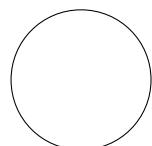
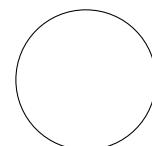
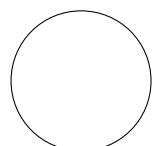
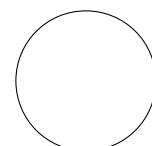
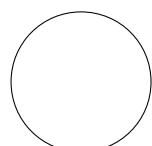
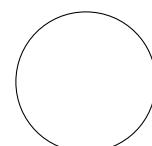
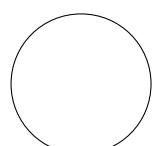
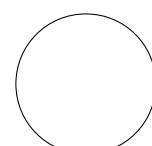
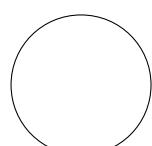
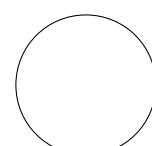
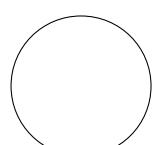
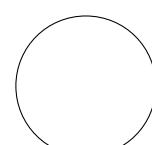


Word Dozen contest

Placing a poker chip of your color, selects a word. The first player whose words have (at least) 3 copies of *some* letter, **wins**.

**BIT****GOLF****BRAT****KNOW****DRY****NAPE****DUCK****PIG****FUEL****SIN****GAS****STOP**

Have You played this game before ?

*Shhh!***Word Dozen** is, secretly, *Tic Tac Toe!*

When your opponent chooses a word, you secretly mark it, either  or , on this board:

NAPE	KNOW	SIN
BRAT	STOP	BIT
GAS	GOLF	PIG

Removing letter-foliage . . .

BIT	GOLF
BRAT	KNOW
DRY	NAPE
DUCK	PIG
FUEL	SIN
GAS	STOP

Some letters are rare; they occur only twice, or only once:

Letter B occurs only in BIT and BRAT,

R only in BRAT and DRY,

L in FUEL and GOLF,

F only in ???,

K only in ???,

W only in ???, and

E only in ???.

Can you put your finger on other rare letters?

*The other rare letters: D, Y, U and C.
Deleting word-foliage...*

BIT	GOLF
BRAT	KNOW
DRY	NAPE
DUCK	PIG
FUEL	SIN
GAS	STOP

So, secretly, our word list reduces to:

IT	GO
AT	NO
	NAP
	PIG
	SIN
GAS	STOP

We have:

1 four-letter word,
4 three-letter words, and
4 two-letter words.

What game has this

1, 4; 4, 3; 4, 2
structure?

Tic Tac Toe!

NAP	NO	SIN
AT	STOP	IT
GAS	GO	PIG

The number of letters in a word, is how many TTTs it lies in.
 Vertical-TTTs are vowels,
 Horizontal-TTTs are consonants;
 diagonals are **P** and **S**.

Inserting the original words into the TTT-board

NAPE	KNOW	SIN
BRAT	STOP	BIT
GAS	GOLF	PIG

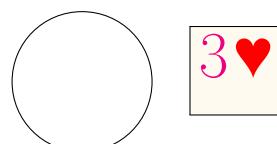
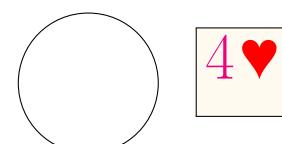
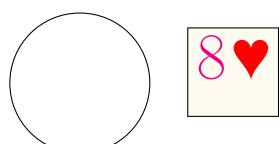
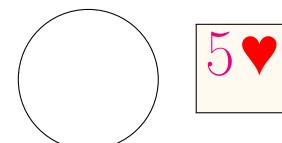
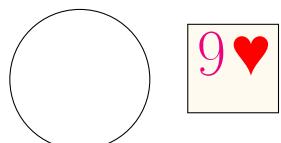
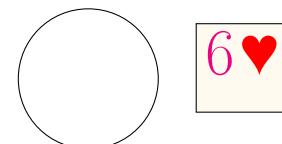
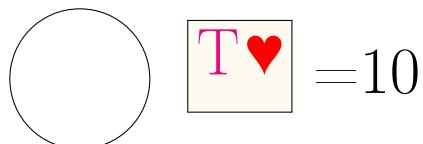
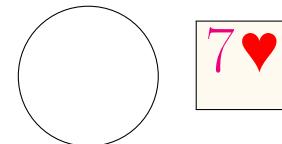
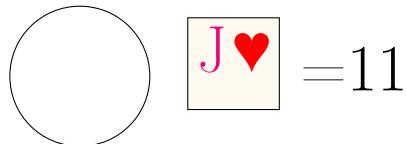
gives an isomorphism from TTT* to the original game.

$\underbrace{\text{iso}}_{\text{same}}$ $\underbrace{\text{morph}}_{\text{form}}$ ism

Simplified Blackjack

Blackjack (= 21) is the goal.

Placing a poker chip of your color, selects a card. The first player with 3 numbers that add to (exactly) 21, **wins**.



Have You played this game before ?

Shhh!

Simplified Blackjack is, *secretly*, *Tic Tac Toe*!

When your opponent chooses a word, you secretly mark it, either **X** or **O**, on this board:

4 ♥	J ♥	6 ♥
9 ♥	7 ♥	5 ♥
8 ♥	3 ♥	T ♥

Suppose we subtract 1 from each card-value. We're now playing with this deck:



Since we need 3 cards to win, our new target is $21 - 3$, i.e 18 . This gives us a game which is isomorphic to BLACKJACK.

What happens if we continue this line of thought to its logical conclusion?

Logical Conclusion. . . . we iterate the idea.

Since $\frac{21}{3} = 7$, subtracting 7 from each card gives symmetry

+4♥	+3♥	+2♥	+1♥	0♥	-1♥	-2♥	-3♥	-4♥
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with 0, now, as the target sum.

The symmetry of the new list suggests a *Magic Square!*

-3♥	+4♥	-1♥
+2♥	0♥	-2♥
+1♥	-4♥	+3♥

Simplified Blackjack is, secretly, *Tic Tac Toe*!

Using the original card-list. . .

4♥	J♥	6♥
9♥	7♥	5♥
8♥	3♥	T♥

. . . gives an isomorphism of BLACKJACK. to TTT.

iso morph ism
same form