

Centre of Gravity		Grade 7 – Form and Function
Lesson Plan	Safety Notes	Try to use a lower surface like a coffee table instead of a dinner table or counter.
<p>Description Investigate how the centre of gravity of a structure affects the structure’s stability and balance, then test your skills at stacking a dramatic overhang that seems to defy gravity.</p>		
<p>Materials At least four identical rectangular stackable objects. The size of the object doesn’t matter as long as all of your chosen objects are the same size and type. Examples: Jenga blocks, a deck of cards, DVD cases, books, granola bars.</p>		
<p>Science Background A structure’s stability is affected by its centre of gravity. The centre of gravity of a structure is the average location of the weight of an object, or the point around which the force of gravity appears to act. A stable structure must have a centre of gravity over its base. When creating a structure from smaller objects, each object has its own centre of gravity that will remain the same but the centre of gravity of the overall structure can be changed as each object is added. If the structure’s overall centre of gravity falls outside the base of support, the structure will topple over.</p>		
<p>Activity Procedure</p> <ul style="list-style-type: none"> • The goal is to create a skewed tower or overhang so that your final block extends out fully past the table’s edge. • Blocks have to be placed and supported entirely by their own weights (no glue or tape!). Only use one block per level. Place one block at a time, offsetting each one. This will create a skewed tower. • Use a trial and error method to see how far you can bring your structure over the edge before it falls over. This finds the centre of gravity. If the centre of gravity of your structure goes past the edge, it will fall over. Do this each time you add a block. How far out is it possible to overhang blocks from the edge of a table without them toppling? 		

Debrief

Centre of gravity is a crucial component to strong and stable structures. It is possible to overhang a full block length past the edge of the table if the blocks are stacked just right, causing the structure's overall centre of gravity to remain on the edge of the table. Interesting architecture sometimes uses cantilevers. Cantilevers are beams or building extensions fixed at only one end that seem to defy gravity. These are achieved by studying the forces at play and making necessary building adjustments to support a different centre of gravity.