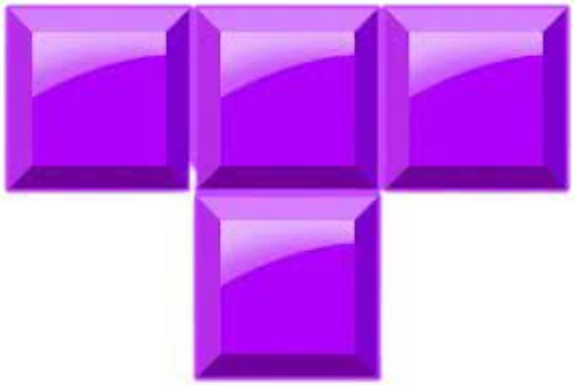
Advanced Tetris



Brief Description

The game of Tetris involves rotating and placing descending pieces in geometrical shapes in such a way that you complete a symmetrical line which causes that line to disappear. You lose the game when you do not place shapes correctly and the rows keep adding on until you reach the top of the playing screen. Tetris is a fairly simple game that takes place on a 2-D plane with fairly basic, but squared shapes. What if Tetris was a little more advanced and challenging?

Product

Students will design and/or create a videogame which works like Tetris only instead of the objects being 2-D shapes, the shapes are 3-D. Those shapes include:

- Rectangle
- Parallelogram
- Trapezoid
- Regular polygon

Because it is a 3-D game, these shapes should have to be rotated in order to fit into its place.

This game can use manipulatives that players move with their hands or it can be created on a computer using geometry software.

Digging Deeper

In order to make the game even more challenging, there should be an ever changing plane that players must complete in order for the line to disappear. These should include:

- Angle
- Circle
- Perpendicular line
- Parallel line
- Line segment

Connection to CCSS - Geometry

Experiment with transformations in the plane

1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
2. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

Suggested Timeline

DAY ONE Introduce students to the game of Tetris	**DAY TWO** Students will review rectangle, parallelogram, trapezoid, regular polygon	**DAY THREE** Students will use the shapes learned yesterday and represent transformations in the plane	**DAY FOUR** Students will learn/review angle, circle, perpendicular line, parallel line, and line segment	**DAY FIVE** Groups will plan their game on graph paper
DAY SIX Groups will plan their game on graph paper	**DAY SEVEN** Groups will finalize the plan for their game on graph paper	**DAY EIGHT** Groups need to decide what form their game will take	**DAY NINE** Groups will need to either bring in supplies or locate appropriate software	**DAY TEN** Groups will create their game
DAY ELEVEN Groups will create their game	**DAY TWELVE** Groups will create their game	**DAY THIRTEEN** Groups will finalize their game by either having all of the materials or access to the software	**DAY FOURTEEN** Groups will beta test their games with another group	**DAY FIFTEEN** Class will play each other's games

Advanced Tetris

Overall	Planning	Gameplay	Math Concepts
Excellent	• Given a geometric figure and a rotation, reflection, or translation, students drew the transformed figure using graph or tracing paper correctly • Plan shows a clear idea of how the game will work and how it will incorporate all of the math concepts required of the project. • Plan reflects a true collaboration of all group members contributions.	• Game is able to consistently represent transformations in the plane using transparencies and/or geometry software. • Game is rather simple to learn to play yet challenging. • Game works well with very few glitches	• Game demonstrates the correct definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. • Games uses a rectangle, parallelogram, trapezoid, and regular polygon, allowing players to rotate and reflect that carries it onto itself. • Developed definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
Good	• Given a geometric figure and a rotation, reflection, or translation, students drew the transformed figure using graph or tracing paper but a few mistakes • Plan shows how the game will work and how it will incorporate the math concepts required of the project but a couple of aspects unclear or confusing. • Plan reflects collaboration of various group members contributions but not all.	• Game is able to represent transformations in the plane using transparencies and/or geometry software but not consistently. • Game can be learned but does take some time and/or is not that challenging to succeed. • Game works but various glitches interferes with game play.	• Game demonstrates the definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc but there are a few mathematical mistakes or misconceptions. • Games uses a rectangle, parallelogram, trapezoid, and regular polygon, but does allow players to rotate and reflect that carries it onto itself. • Not always clear how the definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments are used in the game.
Needs Improvement	• Do not always reflect a geometric figure and a rotation, reflection, or translation, using graph or tracing paper but a few mistakes • Plan does not clearly show how the game will work and how it will incorporate the math concepts required of the project, causing confusion. • Plan does not reflect collaboration of group members contributions but rather the work of one or two individuals.	• Game does not represent transformations in the plane using transparencies and/or geometry software. • Game is difficult to learn and/or is not that challenging. • Game often does not work, stifling the game play.	• Game does not demonstrate the definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. • Games does not use all the shapes of a rectangle, parallelogram, trapezoid, and regular polygon, and/or does not allow players to rotate and reflect that carries it onto itself. • The definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments are used in the game are not explained well.