Hard Disk Module
(Grades 9 -12)

What are the essential questions for this module?

- Where is the hard disk in a computer? What does it look like?
- What materials are used to make hard disks?
- What is a magnetic material?
- How do hard disks store and retrieve information?

What central concepts are discussed?

- Material selection based on physical properties
- Magnetic storage and retrieval of information
- Computer device
- Magnetism
- Binary coding and decoding
- Read/write heads
- Magnetic materials

What National Science Education Standards are addressed?

- Physical Science: Content Standard B
  Structure and Properties of Matter
  Interaction of Energy and Matter

- Science and Technology: Content Standard E
  Propose designs and choose between alternative solutions

What Arizona Department of Education Standards are addressed?

- Strand 5: Physical Science
  Concept 1: Structure and Properties of Matter - Understand physical, chemical, and atomic properties of matter.
    PO 1. Describe substances based on their physical properties.
  Concept 5: Interaction of Energy and Matter - Understand the interactions of energy and matter
What do students need to know to work with this module?

**Understandings**

- Binary code – Base 2 number system
- Properties of materials
- North and south magnetic poles

**Skills**

- Able to visualize motion in three dimensions
- Basic reading skills
- Familiarity with the use of computers and the Internet

<table>
<thead>
<tr>
<th>What Will Students Understand as a Result of Their Work With This Module?</th>
<th>How Will Students Come to This Understanding? They will:</th>
<th>How Will Students Demonstrate This Understanding? They will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of disk in computer and the two most important parts of the drive</td>
<td>Utilize a manipulative that shows the student what a hard disk drive looks like and then disassembles it to show the platter and the arm.</td>
<td>Be able to identify the hard disk drive in a computer and will be able to identify the arm and platter from a graphic.</td>
</tr>
<tr>
<td>Identify materials used to make hard disks</td>
<td>Be given a graphic showing the layers comprising the hard disk and a description of each layer giving its function and composition.</td>
<td>Be able to identify the layers in the hard disk and be able to give a brief explanation of their functions.</td>
</tr>
<tr>
<td>Magnetic materials are a collection of very small magnets</td>
<td>Be given a representation of the alignment of magnets in iron and will analyze and synthesize information given in the module.</td>
<td>Be able to use magnetic orientation to do binary encoding or decoding or be able to determine the orientation given the coding/decoding.</td>
</tr>
<tr>
<td>How hard disks store and retrieve information</td>
<td>Use a manipulative that will allow them to read or write information to or from a hard disk using binary code. The manipulative will show the read or write head and the alignment of the tiny magnets are left or right arrows.</td>
<td>Be able to determine whether magnetic heads are reading or writing information to the hard disk.</td>
</tr>
</tbody>
</table>