# Leiserchess: A Laser-Chess Game

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Leiserchess (pronounced "LYE-sir-chess") is a two-player laser-chess game similar to Laser Chess and Khet. On the surface, Leiserchess is much simpler than these two games in that there are only two kinds of pieces — Kings and Pawns — and all pieces move exactly the same way. A deeper complexity arises from the dynamics of how pieces interact, however, because the Kings carry their own lasers to shoot at each other and at each other's Pawns. The result is an entertaining and challenging game that involves both tactics and strategy.
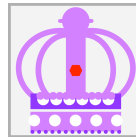
Pieces and Board

Leiserchess is played on a 10x10 square board. Each player has one King and several Pawns:
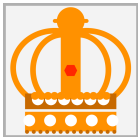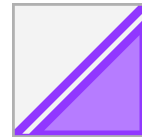
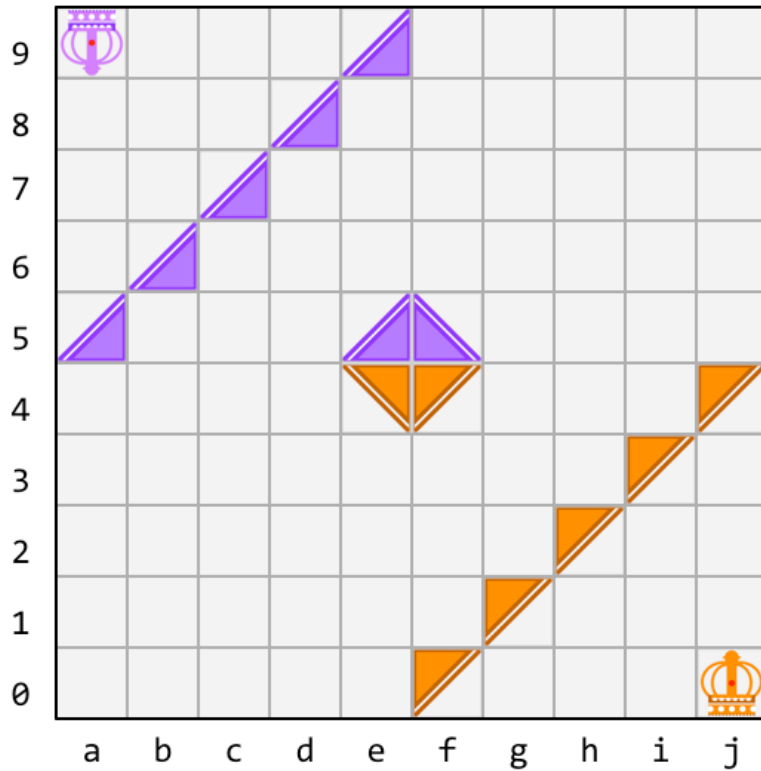| Tangerine King	Tangerine Pawn	Lavender King	Lavender Pawn

The King contains a laser that can be activated to shoot out of its front. Each Pawn contains a mirror oriented at a 45-degree angle to the ranks and files of the board, which can reflect the beam of the laser from rank to file or vice versa.

Opening Position

Play begins with the following opening position:

Rules

Tangerine moves first, and then play alternates between the two players. A player can only move his or her own pieces, not the opponent's. All pieces in Leiserchess move the same, whether King or Pawn. A turn has two parts: moving and firing the laser.

Moving. For the first part of a turn, a player on move chooses a piece and either rotates it or moves it to an adjacent square in any of the eight compass directions while maintaining its orientation. You can rotate a piece by 90, 180, or 270 degrees. You cannot both rotate a piece and move it in the same turn. The following diagram shows a Pawn on a square and its 11 possible moves.

Original position
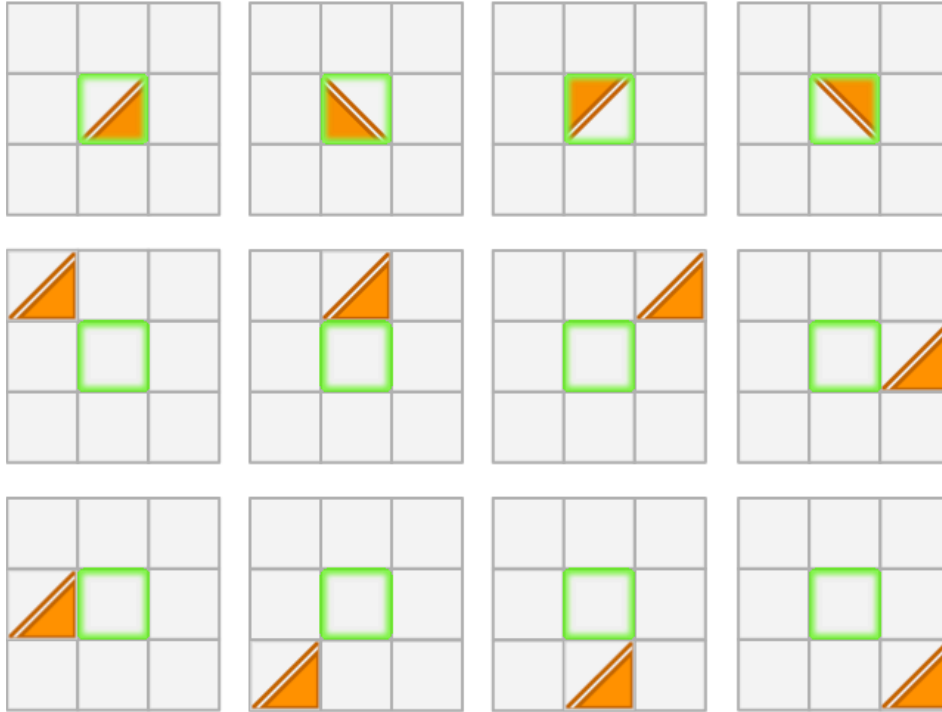
The swap rule. If another piece — your opponent's or your own — occupies the destination square, the two pieces swap positions, maintaining their orientations.

The null move. A player can make a "null" move, in which no piece is actually moved, as long as firing the laser zaps a piece (of either side).

Firing the laser. For the second part of a turn, the player fires his or her laser, which shoots out of the top of the King. The beam may safely bounce off the mirrored surfaces of Pawns, but if the laser zaps an opaque (nonmirrored) side of a piece, the zapped piece is removed from the board, no matter which player owns it. (Yes, you can zap your own Pawns and even commit suicide!) If a player's King is zapped, the game is over, and the player loses. After a player moves, whether making a normal move or a null move, he or she must *always* fire the laser, even if it is self-destructive. For example, if Tangerine rotates its Pawn on j4 right for its first move from the opening position, it zaps its own Pawn on f0:
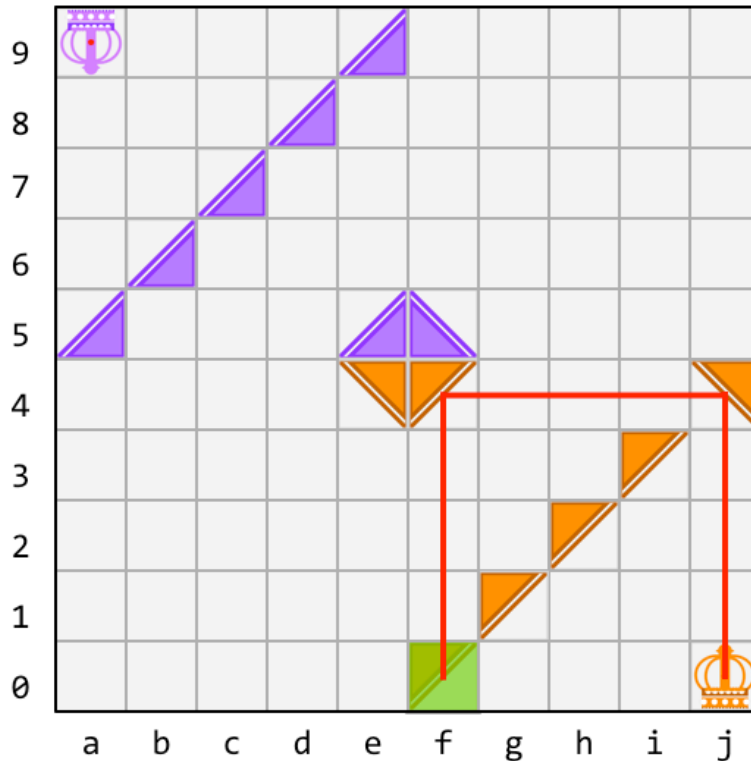
The Ko rule. To help ensure that the game makes progress, Leiserchess has a "Ko" rule similar to the Ko rule in the game of Go. The Leiserchess Ko rule says that a move is illegal if (1) it does not change the position or (2) it returns the position to the position immediately prior to the current position. Such illegal moves can occur in three common ways:

1. A player attempts to play a null move that causes no piece to be zapped, thereby repeating the same position.
2. A player attempts to swap two Pawns that have the same orientation, and no piece is zapped, thereby repeating the same position.
3. After a player has swapped a piece with his or her opponent's, the opponent attempts to swap them back, and no piece is zapped, thereby repeating the position before the first swap.

Draws. A draw occurs (1) if there have been 100 moves by each side without a piece being zapped (unless one side can prove that more than 100 moves are necessary to execute a win); (2) if the same position repeats itself three times with the same side on move and the player on move requests a draw; or (3) if the two players agree to a draw.

Time control. As players become skilled, they tend to think longer. A chess clock (see http://en.wikipedia.org/wiki/Time_control) can be used to keep the pace up. Ideally, use a "delay" clock, such as a Fischer clock. Free chess-clocks applications are available for many smart phones.

Learning Leiserchess

To learn the game, start by clearing the board of all Pawns, and play with just the two Kings, each in a corner of the board. You will discover that this endgame situation can always be won by one of the two players, who can force the opponent's King to the edge and zap it. Playing this endgame will give you a feeling for the power of the laser-slinging Kings. Afterwards, go on to play normal games.

Tactics. Despite the simplicity of the rules, Leiserchess has remarkably interesting tactics. For one King to zap the other, it risks opening itself up to counterattack, and so shots must be artfully composed. For example, consider the following position with Tangerine to move:
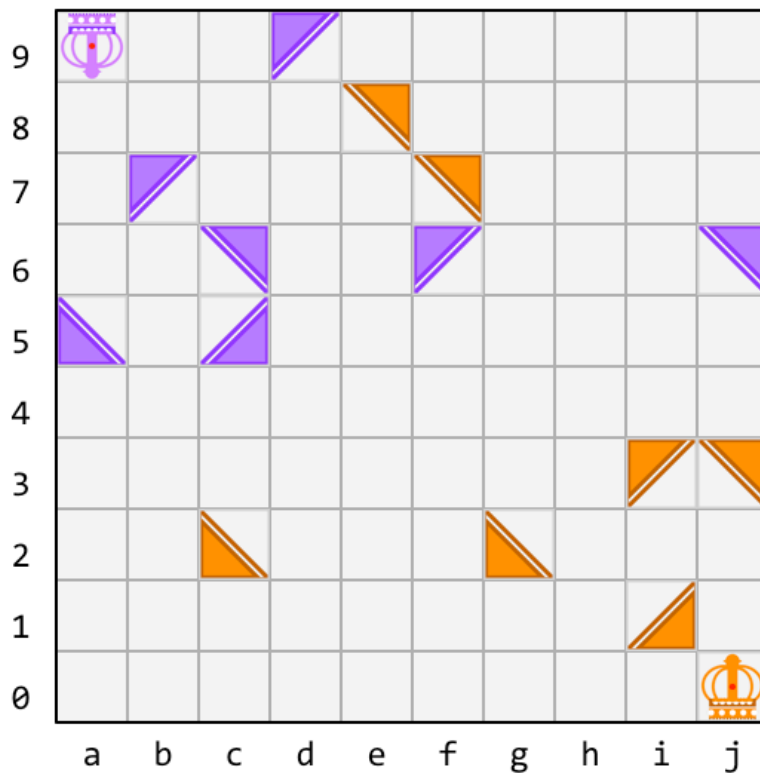
Tangerine can zap the Lavender Pawn at f6 by moving its Tangerine Pawn on c2 to b2:
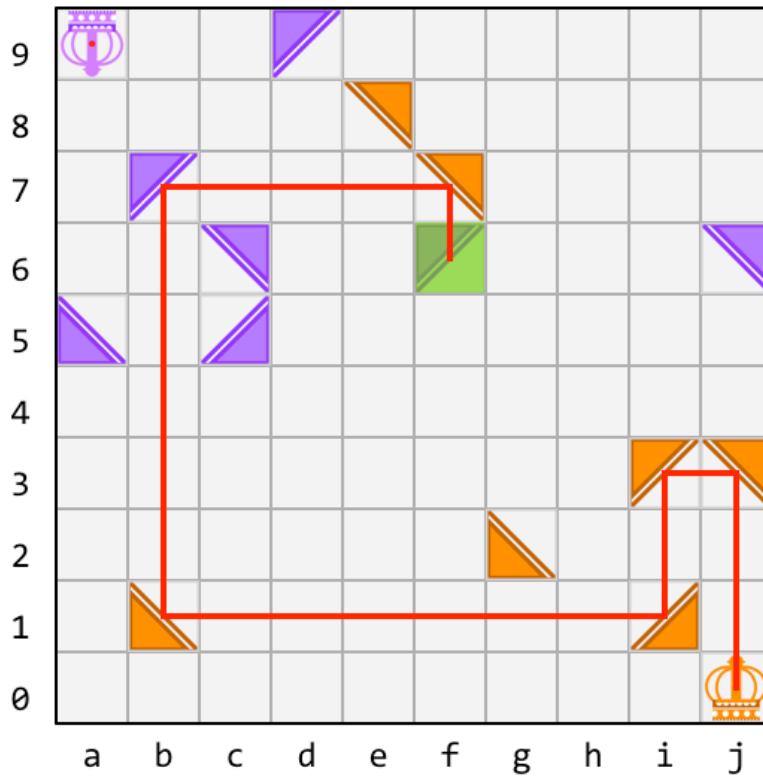
Doing so results in immediate disaster, however, as Lavender counters by moving its Lavender Pawn on c6 to b5, zapping the Tangerine King, and winning the game:
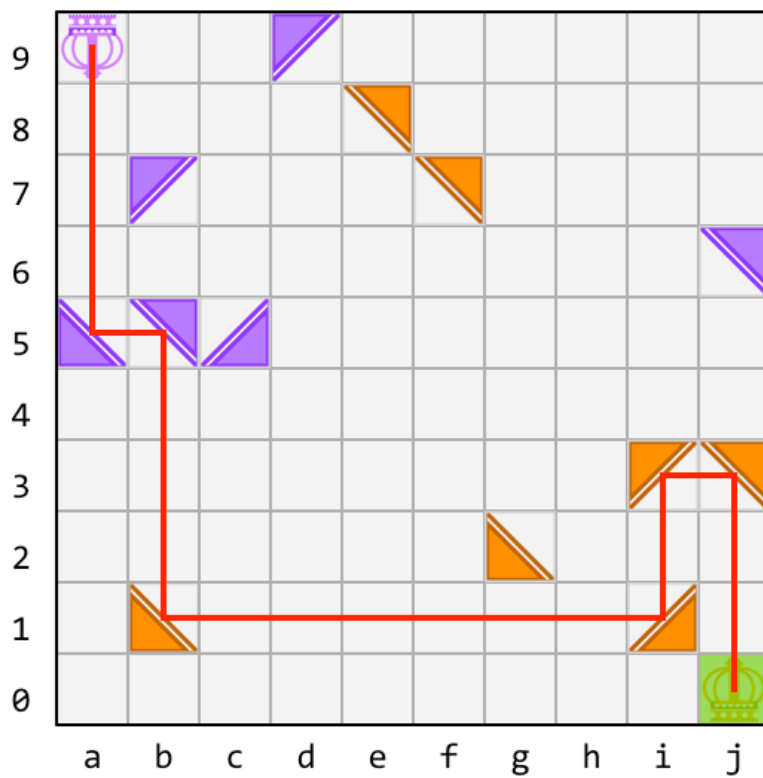
The Pawns at b1, i1, i3, and j3, which Tangerine used to reflect the laser to zap the Lavender Pawn at f6, are now used by Lavender in the reverse direction to zap the Tangerine King. Watch out for poison Pawns!

This kind of tactic illustrates the "emergent complexity" inherent in Leiserchess, where the interaction of simple pieces engenders complex behavior. The "reverse-path" nature of mirrors — "If you can see me, I can see you!" — produces a wealth of tactical issues.

Strategy. Strategy is required for a player with a dominant position to prevail over the opponent. Without a thoughtful plan, the dominant player may not be able to engineer a zap. Although Leiserchess is a young game, some strategic elements have begun to emerge from games played so far:

- It seems generally a bad idea to swap your central Pawns with your opponent's unless you can zap one. Although it advances your own Pawn, it also advances your opponent's. Better is to advance your Pawns without swapping.

- It is generally a good idea to keep some Pawns in the neighborhood of your own King. A "naked" King is generally easy to zap.

- Watch out for pinned pieces. It may be helpful to interpose your own Pawn between your opponent's King and one of his or her Pawns to prevent your own King from being zapped, but your Pawn's mobility may then be limited.

- Pawns toward the edges of the board can easily find themselves unable to "cooperate" with other pieces, rendering them next to useless.

- If your opponent "hunkers down" its King by surrounding it with Pawns, you can invade with your Pawns and use the "swap rule" to disrupt the positions of your opponent's pieces.

Recording Games

Games can be recorded using the following simple notation:

- If a piece is rotated, write down the square holding the piece followed by either "L" for counterclockwise, "R" for a clockwise, or "U" for a 180-degree rotation, e.g., "g1R".

- If a piece is moved to an adjacent square, write down the source square followed by the destination square, e.g., "j4i5".

- A null move is denoted by "moving" the king to its own square, e.g., "j0j0".

- Optionally, if a piece is zapped, append "x" and the square of the zapped piece, e.g., "i6j7xb4".

- The outcome of the game is recorded as 1–0 (Tangerine wins), 0–1 (Lavender wins), or 1/2–1/2 (draw).

Naming the zapped piece is redundant, but it is nice to be able to see at a glance from the record when pieces were zapped.

Here is an example of the game corresponding to the "tactics" example above:

	Tangerine	*Lavender*
1.	f0U	e5L
2.	e4d5	a5R
3.	j4R	f5g5
4.	d5R	e5d5
5.	h2i1	d8U
6.	i1U	g5h4
7.	e5d4	c7U
8.	g1L	h4R
9.	g1f1	h4i5
10.	j4j3	e9d9
11.	d4e5	i5h6
12.	f4f5	h6R
13.	e5d5	e5e4
14.	f0e1	h6h7
15.	e1e2	e4d4
16.	f1g2	h7i7
17.	f5R	i7j6
18.	d5c4	d4d5
19.	c4c5	d5c5
20.	f5f6	b6c6
21.	e2d2	c6c5
22.	f6f7	c7b6
23.	d5e6	d8d7
24.	d2c2	d7e6
25.	d7L	b6b7
26.	d7e8	e6f6
27.	c2R	d9U
28.	c2b1xf6	c6b5xj0
	0–1	

Feedback

Please email questions or comments to leiserchess@gmail.com. Thank you, and I hope you will enjoy Leiserchess!