Lakeshore®

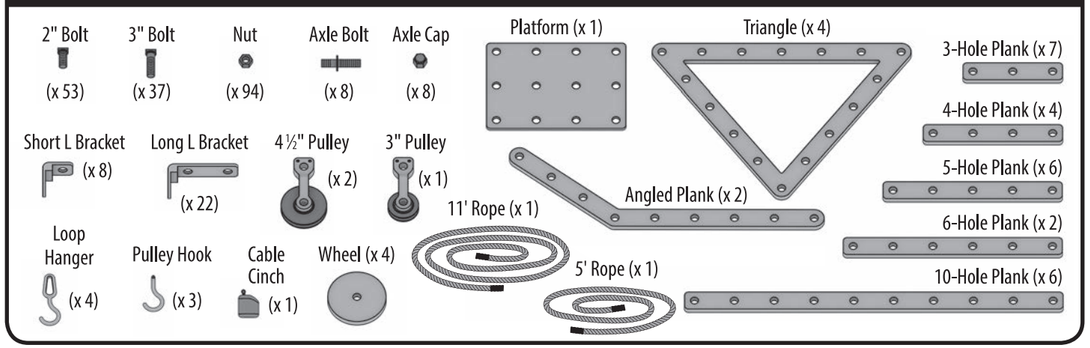
Lakeshore®

Jumbo Simple Machine Builders

TT231

Teacher's Guide

What's Included

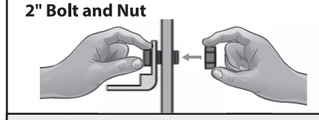
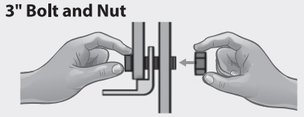
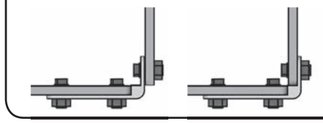


About the Jumbo Simple Machine Builders

Our building set offers children an engaging way to explore the world of simple machines! As children use the pieces to build levers, pulleys, and more, they get hands-on practice learning about structure and stability. Children also gain knowledge on how simple machines make tasks and jobs easier!

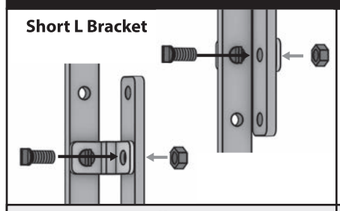
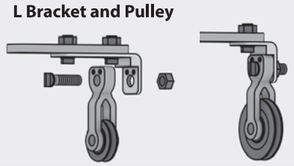
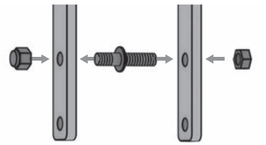
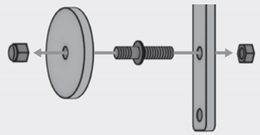
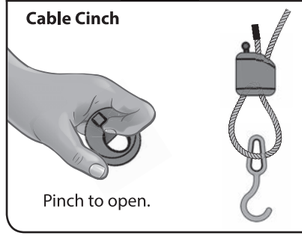
Using the Jumbo Simple Machine Builders

Introduce the pieces in the set and invite children to explore them. Explain and describe the different pieces and how they work together. Then explore the pieces as a whole group and discuss the following:

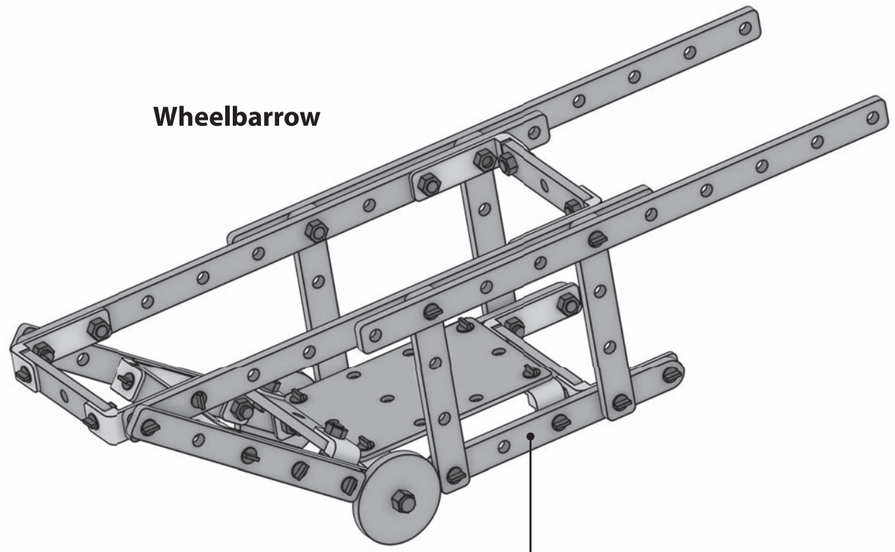
Connection Type	When to Use
2" Bolt and Nut 	A 2" bolt and a nut can be used to connect one plank to one short or long L bracket.
3" Bolt and Nut 	A 3" bolt and a nut can be used to connect two or three planks to each other. They can also be used to connect two or three planks to one short or long L bracket.
Long L Bracket 	A long L bracket (along with nuts and bolts) can be used to connect two planks. This type of connection is useful when building a strong base for a structure or when making corner connections. The three connection points help make the connection secure.

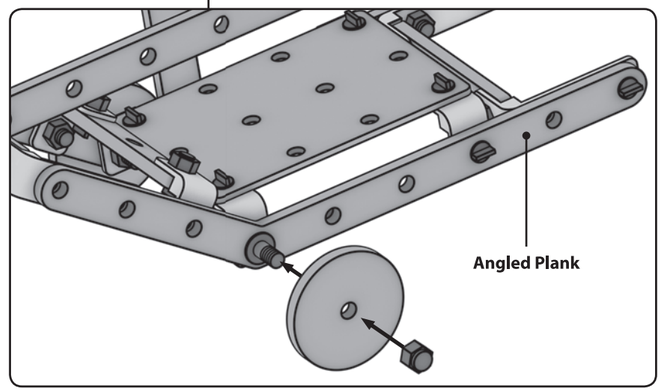
(continued)

⚠ **WARNING:** CHOKING HAZARD
Small parts. Not for children under 3 yrs.

Connection Type	When to Use
Short L Bracket 	A short L bracket (along with nuts and bolts) can be used to connect two planks.
L Bracket and Pulley 	A bolt and nut can be used to connect a short or long L bracket to a pulley. Make sure the pegs on the pulley line up with the holes on the L bracket. Then connect the L bracket to a structure using nuts and bolts.
Axle Bolt and Axle Cap 	Turn a plank into a lever by attaching it to an axle bolt! Insert the short end of an axle bolt into a plank hole and secure it in place with an axle cap. Slide the other end of the axle bolt through a hole in a different plank or L bracket and secure it with a nut.
Wheel, Axle Bolt, and Axle Cap 	Create a wheel and an axle by attaching an axle bolt to a wheel! Insert the short end of an axle bolt into the hole in the wheel and secure it with an axle cap. Slide the other end of the axle bolt through a hole in a plank or L bracket and secure it with a nut.
Pulley Hook and Pulley 	To attach a pulley hook to a pulley, insert the end of the pulley hook into the slot in the pulley. Rotate the pulley hook to secure it in place. Then flip the pulley upside down and slide the rope underneath the wheel. This enables you to use a pulley that moves (instead of a stationary pulley).
Loop Hanger 	Simply slide a rope through the opening in the loop hanger. This construction is perfect for a pulley system that moves side to side! You can also use a bolt to attach a loop hanger to a structure.
Cable Cinch  Pinch to open.	No need to tie knots to close off a rope! First, slide one end of the rope through the opening in the top of the cable cinch. Then, slide the rope end through the opening in a loop hanger and back through the bottom of the cable cinch so the rope is doubled up. This will hold the rope in place without you having to tie a knot. (To remove the rope from the cinch, press and hold the lever at the top of the cinch.)

Wheelbarrow



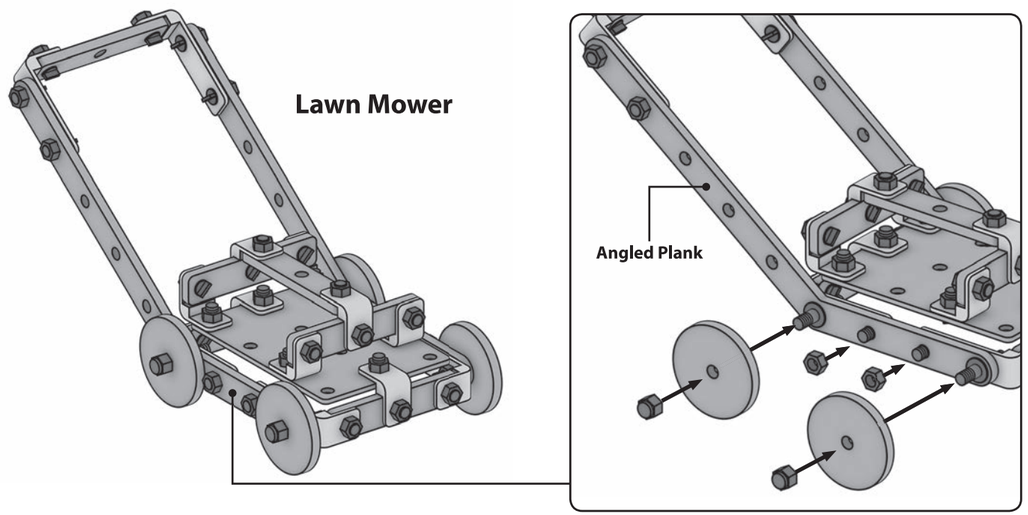


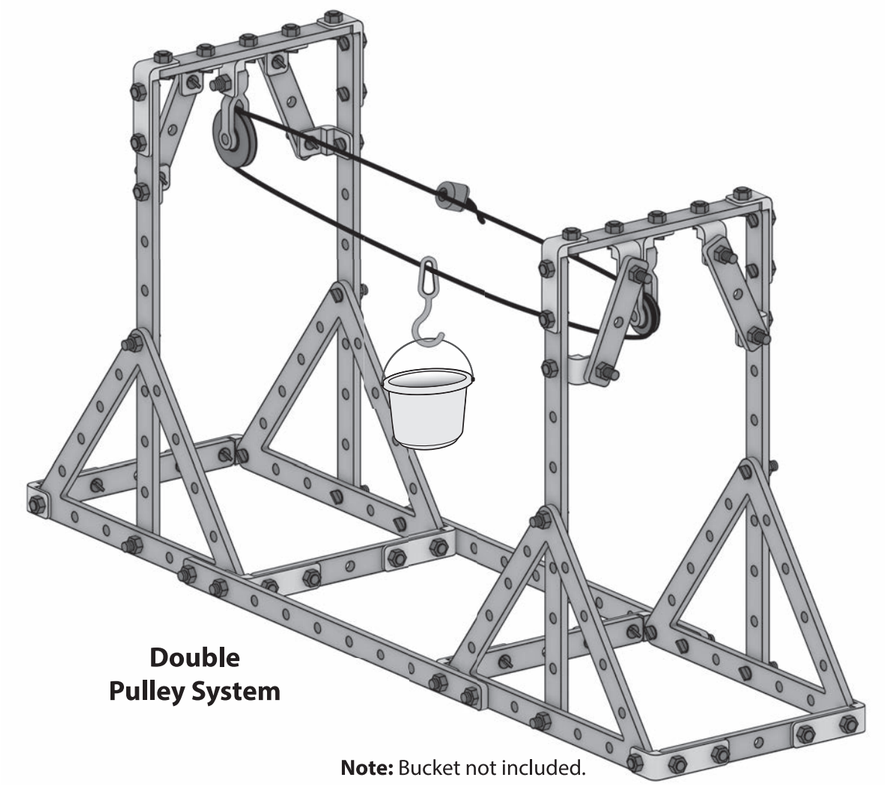
Talk About It

As children explore and work with the builders, ask the following questions to engage their thinking:

- *Can you name some examples of levers?*
- *Can you use the pieces in the set to make examples?*
- *What piece did you use as your fulcrum? Why?*
- *Does work get easier when a structure has more than one pulley?*
- *Can you build a structure that tests this? Explain your results.*
- *Is it easier to move an object from one place to another when a structure uses wheels?*
- *In what ways can you modify your vehicle to make it easier to move?*

Other Examples Using Levers, Pulleys, and Wheels & Axles





Note: Bucket not included.

LEVER

What is a first-class lever?
A lever is a simple machine that uses an arm and a fulcrum to lift an object, or load. In a first-class lever, the fulcrum is between the load and the effort force of an arm. To lift the load, you need more effort, or weight, to tip the scale. The example shown below is a first-class lever.

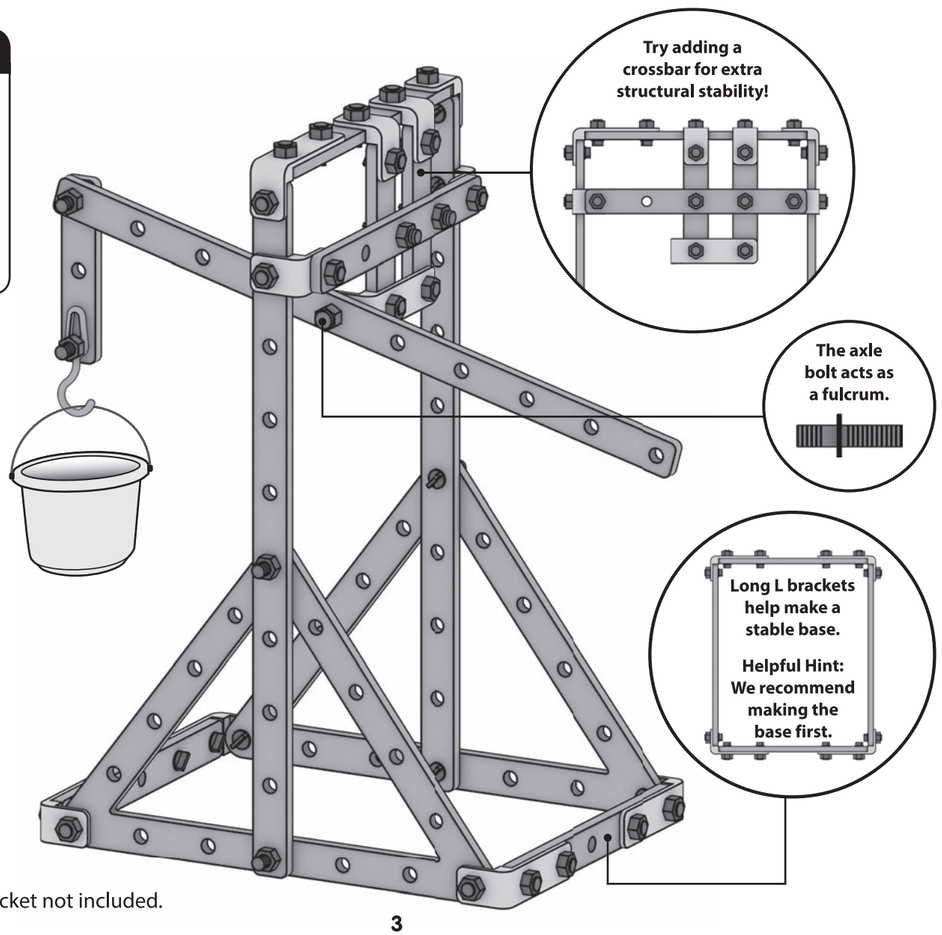
What is a second-class lever?
A second-class lever is a simple machine that uses an arm and a fulcrum to help you lift an object. The fulcrum is the part of a lever that the arm turns on. The object you lift with a lever is called a load, and the force you use to lift the load is called effort force. On a second-class lever, the load is between the effort force and the fulcrum. To lift the load, you pull up on the end of the arm that is opposite the fulcrum. A wheelbarrow is a great example of a second-class lever.

How do levers help make work easier?
A lever is perfect for lifting or moving heavy things. When you push down on one end of a lever, the other end lifts up. This enables you to use less energy than trying to pick up or move an object using only your hands.

Challenge children to use the pieces in the set to build a lever.

Key Pieces

- planks
- axle bolts
- axle caps
- nuts & bolts
- L brackets
- loop hangers



Note: Bucket not included.

PULLEY

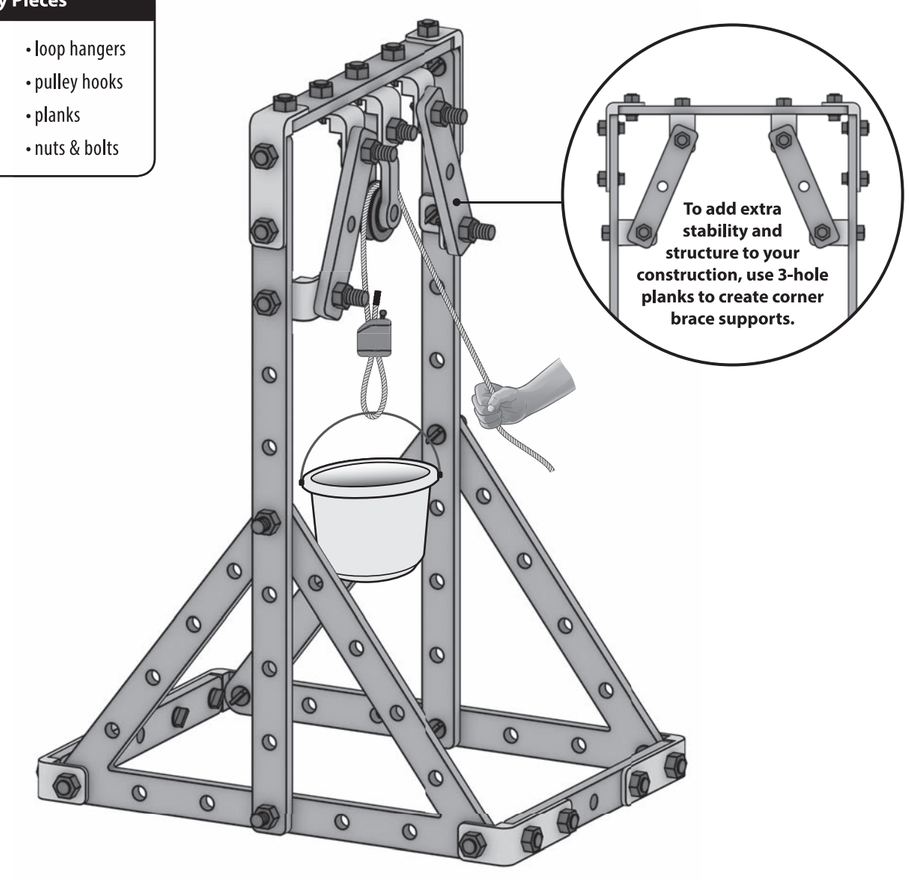
What is a pulley?
A pulley is a simple machine that uses a wheel and a rope to help you lift or lower objects, or loads. The pulley has a grooved wheel that helps keep the rope in place.

How do pulleys help make work easier?
A pulley helps make lifting or lowering heavy objects easier. It helps change the direction of force. When you attach an object to one end of a pulley rope and apply force to the other end by pulling downward, the pulley lifts the object tied to the rope.

Challenge children to use the pieces in the set to build a pulley system.

Key Pieces

- pulleys
- rope
- cable cinch
- L brackets
- loop hangers
- pulley hooks
- planks
- nuts & bolts



Note: Bucket not included.

WHEEL & AXLE

Note: When you use the included wheels and axle bolts, you are using levers, too! When used with a wheel, the axle bolt serves as the fulcrum, and the outside of the wheel is like the handle of a lever—it just wraps all the way around. Wheels and axles help you do more work than you could do by yourself because they allow you to travel a greater distance more easily.

What are wheels and axles?
Wheels and axles are used for moving objects, or loads. They are made up of one or more wheels with a rod, or axle, through the center.

How do wheels and axles help make work easier?
Wheels and axles make it easier to transport heavy loads. They help you do work by taking away friction between a load and the surface that the load is moving on.

Challenge children to use wheels in their constructions.

Key Pieces

- wheels
- axle bolts
- axle caps
- nuts & bolts
- planks
- platform