Building Cryptosystems

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Fill in the blank columns using a pencil. Place the letters randomly. Make sure to have identical columns for both partners. Each row should have the same letter written in it.

One way to select a real good random ordering would be to pub each letter on a piece of paper and pick from those pieces. You could then write the letters in the order they were picked.

You could cut the extra column into 26 squares to help you do this selection.

Blank

Complete Example

Cut the columns out and attach each to the rim of a cup. Each person should have 3 cups. Two should have the alphabet in order and one should have the random ordering you created together.

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Random column (complete example): f p e o w z g i v n b h t a x u j r y s d k r q c l

Example of sheet filled in by one pair of students.

They are team 18.

Letters filled in randomly in last column.

Each team's random column should be different.

Each student in the pair makes 3 cups.

One student uses the red columns .
One student uses the blue columns.

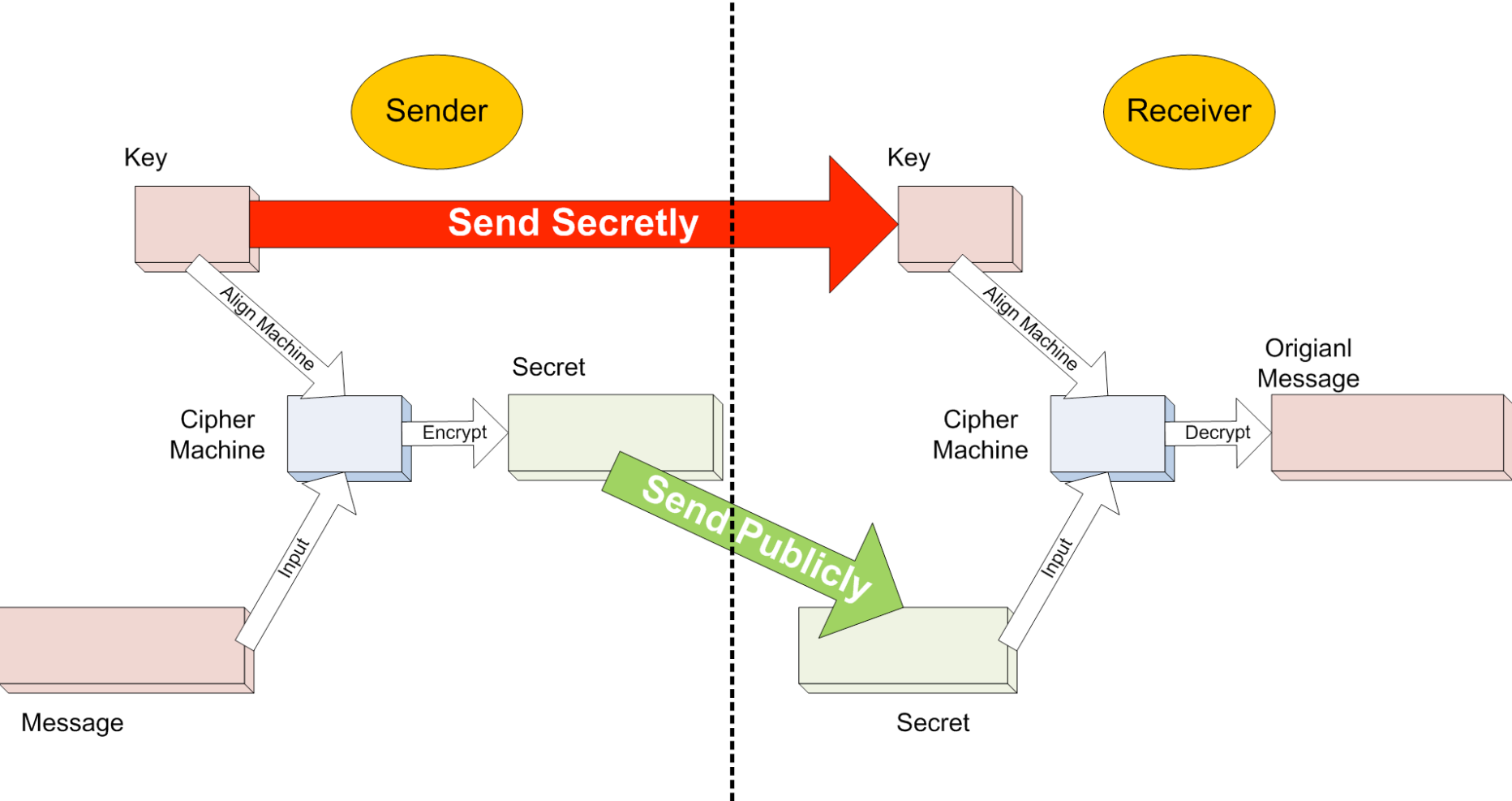Both students write the number '18' on the bottom of their cups.

A	A	A	A	f	f	A
B	B	B	B	p	p	B
C	C	C	C	e	e	C
D	D	D	D	o	o	D
E	E	E	E	w	w	E
F	F	F	F	z	z	F
G	G	G	G	g	g	G
H	H	H	H	i	i	H
I	I	I	I	v	v	I
J	J	J	J	n	n	J
K	K	K	K	b	b	K
L	L	L	L	h	h	L
M	M	M	M	t	t	M
N	N	N	N	a	a	N
O	O	O	O	x	x	O
P	P	P	P	u	u	P
Q	Q	Q	Q	j	j	Q
R	R	R	R	m	m	R
S	S	S	S	y	y	S
T	T	T	T	s	s	T
U	U	U	U	d	d	U
V	V	V	V	k	k	V
W	W	W	W	r	r	W
X	X	X	X	q	q	X
Y	Y	Y	Y	c	c	Y
Z	Z	Z	Z	l	l	Z

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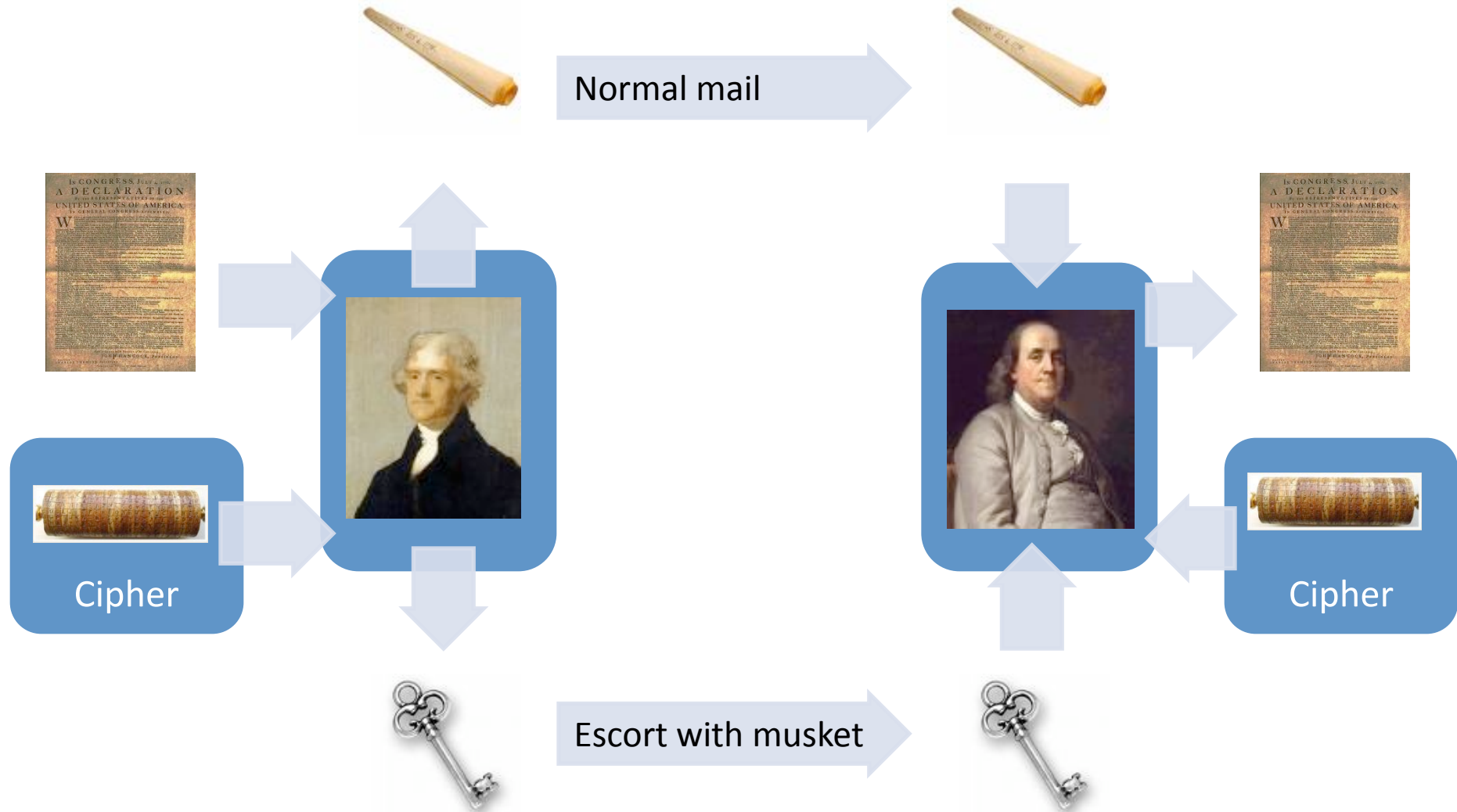Cut the columns out and attach each to the rim of a cup. Each person should have 3 cups. Two should have the alphabet in order and one should have the random ordering you created together.

Sender

Receiver

Key

Key

Send Secretly

Align Machine

Align Machine

Secret

Origianl
Message

Cipher
Machine

Encrypt

Cipher
Machine

Decrypt

Send Publicly

Input

Input

Message

Secret

Example using Caesar's Cipher

Sender

Receiver

Key

N

Key

N

Send Secretly

Align Machine

Align Machine

Cipher Machine

Encrypt

Secret

uryyb sevraq

Cipher Machine

Decrypt

Origianl Message

hello friend

Input

Input

Send Publicly

hello friend

Message

uryyb sevraq

Secret
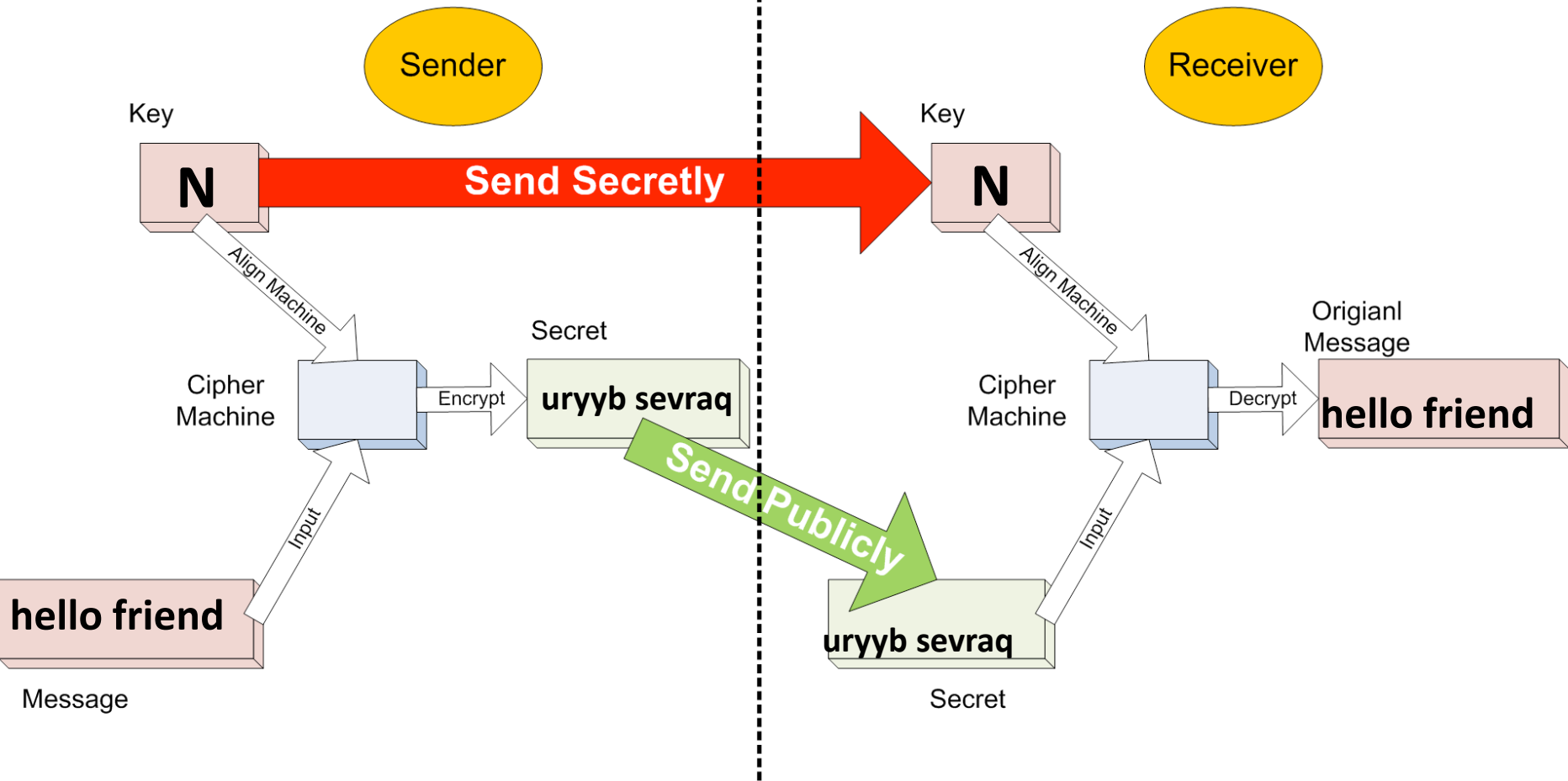
Symmetric Key Crypto Process

Normal mail

Escort with musket

Cipher

Cipher

How to Create Paper Strips

1. Measure diameter of cups. (Do not get cups with a diameter larger than a standard size piece of paper. Large cups will not work.)

2. Divide diameter by the number of characters in your alphabet.

3. Open a spreadsheet application such as Excel or Open Office.

4. Set the cell row height equal to the height you calculated in part 2. This may require some trial and error. Excel may not be exact enough that the strips will fit perfectly. For instance, when creating my sheet, I had to set half of the rows to one height and half to another to make it exact enough. I alternated them so that alignment would not be an issue.

5. Set the cell column width to be equal to the width of the lip of the cup.

6. Use the Excel file attached here as a starting point if you like. It works with the cups used in the video.

Alternatively: do this all with a ruler.