Caesar cipher：

Ciphertext：

FBUQIUUDSHOFJOEKHDQCUMYJXJXUIQCUAUOQDTKFBEQTJEBUQHDYDWYDPZK

Plaintext：

PLEASEENCRYPTYOURNAMEWITHTHESAMEKEYANDUPLOADTOLEARNINGINZJU

KEY:

10

What I should do：

XKQDWMUDZYU

Cryptanalysis process：

利用算法穷举 25 种偏移后的情况，筛选出合理的明文（下附部分代码和执行结果）

```
for (int i = 1; i <= 25; i++) {
    int j = 0;
    char str1[0xFF] = { '\0' };
    while (str[j] != '\0') {
        str1[j] = (str[j] - 'A' + i) % 26 + 'A';
        cout << str1[j] ;
        j++;
    }
    cout << endl;

}
```

```
**************************解密ing**************************

GCVRJVVETIPGKPFLIERDVNZKYKYVJRDVBVPREULGCFRUKFCVRIEZEXZEQAL
HDWSKWWFUJQHLQGMJFSEWOALZLZWKSEWCWQSFVMHDGSVLGDWSJFAFYAFRBM
IEXTLXXGVKRIMRHNKGTFXPBMAMAXLTFXDXRTGWNIEHTWMHEXTKGBGZBGSCN
JFYUMYYHWLSJNSIOLHUGYQCNBNBYMUGYEYSUHXOJFIUXNIFYULHCHACHTDO
KGZVNZZIXMTKOTJPMIVHZRDOCOCZNVHZFZTVIYPKGJVYOJGZVMIDIBDIUEP
LHAWOAAJYNULPUKQNJWIASEPDPDAOWIAGAUWJZQLHKWZPKHAWNJEJCEJVFQ
MIBXPBBKZOVMQVLROKXJBTFQEQEBPXJBHBVXKARMILXAQLIBXOKFKDFKWGR
NJCYQCCLAPWNRWMSPLYKCUGRFRFCQYKCICWYLBSNJMYBRMJCYPLGLEGLXHS
OKDZRDDMBQXOSXNTQMZLDVHSGSGDRZLDJDXZMCTOKNZCSNKDZQMHMFHMYIT
PLEASEENCRYPTYOURNAMEWITHTHESAMEKEYANDUPLOADTOLEARNINGINZJU
QMFBTFFODSZQUZPVSOBNFXJUIUIFTBNFLFZBOEVQMPBEUPMFBSOJOHJOAKV
RNGCUGGPETARVAQWTPCOGYKVJVJGUCOGMGACPFWRNQCFVQNGCTPKPIKPBLW
SOHDVHHQFUBSWBRXUQDPHZLWKWKHVDPHNHBDQGXSORDGWROHDUQLQJLQCMX
TPIEWIIRGVCTXCSYVREQIAMXLXLIWEQIOICERHYTPSEHXSPIEVRMRKMRDNY
UQJFXJJSHWDUYDTZWSFRJBNYMYMJXFRJPJDFSIZUQTFIYTQJFWSNSLNSEOZ
VRKGYKKTIXEVZEUAXTGSKCOZNZNKYGSKQKEGTJAVRUGJZURKGXTOTMOTFPA
WSLHZLLUJYFWAFVBYUHTLDPAOAOLZHTLRLFHUKBWSVHKAVSLHYUPUNPUGQB
XTMIAMMVKZGXBGWCZVIUMEQBPBPMAIUMSMGIVLCXTWILBWTMIZVQVOQVHRC
YUNJBNNWLAHYCHXDAWJVNFRCQCQNBJVNTNHJWMDYUXJMCXUNJAWRWPRWISD
ZVOKCOOXMBIZDIYEBXKWOGSDRDROCKWOUOIKXNEZVYKNDYVOKBXSXQSXJTE
AWPLDPPYNCJAEJZFCYLXPHTESESPDLXPVPJLYOFAWZLOEZWPLCYTYRTYKUF
BXQMEQQZODKBFKAGDZMYQIUFTFTQEMYQWQKMZPGBXAMPFAXQMDZUZSUZLVG
CYRNFRRAPELCGLBHEANZRJVGUGURFNZRXRLNAQHCYBNQGBYRNEAVATVAMWH
DZSOGSSBQFMDHMCIFBOASKWHVHVSGOASYSMOBRIDZCORHCZSOFBWBUWBNXI
EATPHTTCRGNEINDJGCPBTLXIWIWTHPBTZTNPCSJEADPSIDATPGCXCVXCOYJ

明文：
PLEASEENCRYPTYOURNAMEWITHTHESAMEKEYANDUPLOADTOLEARNINGINZJU
```

Vignere cipher：

Ciphertext：

Ktbueluegvitnthuexmonveggmrcgxptlyhhjaogchoemqchpdnetxupbqntietiabpsmaoncnwvoutiu
gtagmmqsxtvxaoniiogtagmbpsmtuvvihpstpdvcrxhokvhxotawswquunewcgxptlcrxtevtubvewcn
wwsxfsnptswtagakvoyyak

Plaintext：

it is essential to seek out enemy agents who have come to conduct espionage against you and to bribe them to serve you give them instructions and care for them thus doubledagents are recruited and used suntzutheart of war

KEY:

CAT

Cryptanalysis process：

上网搜索到可以利用 Friedman 测试法来确定密钥长度，其原理是找到某个密钥长度下的各个分组算得的平均重合因子的结果最接近 0.065。
根据迭代计算得，keylength=3 时符合。
根据秘钥长度对密文进行分组。

第一组：
a=2,b=0,c=6,d=0,e=1,f=1,g=7,h=1,i=3,j=1,k=1,l=0,m=1,n=2,o=2,p=8,q=4,r=0,s=0,t=5,u=4,v=7,w=3,x=0,y=2,z=0
第二组：
a=4,b=0,c=2,d=2,e=9,f=0,g=2,h=2,i=4,j=0,k=0,l=0,m=3,n=3,o=6,p=1,q=0,r=2,s=7,t=10,u=3,v=1,w=0,x=0,y=0,z=0
第三组：
a=4,b=5,c=0,d=0,e=0,f=0,g=2,h=5,i=0,j=0,k=3,l=3,m=4,n=5,o=2,p=0,q=0,r=1,s=1,t=4,u=3,v=3,w=5,x=10,y=1,z=0

标黄的字母出现频率较高，有理由猜测第一组中（e->c OR e->g OR e->P OR e->v），第二组中（e->e OR e->s OR e->t），第三组中（e->x），分别带入解密发现：第一组中 e->g，第二组中 e->e，第三组中 e->x，符合，解出来的密钥为 CAT

根据所得密钥利用 Caesar 解密，解出明文为 it is essential to seek out enemy agents who have come to conduct espionage against you and to bribe them to serve you give them instructions and care for them thus doubledagents are recruited and used suntzutheart of war

Unknown:

Ciphertext：

MAL TIRRUEZF CR MAL RKZYIOL EX MAL OIY UAE RICF “MAL ACWALRM DYEUPLFWL CR ME DYEU MAIM UL IZL RKZZEKYFLF GH OHRMLZH”

Plaintext：

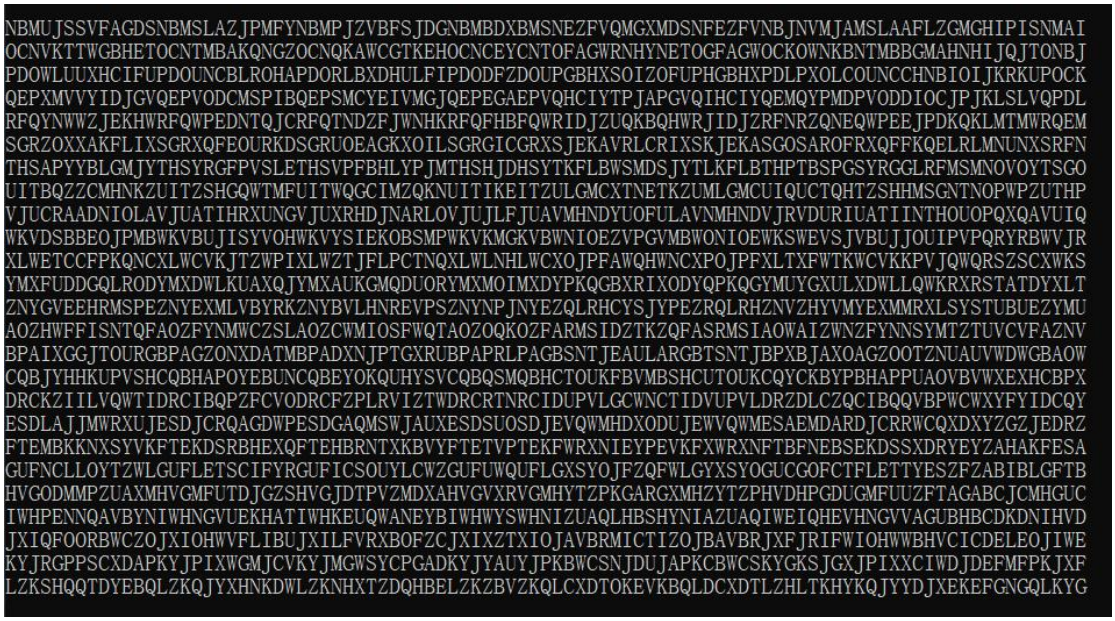
THE PASSWORD IS THE SURNAME OF THE MAN WHO SAID THE HIGHEST KNOWLEDGE IS TO KNOW THAT WE ARE SURROUNDED BY MYSTERY

substitution table：

明文	A	C	E	F	I	K	L	M	O
密文	H	I	O	D	A	U	E	T	M
明文	R	T	U	X	Y	Z			
密文	S	P	W	F	N	R			

Cryptanalysis process：

1. 猜测是 Caesar cipher，将所有情况列举后发现不是。



2. 猜测是 Vignere cipher，利用 Friedman 测试法穷举后找不到合适的 keylength。

3. 猜测是单表加密

频率分析得，

A=4,B=0,C=2,D=0,E=3,F=2,G=0,H=0,I=4,J=0,K=1,L=4,M=3,N=0,O=2,P=0,Q=0,R=5,S=0,T=1,U=2,V=0,W=0,X=1,Y=2,Z=2

同时，观测到 MAL 出现频率较高，猜测又处于句子开头，故猜测是 THE，M->T, A->H,L->E

观察到文中出现了 MAIM,其对应 TH_T，猜测 I->A，则 MAIM->THAT

同理根据 IZL->A_E，猜测 Z->R，则 IZL->ARE

MAIM UL IZL->TAHT _E ARE 猜测 U->W，即 THAT WE ARE
UAE ->WH_ ME->T_ 猜测 E->O 即 UAE ->WHO ME->TO
EX->O_ 猜测 X->F 即 EX->OF
再根据主谓宾结构猜测 CR->IS
进而可根据 ACWALRM->HI_HEST 推出 W->G ACWALRM->HIGHEST
同理可推出其他对应关系。