



## Cipher Wheels

### What You Need

Cipher wheel template  
Scissors  
Brass Fastener

### What You Do

#### Assemble Cipher Wheel

1. Download, print and cut out the cipher wheel disks.
2. Align the smaller disk on top of the larger disk. Press the brass fastener through the center (marked with an X) of both disks and fasten loosely in the back.

#### Encrypt a Code

1. First, select a **key** that will be used to encrypt and decrypt the message. Pick one letter from the smaller disk, and line it up with a different letter on the larger disk.  
**Example Key: Key A:M** = Large Disk: A lined up with Small Disk: M
2. Write out the message you would like to encrypt. Keep your cipher wheel positioned so the letters of your key line up. Find the first letter of your message on the larger disk and write down the letter which appears underneath it on the smaller disk.

**Example Large Disk:** SCIENCE

**Example Small Disk:** UKEIZKI

3. Continue, one letter at a time, until your entire message has been encrypted. When you are finished, send your friends the encrypted message (and the key, separately).

**Example Large Disk:** SCIENCE IS FUN

**Example Small Disk:** UKEIZKI EU HSZ

#### Questions to ask:

- Why might you want to send someone an encrypted message?
- How will you share the key to decipher your message?
- Are there any letters that don't change when you encrypt your message? Look for patterns.

### What's the Science?

A **cipher wheel** is a tool used to **encrypt** a message. To **encrypt** a message means to scramble it into a form that is unreadable except to the person with the **decryption key**. In the case of your cipher wheel, the **key** is the two letters you must align on the wheel in order to translate the secret message. Encryption is used to protect private data and information that is sent, received and stored online. This type of encryption uses collections of algorithms – sets of computer processes and rules – to create unique encryption and decryption keys.

### Try This

**Use science vocabulary:** Use related science words such as cipher, encrypt, decrypt, key and code as you talk and play together. Children learn new vocabulary words when they hear grown-ups use them in context.

**Extend your experiments:** Create a treasure hunt for your family or friends! Hide a “treasure” somewhere around your home. Encrypt the clues and find ways to share the key with them secretly!

### Additional Resources

*Ara the Star Engineer* by Komal Singh  
*Hello Ruby: Adventures in Coding* by Linda Liukas

