# North Carolina Science Olympiad — Code Busters

2016-2017

| Names of participants: (Please print neatly)                      |  |
|---|--|
|   |  |
|   |  |
|   |  |
| School Name:  |  |
| V JV1 JV2 JV3   |  |
|   |  |
| Warning: Do not open this packet until given permission to do so. |  |
| <b>Note:</b> There are useful notes after this page.              |  |
| Scoring: Time to solve first problem in seconds:                  |  |

| Question    | Value | Incorrect letters | Score |
|-------------|-------|-------------------|-------|
| Timed       | 100   |                   |       |
| 1           | 250   |                   |       |
| 2           | 300   |                   |       |
| 3           | 250   |                   |       |
| 4           | 250   |                   |       |
| 5           | 140   |                   |       |
| 6           | 180   |                   |       |
| 7           | 100   |                   |       |
| 8           | 100   |                   |       |
| 9           | 100   |                   |       |
| 10          | 50    |                   |       |
| 11          | 400   |                   |       |
| 12          | 100   |                   |       |
| 13          | 125   |                   |       |
| 14          | 100   |                   |       |
| 15          | 180   |                   |       |
| 16          | 60    |                   |       |
| 17          | 160   |                   |       |
| 18          | 400   |                   |       |
| Bonus       |       |                   |       |
| Final Score |       |                   |       |

The following tables might be useful during the event.

| A<br>B<br>C | A B C D E   | B<br>C<br>D<br>E | C D E | D<br>E | E<br>E<br>F | F<br>F | <b>G</b> | H | I | J | K | L | М | N  | 0 | P | Q | R      | S | T | Ū | V | W | Х | Y | Z |
|-------------|-------------|------------------|-------|--------|-------------|--------|----------|---|---|---|---|---|---|----|---|---|---|--------|---|---|---|---|---|---|---|---|
| B<br>C      | B<br>C<br>D | C<br>D           | D     | E      |             | F      | G        |   |   |   |   |   |   | _` | ) |   | æ |        |   |   |   |   |   |   |   |   |
| С           | C<br>D      | D                |       |        | 됴           |        | )        | Η | Ι | J | K | L | M | N  | 0 | Р | Q | R      | S | Т | U | V | W | Х | Y | Z |
|             | D           |                  | E     |        | T.          | G      | Η        | Ι | J | K | L | M | N | 0  | Р | Q | R | S      | Τ | U | V | W | Χ | Y | Z | Α |
| D           |             | F.               |       | F      | G           | Η      | Ι        | J | K | L | M | Ν | 0 | Ρ  | Q | R | S | Τ      | U | V | W | Χ | Y | Z | Α | В |
|             | F           | -                | F     | G      | Η           | Ι      | J        | K | L | M | Ν | 0 | Р | Q  | R | S | Т | U      | V | W | Χ | Y | Z | Α | В | С |
| E           | ш           | F                | G     | Н      | Ι           | J      | K        | L | M | N | 0 | Р | Q | R  | S | Т | U | V      | W | Χ | Y | Z | Α | В | С | D |
| F           | F           | Ŋ                | Н     | Ι      | J           | K      | L        | M | N | 0 | Р | Q | R | S  | Т | U | V | M      | Χ | Y | Z | Α | В | С | D | Ε |
| G           | G           | Η                | Ι     | J      | K           | L      | M        | Ν | 0 | Р | Q | R | S | Т  | U | V | M | Χ      | Y | Z | Α | В | С | D | Ε | F |
| H           | Н           | Ι                | J     | K      | L           | M      | Ν        | 0 | Р | Q | R | S | Т | U  | V | W | Χ | Y      | Z | Α | В | С | D | E | F | G |
| I           | I           | J                | K     | L      | M           | N      | 0        | Р | Q | R | S | Т | U | V  | W | Χ | Y | Z      | А | В | C | D | Ε | F | Ŋ | Н |
| J           | J           | K                | L     | M      | Ν           | 0      | Р        | Q | R | S | Т | U | V | W  | Х | Y | Z | А      | В | С | D | E | F | G | Η | Ι |
| K           | K           | L                | M     | N      | 0           | Р      | Q        | R | S | Τ | U | V | W | Х  | Y | Z | Α | В      | С | D | E | F | G | Н | I | J |
| L           | L           | M                | Ν     | 0      | Р           | Q      | R        | S | Т | U | V | W | Х | Y  | Z | Α | В | $\Box$ | D | Ε | F | G | Н | I | J | K |
| M           | M           | Ν                | 0     | Р      | Q           | R      | S        | Т | U | V | W | Х | Y | Z  | Α | В | С | D      | Ε | F | G | Н | Ι | J | K | L |
| N           | N           | 0                | Р     | Q      | R           | S      | Т        | U | V | W | Х | Y | Z | А  | В | С | D | Ε      | F | Ŋ | Η | I | J | K | Г | M |
| 0           | 0           | Р                | Q     | R      | S           | Т      | U        | V | W | Χ | Y | Z | А | В  | С | D | Ε | F      | Ŋ | Η | I | J | K | L | M | N |
| P           | Р           | Q                | R     | S      | Т           | U      | V        | W | Х | Y | Z | Α | В | С  | D | Ε | F | G      | Н | I | J | K | L | M | N | 0 |
| Q           | Q           | R                | S     | Т      | U           | V      | W        | Χ | Y | Ζ | Α | В | C | D  | Ε | F | Ъ | Н      | Ι | J | K | L | M | N | 0 | Р |
| R           | R           | S                | Т     | U      | V           | W      | Х        | Y | Z | А | В | С | D | E  | F | G | Н | Ι      | J | K | L | М | N | 0 | Р | Q |
| S           | S           | Т                | U     | V      | W           | Χ      | Y        | Z | Α | В | С | D | E | F  | G | Н | Ι | J      | K | L | M | N | 0 | Р | Q | R |
| T           | Т           | U                | V     | W      | Х           | Y      | Z        | А | В | С | D | Ε | F | U  | Н | I | Ъ | K      | L | M | Ν | 0 | Р | Q | R | S |
| U           | U           | V                | W     | Х      | Y           | Z      | А        | В | С | D | E | F | G | Н  | I | J | K | L      | М | N | 0 | Р | Q | R | S | Т |
| v           | V           | W                | Х     | Y      | Z           | Α      | В        | С | D | Ε | F | G | Н | I  | J | K | L | M      | N | 0 | Р | Q | R | S | Т | U |
| W           | W           | Х                | Y     | Z      | А           | В      | С        | D | Ε | F | G | Н | I | J  | K | L | M | N      | 0 | Р | Q | R | S | Т | U | V |
| Х           | Х           | Y                | Z     | А      | В           | С      | D        | Ε | F | G | Н | I | J | K  | L | М | N | 0      | Р | Q | R | S | Т | U | V | W |
| Y           | Y           | Z                | Α     | В      | С           | D      | Ε        | F | G | Н | Ι | J | K | L  | M | N | 0 | Р      | Q | R | S | Т | U | V | W | Х |
| Z           | Z           | Α                | В     | С      | D           | Ε      | F        | G | Н | Ι | J | K | L | M  | N | 0 | Р | Q      | R | S | Т | U | V | W | Х | Y |

| Α | В | ŋ | D | E | F | Ф | Н | I | J | K  | ь  | M  | N  | 0  | Р  | Ø  | R  | ន  | Т  | Д  | ٧  | W  | X  | Y  | Z  |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |

#### Frequency Table of English letters:

| E | 12.51% | S | 6.54% | С | 3.06% | G | 1.96% | K | 0.67% |
|---|--------|---|-------|---|-------|---|-------|---|-------|
| T | 9.25%  | R | 6.12% | U | 2.71% | W | 1.92% | X | 0.19% |
| Α | 8.04%  | Н | 5.49% | M | 2.53% | Y | 1.73% | J | 0.16% |
| 0 | 7.60%  | L | 4.14% | F | 2.30% | В | 1.54% | Q | 0.11% |
| I | 7.26%  | D | 3.99% | P | 2.00% | V | 0.99% | Z | 0.09% |
| N | 7.09%  |   |       |   |       |   |       |   |       |

#### Frequency Table of Spanish letters:

| Ε | 14.08% | I | 5.98% | M | 3.08% | Y | 1.09% | Z                        | 0.47% |
|---|--------|---|-------|---|-------|---|-------|--------------------------|-------|
| Α | 12.16% | L | 5.24% | P | 2.89% | V | 1.05% | $\widetilde{\mathrm{N}}$ | 0.17% |
| 0 | 9.20%  | D | 4.67% | В | 1.49% | G | 1.00% | X                        | 0.14% |
| S | 7.20%  | T | 4.60% | H | 1.18% | F | 0.69% | K                        | 0.11% |
| N | 6.83%  | U | 4.69% | Q | 1.11% | J | 0.52% | W                        | 0.04% |
| R | 6.41%  | С | 3.87% |   |       |   |       |                          |       |

For the purposes of cryptograms it is customary to treat n and ñ as distinct letters, but a and á are the same letter. Likewise for e and é, and i and í. In other words, all the accent marks get amputated when working with cryptograms. Also, while some older Spanish dictionaries consider ch, ll, and rr, to be their own letters—this has fallen out of modern usage. Accordingly, "burro" is considered as five letters: "b-u-r-r-o" and not as four letters "b-u-rr-o."

| School | 17 | TX/1 | JV2 | III/2 |
|--------|----|------|-----|-------|
| SCHOOL | V  | JVI  | JVZ | JVJ   |

Timed question [100 Points]: Solve this Cryptogram which is a quote by George T. Hewitt. When you have solved it, raise your hand so that the time can be recorded and the solution checked.

#### MRY PYWM MRBLZW BL TBDY XFY

#### LYSYF FXMBALYN. DFBYLNWRBV, TAKXTMK,

### TASY NA LAM FYGQBFY UAQVALW.

|      | Α | В | C | D | E | F | ъ | Н | I | J | K | L | M | N | 0 | Ρ | Q | R | S | T | ט | ٧ | W | X | Y  | Z |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|---|
| Freq | 7 | 7 |   | 2 |   | 6 | 1 |   |   |   | 2 | 7 | 6 | 3 |   | 1 | 2 | 3 | 2 | 4 | 1 | 2 | 4 | 3 | 11 | 1 |
|      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |
|      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |

| School | V | IV1   | JV2   | IV3   |
|--------|---|-------|-------|-------|
| SCHOOL | v | J V I | J V Z | J V J |

1) [250 Points] Solve this Patristrocrat containing a quote by Robert Brault. In it, you will find the word OVERCOME appear twice.

# COHHA CCBCU IUYAF VFJCI UHYAC FQAKH FTAUP EVFKA

QAKWF JCIUH YAFQA KHFTA UPARH OCAPF IOCAE.

|      | A  | В | U | Р | E | F | ъ | н | I | Ъ | K | Ь | M | N | 0 | P | Q | R | ន | T | ם | ٧ | W | X | Y | Z |
|------|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Freq | 13 | 1 | 9 |   | 2 | 9 |   | 7 | 4 | 2 | 4 |   |   |   | 3 | 3 | 3 | 1 |   | 2 | 6 | 2 | 1 |   | 3 |   |
|      |    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

2) [300 Points] Solve this Cryptogram which is a quote by Lily Tomlin.

NDVVDHBQ HW QGDEDUKTV OEYTUKEYQ FTVI

UJY YTEUJ KBQYYB, MHUJ FJYB FY QVYYG

TBZ FJYB FY TFTIY.

|      | Α | В | C | D | E | F | G | н | I | Ъ | K | L | M | N | 0 | P | Q | R | s | T | ט | V | W | х | Y  | Z |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|---|
| Freq |   | 6 |   | 4 | 4 | 6 | 2 | 3 | 2 | 5 | 3 |   | 1 | 1 | 1 |   | 5 |   |   | 7 | 5 | 5 | 1 |   | 13 | 1 |
|      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |

| School | $\mathbf{V}$ | IV1   | JV2 | IV3   |
|--------|--------------|-------|-----|-------|
| SCHOOL | v            | J V I | JVZ | J V J |

3) [250 Points] Solve this Cryptogram which is meaningful advice by Erich Fromm.

# KAPCP JX TB VPITJTR KB NJEP PQOPSK

### KAP VPITJTR VIT RJMPX AJX NJEP WU

FTEBNHJTR BE AJX SBZPCX.

|      | Α | В | U | D | E | F | G | Н | I | J | K | L | M | N | 0 | P  | Q | R | ន | T | ט | ٧ | W | X | Y | Z |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|---|---|
| Freq | 4 | 5 | 2 |   | 4 | 1 |   | 1 | 3 | 9 | 4 |   | 1 | 3 | 1 | 11 | 1 | 4 | 2 | 8 | 1 | 3 | 1 | 5 |   | 1 |
|      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |

4) [250 Points] Solve this Spanish proverb Cryptogram.

#### MJ XLBJ ZC HI GHZED P KH ZYZC ZM FHZ BZOLBZ CL

ZYZC HIJ WLZRJ D CZYJC HI GHEJBDY.

|      | A | В | C | D | E | F | G | н | I | J | K | L | M | N | Ñ | 0 | P | Q | R | ន | Т | U | ٧ | W | Х | Y | Z  |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|
| Freq |   | 4 | 6 | 3 | 2 | 1 | 2 | 7 | 3 | 6 | 1 | 4 | 2 |   |   | 1 | 1 |   | 1 |   |   |   |   | 1 | 1 | 4 | 12 |
|      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |

| School | $\mathbf{V}$ | IV1 | JV2 | IV3 |
|--------|--------------|-----|-----|-----|
| SCHOOL | v            | JVI | JVZ | JVJ |

5) [140 Points] Solve this unattributed quote Cryptogram that talks about a positive outlook.

# LWV LQAV LU RV WFIIG QK DUT. LWV ICFEV

# LU RV WFIIG QK WVBV. LWV TFG LU RV

WFIIG QK LU AFHV ULWVBK KU.

|      | A | В | C | D | E | F | G | Н | I | J | K | L | M | N | 0 | P | Q | R | S | Т | U | v  | W | X | Y | Z |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|---|---|---|---|
| Freq | 2 | 2 | 1 | 1 | 1 | 6 | 4 | 1 | 7 |   | 5 | 9 |   |   |   |   | 4 | 3 |   | 2 | 7 | 12 | 8 |   |   |   |
|      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |   |   |   |   |

6) [180 Points] Solve this cipher which quotes Samuel Johnson. The second word is **AM** and the last word is **NATIONS**.

#### WEDET KEXYY JIIXK VMCEC XTECF OEFMW YTJYZ HMQEO

#### YMTEC FOEFM YEIMZ VMRML WFIMM YJACE ZWJCY

|      | Α | В | C | D | E  | F | G | н | I | J | K | L | M  | N | 0 | P | Q | R | ន | Т | Ū | V | W | х | Y | Z |
|------|---|---|---|---|----|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Freq | 1 |   | 6 | 1 | 11 | 5 |   | 1 | 4 | 4 | 2 | 1 | 10 |   | 3 |   | 1 | 1 |   | 4 |   | 2 | 4 | 3 | 8 | 3 |
|      |   |   |   |   |    |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |   |   |   |

| School | V | IV1 | JV2 | IV3   |
|--------|---|-----|-----|-------|
| SCHOOL | v | JVI | JVZ | J V J |

7) [100 Points] Your teacher has this sign on the wall. What does it say?

# 

| Answer: |  |  |  |  |  |  |
|---------|--|--|--|--|--|--|
|         |  |  |  |  |  |  |

8) [100 Points] Using a key of **BLOR** encode the string **PHYSIOLOGY** using the Hill Cipher with a 26 character alphabet. e.g.

$$\begin{pmatrix} B & L \\ O & R \end{pmatrix} \equiv \begin{pmatrix} 2 & 11 \\ 14 & 17 \end{pmatrix}$$

| Р | Н | Y | S | I | 0 | L | 0 | G | Y |
|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |   |

|                |                     |              |               | School             | <i>\</i> | JV1   | JV2    | JV3 |
|----------------|---------------------|--------------|---------------|--------------------|----------|-------|--------|-----|
| 9) [100 Points | ] Encode the string | DREAMBIGANDI | DARETOFAIL us | ing the Affine Cip | her with | a=7 a | nd b = | 9.  |

| D | R | E | Α | M | В | I | G | Α | N | D | D | Α | R | E | T | 0 | F | Α | I | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

10) [50 Points] Using a code word of **GENIUS**, encode the following quote from James A. Garfield using the Vigenère cipher.

MAN CANNOT LIVE BY BREAD ALONE; HE MUST HAVE PEANUT BUTTER.

| F | Answer: |  |  |  |  |  |
|---|---------|--|--|--|--|--|
|   |         |  |  |  |  |  |
|   |         |  |  |  |  |  |

| School | $\mathbf{V}$ | IV1 | JV2 | IV3 |
|--------|--------------|-----|-----|-----|
| SCHOOL | v            | JVI | JVZ | JVJ |

11) [400 Points] Your phone badly misheard this quote from Albert Einstein and misheard a few words before encrypting it. What does it say?

IBIOLPWZFX ZF PWI MFZBIOKI WYK Y DEODEKI. ZFJIIJ,

PWI ZFBZKZGSI ZFPISSZXIFUI PWYP NSEAK PWOIA

IBIOLPWZFX ZF Y DMODEKINMS NYKWZEF ZK YSKE

NSEAZFX PWOIA LEM.

|      | Α | В | C | D | E | F  | Ъ | Н | I  | Ъ | K | L | M | N | 0 | P | Q | R | ន | T | Ū | V | W | X | Y | Z  |
|------|---|---|---|---|---|----|---|---|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|
| Freq | 4 | 4 |   | 4 | 8 | 11 | 1 |   | 18 | 2 | 9 | 3 | 4 | 4 | 7 | 9 |   |   | 7 |   | 1 |   | 9 | 4 | 6 | 14 |
|      |   |   |   |   |   |    |   |   |    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |

12) [100 Points] Solve this Cryptogram which is a quote by Robert Brault where the word **YOU** appears multiple times.

VZ DPN USQA ICFI CPEQ FSY YQLEFVM AQMQ

EFICL IP ICQ LFWQ YQLIVSFIVPS,

ACVJC APNTY DPN JCPPLQ?

|      | Α | В | C | D | E | F | ъ | н | I | Ъ | K | Ь | M | N | 0 | P | Q | R | ន | T | Ū | ٧ | W | X | Y | Z |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Freq | 4 |   | 7 | 2 | 3 | 6 |   |   | 7 | 2 |   | 5 | 2 | 3 |   | 8 | 9 |   | 4 | 1 | 1 | 5 | 1 |   | 4 | 1 |
|      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

| School | V | JV1 | JV2 | JV3 |
|--------|---|-----|-----|-----|

13) [125 Points] Using a key of **FARMBATTS** encode the string **MECHATRONIC** using the Hill Cipher with a 26 character alphabet. e.g.

$$\begin{pmatrix} F & A & R \\ M & B & A \\ T & T & S \end{pmatrix} = \begin{pmatrix} 5 & 0 & 17 \\ 12 & 1 & 0 \\ 19 & 19 & 18 \end{pmatrix}$$

| M | E | C | Н | Α | Т | R | 0 | N | I | C |  |
|---|---|---|---|---|---|---|---|---|---|---|--|
|   |   |   |   |   |   |   |   |   |   |   |  |

14) **[100 Points]** Henry Van Dyke once said this about a treasure. It has been encoded using the Vigenère cipher using a very common five letter word. You have been told that the 6<sup>th</sup> through the 13<sup>th</sup> letters in the code (MYMNYNYM) actually is the word TREASURE. What does the message decode to?

# FHVLG MYMNY NYMOK LPLRY TSQOG UHAVY

# NUTBI DLLJO MOIIK KIIYQ XF

| Answer: |  |  |
|---------|--|--|
|         |  |  |
|         |  |  |

| School | V | JV1 | JV2 | JV3 |
|--------|---|-----|-----|-----|

15) [180 Points] John F. Kennedy said this. What did he say?

# 

# ARX X PA F T X X A F

| Answer:    |  |  |  |
|------------|--|--|--|
| TIIS W CI. |  |  |  |

16) **[60 Points]** You know that a message has been encrypted using the Affine Cipher with an alphabet of 26 characters. You have discovered that the message **IGCXX** decodes to say **SMALL**. What are the values of a and b in the function ax + b that were used to encode the message?

| a= | b= |
|----|----|
|    |    |

| intercepted        | oints] Anoth<br>. You have<br>, what does | been told th                            | at the last tv |       |       | ing an alpha | bet of 26 ch | JV1 JV2<br>aracters has<br>With that |  |
|--------------------|---|---|----------------|-------|-------|--------------|--------------|--------------------------------------|--|
| DLROTE             | FOZLOBN                                   | (VAEXQX                                 | KMRHTI         | LRKC  |       |              |              |                                      |  |
| Answer:            |   |   |                |       |       |              |              |                                      |  |
|                    |   |   |                |       |       |              |              |                                      |  |
|                    |   |   |                |       |       |              |              |                                      |  |
|                    |   |   |                |       |       |              |              |                                      |  |
|                    |   |   |                |       |       |              |              |                                      |  |
| 18) [ <b>400 P</b> | oints] Solve                              | this cryptog                            | ram.           |       |       |              |              |                                      |  |
| , .                | WFNYF                                     | • | •              | JDBOD | JYKBO | FDKPQ        | YFHCC        | VQODK                                |  |
| PQYXE              | KKBOV                                     | QPLHY                                   | VSHFK          | EQOYP | нквоі |              |              |                                      |  |

|      | Α | В | C | D | E | F | G | н | I | J | K | L | M | N | 0 | P | Q | R | S | T | U | V | W | X | Y | Z |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Freq |   | 4 | 2 | 4 | 2 | 7 |   | 6 | 2 | 3 | 7 | 1 |   | 2 | 8 | 4 | 6 |   | 1 |   |   | 4 | 3 | 2 | 6 | 1 |
|      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |