

# PANELCRAFT

## *ACTIVITY GUIDE*



# Create! Play! Learn!

Panelcraft™ building panels connect regardless of their orientation. This is made possible by the power of the encased spherical neodymium magnets which rotate to ensure attraction when two panels are brought together. The neodymium magnet compound was developed by General Motors in 1982 with the intention of making lighter and stronger motors that move things like windshield wipers. Today they are found in many places such as; ear buds for MP3 players, guitar pickups, cordless drills and even magnetic jewelry clasps.

Panelcraft is a fun way to explore Science, Technology, Engineering and Mathematical (STEM) concepts. The next section explains STEM concepts and gives examples using Panelcraft.

## SCIENCE - Force and Motion

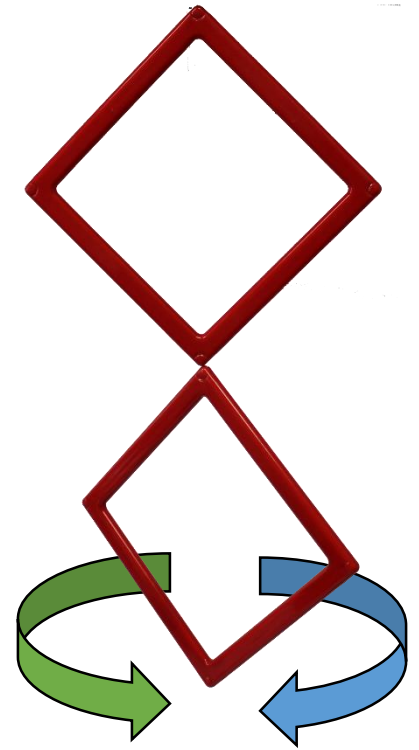
**Force** is defined as a push or a pull. How much force does a Click-on panel have? To test this pick up a window panel and hang a panel from its edge. Does it hold the weight of the panel? Can it hold more than a single panel? Try it!

When two forces are pulling things apart it is called a **tension force**, and when two forces are pushing together it is called a **compression force**.



**Motion** can be defined as the action of changing place or position. What types of motion be made with Panelcraft? Suspend a single panel from a Window panel edge. Lift the second panel to the side and let go of the second panel and let it swing back and forth. This is an example of **Simple Harmonic Motion (SHM)** known as **pendulum motion**. Does the motion change if two or more panels are suspended? Try it!

Next, suspend a window panel corner from another window panel corner. Notice that the bottom panel is free to spin completely around. This is an example of **Rotational Motion**. Now rotate the bottom panel the other way. Scientist call the two directions of rotational motion **positive** and **negative** rotation.

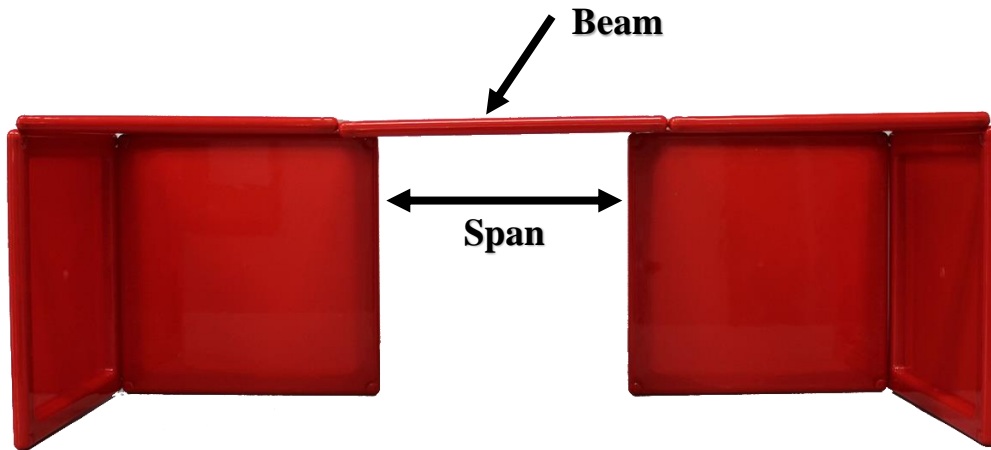


## ACHITECTURE and TECHNOLOGY

**Architecture** is both the process and the product of planning, designing, and constructing buildings and other physical structures. There are many different types of buildings and structures you can make with Panelcraft.

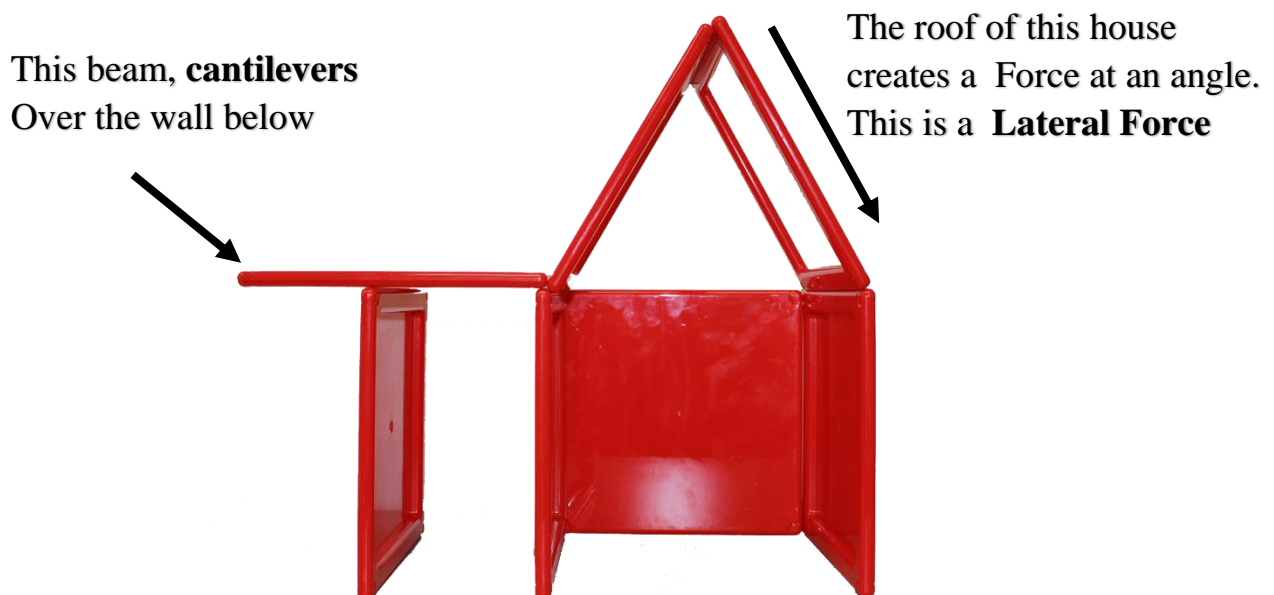


Architects are always challenged to enclose space. In most cases, we create a structure that **spans** from one object to another. **Span** is the distance between two intermediate supports for a structure, e.g. a **beam** or a bridge. Below, you see an example of a simple **span**. Can you create a structure that **spans** from one object to another?



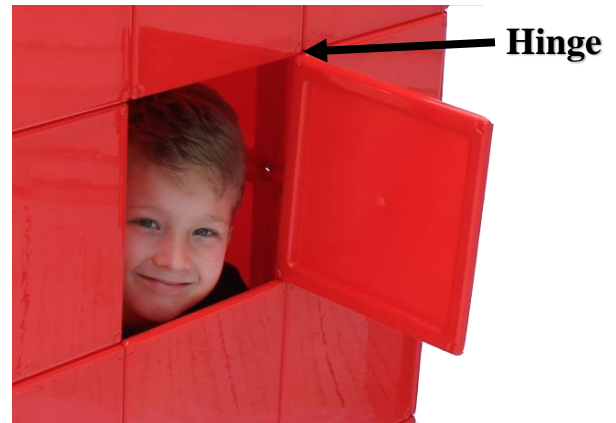
The **span** shown above is supported at both ends. The **span** shown below is supported at one end, and in the middle. This creates a condition called a **cantilever**. A **cantilever** is a beam anchored at only one end. **Cantilever** construction allows for overhanging structures without external bracing.

Tension and compression forces are among several forces architects deal with every day. Often, these forces are at an angle. We call these **lateral forces**.



**Technology** deals with the ways and tools humans use to provide for their needs. There is almost no limit to the number of technologies you can make with Panelcraft. Do you need a bookcase to store books? Do you want a playhouse to climb inside? Do you need a storage box to keep your favorite things? These and many more things can be built with Panelcraft.

Using Panelcraft you can even make a **hinge**. A hinge is a type of bearing that connects two solid objects, typically allowing only a limited angle of rotation between them.



## ENGINEERING

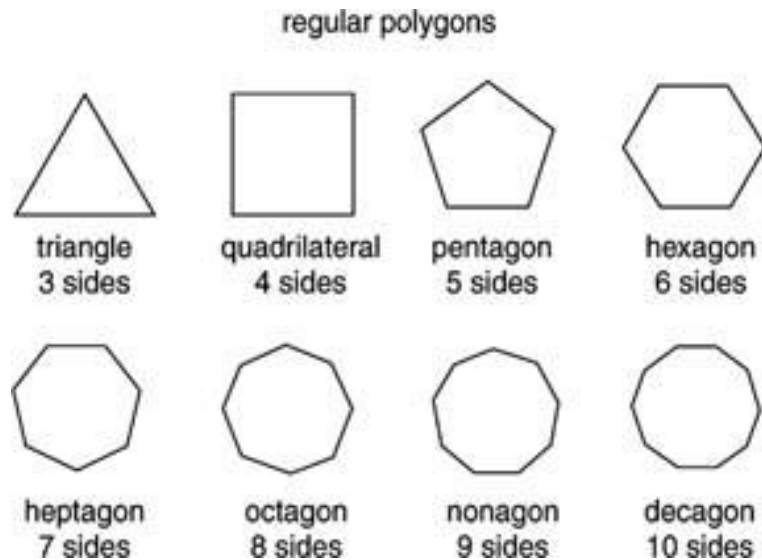
Engineering is defined as the creative application of scientific principles to design or develop structures, devices and processes. Can you apply the scientific principle of force to develop shutters for a windows using Panelcraft? Can you design a door?

A **truss** is a structure comprising five or more triangular units constructed with straight members whose ends are connected at joints referred to as nodes. Trusses are frequently used to support bridges and highway signs. Can you build a **Truss**? The example below has only 3 triangular units.

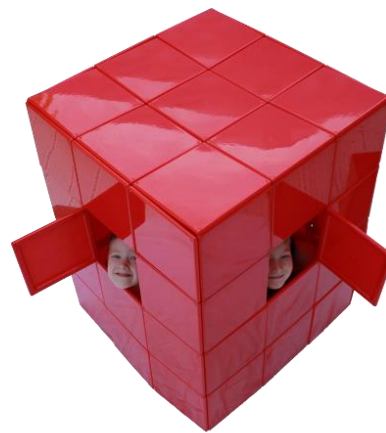


# MATHEMATICS

**Mathematics** is the study of patterns and numbers. The panels that make up the Panelcraft set are squares that are a type of **polygon** with four sides. A polygon is a closed flat figure having three or more straight sides.



Using Panelcraft you can make different types of **polyhedrons**. A **polyhedron** is a solid in three dimensions with flat faces, straight edges and sharp corners. One type of polyhedron you can make is a **cube**. Other types of polyhedrons you can make are called **prisms**. A triangle shaped prism can be made with 3 panels. A pentagonal shaped prism can be made with five panels. You can make prisms with as many sides as you want!



Building a prism with two or more levels can make what architects and engineers call a **column**. A **column** is a structural element that transmits, through compression, the weight of the structure above to other structural elements below.



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