing sets of student materials, laminating reusable pieces, and becoming familiar with the online resources.

During class:
Instructional strategies are suggested in this section. These might include suggestions for grouping students, questions to assess prior knowledge, or dialog with which to set a learning context.

Misconceptions
Where appropriate, possible misconceptions are mentioned here. These are suggested to make it easier to probe the class to determine if misconceptions exist. It will also facilitate overcoming the misconceptions.

Assumptions of Prior Knowledge
This section addresses what students need to know in order to successfully move through the activity. Prior knowledge could stem from science instruction in earlier grades or from work in the current course.

Further Explorations

Two or three additional activities are suggested here. These activities, only briefly described, recognize student diversity by utilizing different teaching and learning strategies than the primary activity.

Graphic indicates relevant sections on the *DNA Interactive* web site (www.dnai.org).

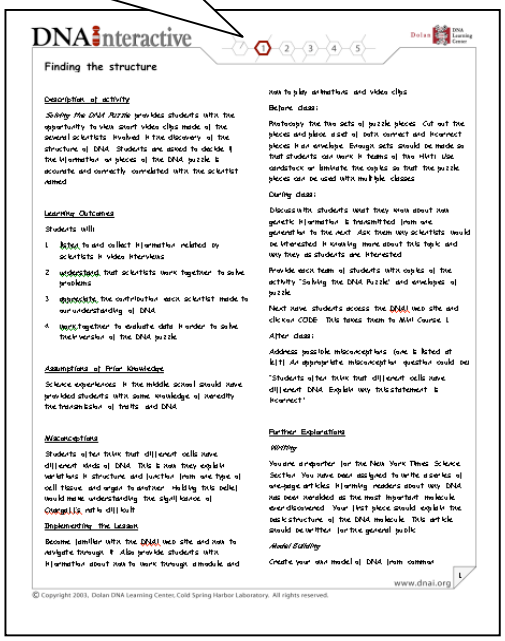
Glossary
This section includes a listing of key terms from the module.

Resources
Specific web sites, videos, DVDs, books, and articles that may be interesting to teachers or students are listed under this heading.

Activity Pages Include:
This section lists the other pages provided for the activity. These include student worksheets, answer sheets, templates for materials required in order to complete an activity, illustrations, etc.

Correlation to National Science Education Standards

These pages correlate the activity to the U.S. National Science Education Standards. Correlations to curricula in countries such as the U.K. and Australia are currently being collated.


DNA Interactive

Finding the structure

Description of activity

Learning Outcomes

Students will:

Assumptions of Prior Knowledge

Misconceptions

Implementing the Lesson

Materials

Before class:

During class:

After class:

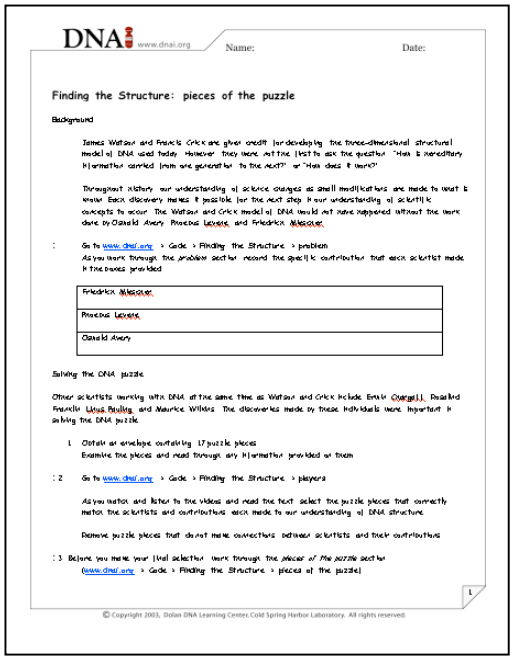
Further Explorations

Activity

Student Worksheets

The student worksheets have been developed for copying and distribution to individual students or cooperative working groups.

There is a name and date section at the top of each page, and the sheets contain both instructions and questions.


DNA www.dnai.org

Name: Date:

Finding the Structure: pieces of the puzzle

Background

Solving the DNA puzzle

Answer Sheets

These pages contain the questions asked on the student worksheets, together with their answers.

DNA www.dnai.org ANSWERS

Model organisms: the genes we share

6. Which organism does this result come from?

Mus musculus (mouse)

7. List 5 organisms that are shown to possess a gene homologous to the HD gene.

Organism 1. _____R. norvegicus (rat)
Organism 2. _____D. rerio (zebrafish)
Organism 3. _____H. sapiens (human)
Organism 4. _____S. scrofa (domestic pig)
Organism 5. _____B. taurus (cow)

8. Which organism has the closest nucleotide sequence to the mouse HD gene? *Rat.*

What percentage of the DNA sequence of the mouse HD gene matches the human HD gene? *82.7%*

10. How similar is the mouse HD protein to the human and the rat HD protein? *Human 89%; rat 96%.*

When you compared humans and mice, why were their protein (amino acid) sequences more similar than their nucleotide sequences?

There is more than one codon that codes for a particular amino acid. Therefore two organisms can have quite different nucleotide sequences encoding similar amino acid sequences.

What mouse chromosome does the HD gene map to? Explain why it might not be on the same chromosome in a human.

Chromosome 5; mice have a different number and arrangement of chromosomes than humans.

Based on your computer analysis of the HD gene in mice, what would happen if scientists mutated this gene the same way that the human gene is mutated in HD? Do you think the mice would develop HD? How could you determine the effect on the mice?

The mouse would develop Huntington disease. To determine whether the mouse has HD, it could be made to run a maze, while researchers look for abnormal movements. A close look at the mouse brain could also reveal symptoms of Huntington disease.

Explain why drug companies would be interested in mice with Huntington disease.

An HD mouse could make drug testing more economical. Trials can also be simply controlled by using genetically identical mice. Finally, tests that cannot be done on humans may be carried out on mice (with appropriate approvals from regulatory agencies and committees).

Is it ethical to create a mouse model to study Huntington disease? Defend your argument.

Student answers.

Templates

Some templates are available for printing in either color or black and white. These template pages can be laminated for reuse.