



VESTROCK

Game description

This is a two-player card game.

Every player plays in a series of tournaments. In each tournament a player plays simultaneously a number of one-on-one matches. During a match, there is a deck of cards from which both players can draw cards. Each card is either a creature or a spell. The players play creatures on the board, which can then attack the opponent or provide the owner with mana points. These points, in turn, are needed to play some (more powerful) creatures or to cast spells.

The main goal of the game is to reduce the opponent's health points to zero.

Tournament

In each tournament, every pair of players plays two games against each other, each starting with a different player having the first turn. During a tournament, every player simultaneously plays in all their matches. Each match has an identifier. The player's matches' identifiers are available through `GET_MY_MATCHES` command.

Match

Within a match, both players use a shared deck of cards and they both start with the same amount of health. At the very beginning all cards are in the deck. During alternating turns, players discard cards from their hands, draw new cards from the deck and play some creatures or spells to the board from their hand. Boards and hands of both players are empty at the beginning of the game.

Both deck and player hands are visible to both players - there is no surprise element when drawing cards.

The player's aim is to reduce the opponent's health to zero. In order to achieve this, the player can, in their turn, perform a variety of actions, described below. The game ends either when one of the players has no health left, or when a the turn limit has been reached. At the end of the game, the score of the game is counted with respect to the amount of health points of both players. Detailed scoring rules are described in 'scoring' section.

Cards

There are two types of cards in the deck: creatures and spells. When a player plays a creature, it is added to his army on the board. It is initially inactive in the turn it was placed on the board. Only creatures on the board can attack the enemy, or defend the owner. Spells, however, are one-use only — their effect is applied immediately and they are removed from the game. There are different kinds of spells, which are specified below.

Mana Each card has an associated cost — the amount of mana needed to play it. At the beginning of each turn, both players' mana pools are equal to 0. A player can deactivate (*tap*) an active creature on the board to gain some mana. When a player wants to play a card, the cost of the card is subtracted from the player's mana pool. Obviously, one cannot play a card that is more expensive than one's current mana pool. There are creatures in the deck that have mana cost 0 and give a positive amount of mana when *tapped*.

Creature cards Creatures can be used to gain mana, attack the opponent or block other attacking creatures of the opponent. Creatures are described with five parameters:

- Attack — denoted AT;
- Health — denoted HP;
- Max health — denoted HPMAX;

- Mana gain — denoted MANA;
- Mana cost — denoted COST.

COST is the amount of mana needed to play the card and MANA is the amount of mana gained after *tapping* the creature.

When a creature attacks a player, it deals damage equal to its AT.

When a creature with stats $(AT_1, HP_1, HPMAX_1, MANA_1)$ fights with a $(AT_2, HP_2, HPMAX_2, MANA_2)$, they both deal damage to each other. After the fight, their stats become $(AT_1, HP_1 - AT_2, HPMAX_1, MANA_1)$ and $(AT_2, HP_2 - AT_1, HPMAX_2, MANA_2)$, respectively.

When a creature's HP falls to or below 0, this creature dies and it is removed from the game. Thus, for every creature, if $0 < HP \leq HPMAX$ then it is not removed from the game. Similarly, health points of any player cannot get below 0 nor more than his initial, maximum health points.

Note that creature parameters may be altered with spells.

Active and inactive creatures A creature on board is always active or inactive. An active creature can **attack** the opponent or can be **deactivated** to provide their owner with mana. Both of these actions make the creature inactive and can be performed by the player anytime in their turn. Inactive creatures cannot perform any other action in this turn and cannot be used to block the opponent's creatures. At the beginning of each player's **action phase**, which is when the **blocking phase** ends, all his creatures automatically become active again.

Spell cards There are the following spell types:

- Heal K — add K HP to target player's or creature's health points (a creature's HP cannot exceed its MAXHP);
- Damage K — deals K damage to target player or creature;
- Take K cards — allow the current player to draw K additional cards this turn;
- Buff (A, B) — improves the creature's stats from $(AT, HP, HPMAX, MANA)$ to $(AT + A, HP + B, HPMAX + B, MANA)$;
- Deactivate — makes any selected creature on the board inactive. It does not give any mana. Using this spell makes the creature unable to block on its next blocking phase. If the creature was already inactive, nothing happens, but the spell is casted.

Turns

Each turn consists of two phases — **blocking phase** followed by **action phase**.

Blocking phase In the blocking phase, the current player can only use GET-type commands and the BLOCK command. If the player is attacked by some creatures of the opponent, they (the current player) can choose some of its **active** creatures to block the attackers. If the current player assigns a creature to block one of the opponent's attacking creatures, the attacking creature is considered **blocked** and will not deal any damage to the current player this turn. Both blocked and blocking creatures deal damages to each other and the blocking creature (if it survives the fight) gets inactive and cannot block again this turn.

The **blocking phase** ends when either:

- the current player performs FINISH_BLOCK action, or
- the current player performs any action different than blocking, or
- the turn time runs out

The blocking phase finishes, all the remaining attacking creatures (which were not blocked) deal damage to the current player equal to their attack statistic. Finally, just after the blocking phase and before the action phase, all creatures of the current player become active again.

Action phase In this phase, the active player has more possible actions to choose from:

- drawing cards — the player takes a card from the top of the common deck and puts it into his hand;
- burning cards — the player removes the top card from the top of the common deck – it is permanently removed from the game;
- discarding cards — the player removes a card from his hand – it is permanently removed from the game;
- generating mana — the player deactivates his active creature to gain mana required to play cards from hand;
- playing cards — the player can choose a card from his hand to play it (place a creature on the board or execute spell card's effect);
- attacking — the player orders one of their active creatures on the board to attack the opponent.

Each of the actions can be performed multiple times per turn. If a player has some mana left at the end of their turn, it is lost and cannot be used in the next turn.

Other

End of the deck During the game, it may happen that the players have already drawn all the cards from the deck. It does not end the game, although neither player can perform deck actions (drawing or burning cards).

Turn and match length Each turn lasts 1 second. Every match lasts around 60 turns. The exact number of remaining turns can be obtained using the GET_TURN_INFO.

Scoring

The scoring of each **match** depends on the initial (which is also the maximum) number of player's health points, which is further called INIT_HP. At the end of the match, if your health is MY_HP and the opponent's health is OPP_HP, then the final score is $MY_HP - OPP_HP + \alpha \cdot INIT_HP$, where the coefficient α is equal to:

- 3, if $OPP_HP = 0$,
- 0, if $MY_HP = 0$,
- 1.5 otherwise.

This may imply that winning games is most profitable, and that if you can't win the match, you may want to focus on maximizing your remaining health points.

Consider now a tournament with many simultaneous matches. We take scores of all players from all matches and define rank $R(S)$ of the score S to be the number of scores strictly smaller than S . A player who received scores S_1, S_2, \dots, S_n in their n matches is awarded a total score from the entire **tournament** computed using formula $\sum_{i=1}^n R(S_i)^{1.5}$.

Game server description

During the competition multiple tournaments are held. After each, every player is awarded points according to the **tournament score**, and a new tournament starts. Within a tournament, every match uses a copy of the same deck (identical cards in the same order). In some matches you are the starting player, and in others you are the second player.

Cards' description

Each card is described by seven parameters separated by single space:

- ID — unique identifier
- TYPE — C for creatures; for spell cards: H, D, T, B, I for *heal*, *damage*, *take cards*, *buff* and *deactivate*, respectively
- AT — attack (for creatures), amount of damage dealt (for damage spells), AT increase (for buff spells), amount of additional cards to draw (for take cards spells)
- HP — health (for creatures), health gained (for heal spells), HP increase (for buff spells)
- HPMAX — max health (for creatures), HPMAX increase (for buff spells)
- COST — mana cost required to play this card
- MANA — mana received when deactivating the creature by *tapping* (this parameter is always -1 for spells)

Examples (the underlined values are not important to the card type and are meaningless):

- 42 C 1 2 2 5 0 — a creature with 1 AT, 2 HP, and 3 MAXHP, it costs 5 mana to play, and *tapping* it will not get you any mana;
- 4 C 0 2 3 2 2 — a creature with 1 AT, 2 HP, and 3 MAXHP, it costs 2 mana to place on board. If you *tap* this creature, you get 2 mana;
- 37 H 0 1 0 5 -1 — a spell that gives 1 HP to target player or creature and costs 5 mana;
- 38 D 2 0 0 1 -1 — a spell that deals 2 damage to target player or selected creature and costs 1 mana;
- 22 T 2 0 0 5 -1 — a spell that takes top 2 cards from your deck, it costs 5 mana;
- 15 B 1 2 0 5 -1 — a spell that buffs creature by 1 AT and 2 HP, it costs 5 mana;
- 13 I 0 0 0 2 -1 — a spell that deactivates one creature, it costs 2 mana.

The following table summarizes field values for different card types. If there is no specified value for a parameter, it means that it is non-negative (i.e. AT, HP, HPMAX, COST, MANA, K , A , $B \geq 0$).

Card	Type (abbr.)	AT	HP	HPMAX	COST	MANA
Creature	C	AT	HP	HPMAX	COST	MANA
Heal K	H	0	K	0	COST	-1
Damage K	D	K	0	0	COST	-1
Take K cards	T	K	0	0	COST	-1
Buff (A, B)	B	A	B	0	COST	-1
Deactivate	I	0	0	0	COST	-1

Furthermore, all card IDs are positive and for every creature it holds that $0 < HP \leq HPMAX$. For every card in the initial deck the absolute value of all parameters (apart from ID) does not exceed 100 and the ID is a positive integer and does not exceed 1000. Usually, though, card parameters are small (less than 10).

Commands' description

Commands return the current state of the game, such as cards in different locations, player status, etc.. All numbers used in game are integers. AT, HP and HPMAX are non-negative.

WAIT

Immediately returns OK (as any other command). The server then waits (not accepting other commands) until the next turn starts, and then it responds with one more OK.

```
> WAIT
< OK
(after some time...)
< OK
```

GET_MY_MATCHES

In first line returns the number of matches the player currently participates in.
In next line there is a space-separated sequence of match IDs.

```
> GET_MY_MATCHES
< OK
< 5
< 3 5 7 11 20
```

GET_FINAL_SCORE match_id

If the specified match has ended, then this command returns two numbers: the score of the player executing this command and the score of its opponent.

```
> GET_FINAL_SCORE 123
< OK
< 10 -10
```

GET_TURN_INFO match_id

Returns a number stating whether you can move in this turn (1, if yes, 0, if no) and the number of turns left in this match.

```
> GET_TURN_INFO 511
< OK
< 0 15
```

All the commands below can only be played by the player whose turn currently is.

GET_HP match_id

Returns three numbers: initial (and the maximum) HP of both players, current HP of the current player, and current HP of the opponent.

```
> GET_HP 89
< OK
< 10 4 8
```

GET_CARD_LIMITS match_id

Returns the number of cards that still can be drawn in this turn, the number of cards that can be burned and the maximum number of cards that a player can keep in their hand.

```
> GET_CARD_LIMITS 3
< OK
< 2 2 10
```

GET_CURRENT_MANA match_id

Responds with the number representing currently available mana.

```
> GET_CURRENT_MANA 12
< OK
< 3
```

GET_DECK match_id

Returns the number of cards left in the deck.

Each following line describes a card in the deck (as described in Cards description) listed from top to bottom, one card per line.

```
> GET_DECK 722
< OK
< 2
< 1 C 0 1 1 0 1
< 2 C 0 1 1 0 1
```

GET_HANDS match_id

In the first line of the response the first number is the number of cards in player's hand and the second is the number of cards in opponent's hand.

Following lines contain descriptions of cards in player's hand (using format defined in 'Cards description' section). Then cards in opponent's hand, one card per line.

Cards for each player are listed in the order of increasing card IDs.

```
> GET_HANDS 51
< OK
< 2 2
< 1 C 0 1 1 0 1
< 2 C 0 1 1 0 1
< 3 C 1 2 2 5 0
< 4 C 1 2 2 5 0
```

GET_BOARD match_id

In the first line of the response the first number is the number of cards player has on the board and the second number is the number of opponent cards on the board.

Following lines are descriptions of player cards and their status (Active/Inactive). Each line contains card description, and 1 if card is active or 0 otherwise. Card description and status are separated by single space.

Next lines describe all opponent's cards on the board, in the same format.

Cards for each player are listed in the order of increasing card IDs.

```
> GET_BOARD 12
< OK
< 2 2
< 1 C 0 1 1 0 1 1
< 2 C 0 1 1 0 1 0
< 3 C 1 2 2 5 0 1
< 4 C 1 2 2 5 0 1
```

GET_ATTACKERS match_id

Returns the number of creatures that are currently attacking.

Next lines contain descriptions of each attacking creature (again, using format from 'Card description' section).

If these creatures aren't blocked they will attack the player directly!

Do not assume anything about the order of cards.

```
> GET_ATTACKERS 100
< OK
< 2
< 3 C 1 2 2 5 0
< 4 C 1 2 2 5 0
```

All following action commands (apart from BLOCK) implicitly finish the blocking phase and their effect takes place after resolving all blocks. See also FINISH_BLOCK command.

DRAW_CARD match_id

Can be performed a limited number of times per turn (see GET_CARD_LIMITS). Moves the top card from the deck to player's hand.

Returns the description of the drawn card.

```
> DRAW_CARD 611
< OK
< 3 C 1 2 2 5 0
```

BURN_CARD match_id

Can be performed a limited number of times per turn (see GET_CARD_LIMITS). Discards the card on the top of the deck, permanently removing it from the game.

Draws and burns can be interleaved.

```
> BURN_CARD 702
< OK
```

DISCARD_CARD match_id card_id

Permanently removes the selected card from player's hand.

```
> DISCARD_CARD 393 5
< OK
```

ADD_MANA match_id card_id

Increases your available mana according to the mana gain of the target card. The card must be active for this action.

```
> ADD_MANA 42 5
< OK
```

PLAY_CARD match_id card_id target_id

Playing cards costs mana, the amount depending on the played card.

When playing creatures from hand onto the board, use `target_id -1`. A creature that is placed on the board is initially inactive.

When playing spells, the target can be either the ID of a creature on board, `-5` — denoting the current player, or `-6` — denoting the opponent player.

- *Heal* and *Damage* spells can be played on either of the players or any creature on the board. Note that HP never gets lower than 0 or greater than MAX_HP.
- The only possible target of *Take card* is the current player (-5).
- The target of *Buff* and *Inactive* can be any creature on the board, but not a player.

During one turn a player can play multiple cards, as long as they have enough mana.

```
> PLAY_CARD 51 13 -1
< OK
```

ATTACK match_id card_id

Note that you can select the card that attacks, but not the attack target.

You can use this command multiple times during one turn. When a creature attacks, it becomes inactive. Damage is not dealt immediately. It will be computed when the **blocking phase** of the next turn ends.

```
> ATTACK 742 5
< OK
```

BLOCK match_id attacker_id blocker_id

A creature must be active to block (must have not attacked last turn) and can block at most once per turn. In order to ensure this, after the block the blocking creature becomes inactive.

Every attacking creature can be blocked multiple times.

If the HP of a creature (either attacking or blocking) gets below or equal to 0, it gets removed from the board.

```
> BLOCK 17 5 7
< OK
```

FINISH_BLOCK match_id

This function can be used to explicitly state the end of the blocking phase. All damages are computed and dealt to player, then all current player's creatures becomes active again. It is not necessary to call this function, because each action (other than BLOCK) implicitly calls it and (if no action action was performed in a turn) it is also called automatically at the very end of the turn.

```
> FINISH_BLOCK 1022
< OK
```

Possible errors

If a player calls a command which - from some reason - is invalid (in the current moment, with these arguments), then instead of responding with a OK, an appropriate error is returned using format ERR code description. If there are multiple reasons why the command is not valid, then only one error is returned.

- 900 NoCardWithSuchId — you're trying to use a card with ID that is not known
- 901 NotEnoughMana — you don't have enough mana to play a card
- 903 NotYourCard — you're trying to operate on a card which you don't own
- 905 InactiveCard — you're performing an operation on a card which is not active
- 906 CardNotInHand — you cannot play a card that is not in your hand
- 907 DrawLimitExceeded — you have already reached the limit of cards to draw
- 908 BurnLimitExceeded — you have already reached the limit of cards to burn
- 910 NoSuchAttacker — there is no such attacker
- 911 BlockingAlreadyFinished — the blocking phase is over, you cannot block in this turn anymore
- 912 CardNotOnBoard — the specified card is not on board
- 913 NotYourTurn — now it's time for your opponent to move
- 915 WrongTarget — wrong target of the spell
- 916 SpellTargetNotOnBoard — the target of the spell is not on board
- 918 DeckIsEmpty — the deck is empty so you cannot draw nor burn a card
- 919 HandLimitExceeded — you cannot draw cards anymore
- 930 NotYourMatch — you are not a player in the match which has the given ID
- 932 GameHasEnded — you're trying to do something in a game which has already ended
- 933 GameHasNotEndedYet — you're trying to see the final score of the game which has not ended yet