

Tetris

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1 Introduction

Tetris is a falling block, matching puzzle video game designed by Alexey Pajitnov in the Soviet Union. It was the first software to be exported from the USSR to the US when it was released on June 6th, 1984. Tetris uses tetrominoes, the four-element special case of polyominoes.

2 Objective

The objective of Tetris is to play the game for as long as possible while scoring highest score possible by completely filling rows in the grid using the 7 Tetriminos given in a random order.

3 How to Play

A random sequence of Tetriminos fall down into a grid that is 10 cells wide by 22 cells high with the topmost two cells hidden. The objective of the game is to manipulate these Tetriminos by moving them left, right or rotating them 90 degrees so that it completes a row leaving no gaps. Once a row is completed it disappears and the blocks above that row move down as many rows as have been completed. The Tetriminos fall resting on either the bottom of the grid or the Tetriminos below it. Once the Tetriminos touches the Tetriminos below it, the current Tetriminos locks into place. Over time the Tetriminos will fall faster making it harder to position them before they lock into place.

4 Tetriminos

Tetriminos are game pieces shaped like tetrominoes. Tetrominoes are geometric shapes composed of four square blocks. In this game there are seven

Tetriminos. Each Tetriminos is given a name based on its shape, I, J, L, O, S, T, and Z.

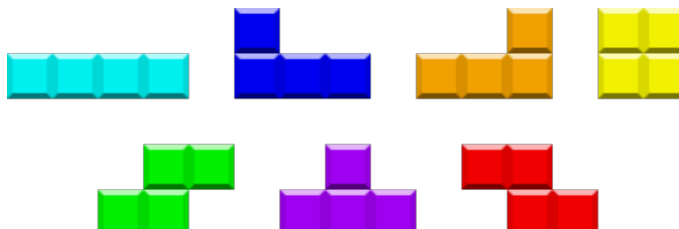


Figure 1: The seven Tetriminos. Top row, from left to right: I, J, L, O. Bottom row: S, T, Z

All Tetriminos are capable of completing two rows simultaneously, which is called a double. However, only the I, J and L Tetriminos are capable of clearing three rows simultaneously, which is otherwise known as a triple, and only the I Tetriminos can clear four rows simultaneously. When four rows are cleared simultaneously it is called a tetris.

5 Scoring

Tetris is built on the idea that more difficult line completions should be awarded more points. Therefore when one line is cleared on level zero the player receives 40 points however if the lines are cleared by a tetris on level zero the player receives 1,200 points.

Level	Single	Double	Triple	Tetris
0	40	100	300	1200
1	80	200	600	2400
2	120	300	900	3600
...	...	...	...	...
9	400	1000	3000	12000
n	$40*(n + 1)$	$100*(n + 1)$	$300*(n + 1)$	$1200*(n + 1)$

There are only 10 levels in Tetris therefore the maximum score for a single move is 12,000, while the lowest possible score is 40.

6 Leveling Up

The player levels up every ten lines that are cleared. Once the player levels up the speed of the Tetriminos increases according to the chart below.

Level	Frames per Row	Level	Frames per Row
0	53	5	33
1	49	6	28
2	45	7	22
3	41	8	17
4	37	9	11

7 Completing the Game

7.1 Loosing

Players may loose the game if the Tetriminos are stacked so high that they touch the top of the grid. This way of loosing is often referred to as topping out. This commonly happens when the player can no longer keep up with the increasing speed.

7.2 Is Tetris Infinite?

Since topping out is the only way of losing the game it raises the question Is Tetris infinite? The answer to this question is no. Due to the games random generation of Tetriminos it is inevitable that at one point the player will receive a large number of alternating S and Z Tetriminos. These Tetriminos will force the player to leave holes in the grid and the player will eventually top out. Thus, if a game with ideal, uniform, uncorrelated random number generator is played long enough, any player will top out.

References

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