

WINTERHOUSE WORD PUZZLES

CREATING A VIGENÈRE CIPHER

THE VIGENÈRE CIPHER is the most important code that appears in *Winterhouse*. This is a very old and complicated method of writing in code language, but by using it, a person can create coded messages that are difficult to break.

Here's what you need to create a Vigenère Cipher:

- You'll need to use a Vigenère grid or Square—like this:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
A	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
B	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A
C	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B
D	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C
E	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D
F	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E
G	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F
H	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G
I	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H
J	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I
K	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J
L	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K
M	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L
N	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M
O	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N
P	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Q	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
R	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
S	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
T	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
U	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
V	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
W	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
X	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
Y	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
Z	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y



WINTERHOUSE WORD PUZZLES

CREATING A VIGENÈRE CIPHER

Steps to create a Vigenère Cipher continued:

- Next, come up with a **word or phrase** you want to turn into a code. Let's use "Look at the beautiful picture." This is actually the phrase presented to Elizabeth when she learns about the Vigenère Cipher in *Winterhouse*, so it is a very handy example.
- Then, we'll need to come up with a **keyword**—how about "hotel"? Now what you do is "lay" your keyword over the phrase you want to turn into a code, like this:

h	o	t	e	l	h	o	t	e	l	h	o	t	e	l	h	o	t	e	l				
l	o	o	k	a	t	t	h	e	b	e	a	u	t	i	f	u	p	i	c	t	u	r	e

- Now, use the Vigenère Square above to help you "translate" everything into a coded message by finding where your pairs of letters meet in the grid. That sounds a little complicated, but just give it a try—match the "h" in "hotel" with the "l" in "look," and where they intersect in the Vigenère Square you will find the letter "s." Working through the entire phrase will give you this:

h	o	t	e	l	h	o	t	e	l	h	o	t	e	l	h	o	t	e	l	h	o	t	e	l
l	o	o	k	a	t	t	h	e	b	e	a	u	t	i	f	u	p	i	c	t	u	r	e	
s	c	h	o	l	a	h	a	i	m	l	o	n	x	t	m	i	e	t	t	j	h	n	v	p

When you are all done, the original phrase: "**Look at the beautiful picture**" is transformed into "**Scho la hai mlonxtmie ttjhnvp.**" The only way someone else can figure out what those words mean is by using the keyword "hotel" to decode them!

Examples:

If you want to know the titles of three of Elizabeth's favorite books, try using the Vigenère Square with the keywords below to figure them out! Remember to work backwards to decode a message. For example, in #1 below, you have to start with the "m" (from "magic") along the very top row in the square, move down the column until you find "f" (from "fhk"), and then move along the far left column to land on the letter "t," which will be the first letter of the hidden message.

1. **FHK OQXDKV EAMVIUE** (keyword = "magic") _____
2. **UVS GFGHSOU UKNS** (keyword = "book") _____
3. **YHM AVGBQM** (keyword = "faith") _____



WINTERHOUSE WORD PUZZLES

WORD LADDER

Directions for a word ladder:

- You start with two words: your starting word and your ending word.
- Then change only one letter at a time to create a new word.
- Work your way from your starting word toward your ending word.

Example:

Turn “COLD” into
“WARM” in four steps:

COLD
CORD
CARD
WARD
WARM

Want to give it a try?

Can you change “HATE” into “LOVE”? Or “LOSE” into “FIND”? “LESS” into “MORE”? “MARK” into “WORD”? Or “WORK” into “GAME”?

Can you do each one in five steps or even less?

See how well you do...and if you want a little bit of help, use the clues below.

Once you’ve completed the word ladders below, take the final word from each puzzle and use them to fill in the sentence at the bottom of page 4 for a final message!

(Starting word)	HATE
Elizabeth opened it to enter her aunt and uncle’s yard	GATE
Elizabeth ____ clues to Freddy during their scavenger hunt	GAVE
In the second Winterhouse book, Freddy will ____ Elizabeth a look at his new invention	GIVE
At the Winterhouse Hotel, most of the women in the Falls family ____ to be 100 years old	LIVE
Elizabeth would ____ to read books all day	LOVE (#1)

Now you give it a try!

(Starting word)	LOSE
This holds up the glasses on Elizabeth’s face	
The number of women at the Winterhouse Hotel who live to be older than 100	
The age Elizabeth was two years before she came to Winterhouse	
If Elizabeth has an overdue book at the library, she might have to pay this	
“The Book” is something Selena and Marcus Hiems want to ____	



WINTERHOUSE WORD PUZZLES

WORD LADDER

(Starting word)	LESS
For Elizabeth, missing out on Christmas vacation in the town of Drere felt like a _____	
When Elizabeth and Freddy compete at word ladders, neither wants to _____	
When Elizabeth first sees the Winterhouse library, she falls in _____ with it	
Elizabeth would love to _____ from Drere to Winterhouse	
One taste of Flurschen always leave a person wanting _____	

(Starting word)	MARK
One night, Elizabeth and Freddy go skiing in the _____	
The circular driveway in front of Winterhouse is a place where vehicles can _____	
Dinners in Winter Hall typically feature chicken, beef, fish, or _____	
Freddy is perfecting his Walnut WonderLog, so he spends part of each day hard at _____	
Elizabeth and Freddy are trying to crack a code by figuring out the key _____	

(Starting word)	WORK
At the Christmas Eve dinner, a green velveteen dress is what Elizabeth _____	
Each apple used in the apple pies made in the Winterhouse kitchen has a _____	
Freddy has _____ to Winterhouse during three previous Christmas holidays	
After her parents died, Elizabeth _____ to live with her aunt and uncle	
Word ladders are just one sort of _____ Elizabeth and Freddy like to play	

Elizabeth and Freddy would _____ to _____ _____ s to play!
 (Word #1) (Word #2) (Word #3) (Word #4) (Word #5)



ANSWER KEY

PHK OQXDKV EAMVIUE (keyword = “magic”) | *The Golden Compass*

UVS GFGHSOU UKNS (keyword = “book”) | *The Westing Game*

YHM AVGBQM (keyword = “faith”) | *The Hobbit*

(Starting word)	LOSE
This holds up the glasses on Elizabeth’s face	NOSE
The number of women at the Winterhouse Hotel who live to be older than 100	NONE
The age Elizabeth was two years before she came to Winterhouse	NINE
If Elizabeth has an overdue book at the library, she might have to pay this	FINE
“The Book” is something Selena and Marcus Hiems want to _____	FIND (#2)

(Starting word)	MARK
One night, Elizabeth and Freddy go skiing in the _____	DARK
The circular driveway in front of Winterhouse is a place where vehicles can _____	PARK
Dinners in Winter Hall typically feature chicken, beef, fish, or _____	PORK
Freddy is perfecting his Walnut WonderLog, so he spends part of each day hard at _____	WORK
Elizabeth and Freddy are trying to crack a code by figuring out the key _____	WORD (#4)

(Starting word)	LESS
For Elizabeth, missing out on Christmas vacation in the town of Drere felt like a _____	LOSS
When Elizabeth and Freddy compete at word ladders, neither wants to _____	LOSE
When Elizabeth first sees the Winterhouse library, she falls in _____ with it	LOVE
Elizabeth would love to _____ from Drere to Winterhouse	MOVE
One taste of Flurschen always leave a person wanting _____	MORE (#3)

(Starting word)	WORK
At the Christmas Eve dinner, a green velveteen dress is what Elizabeth _____	WORE
Each apple used in the apple pies made in the Winterhouse kitchen has a _____	CORE
Freddy has _____ to Winterhouse during three previous Christmas holidays	COME
After her parents died, Elizabeth _____ to live with her aunt and uncle	CAME
Word ladders are just one sort of _____ Elizabeth and Freddy like to play	GAME (#5)

Elizabeth and Freddy would (**love**) to (**find**) (**more**) (**word**) (**game**)s to play!

