



## cranes guidebook

**Do you like cranes? Do you see them at construction sites in your town? Are you curious about how they work? Then come along! Let's do the experiments in this kit together to learn all about cranes!**

**In this guidebook, you will see a lot of things that you already recognize. The pictures will guide us in doing our experiments and projects. And whenever you see a Try It box, you will see more ideas for other exciting experiments.**

**Inside the kit, you will also find a colored Knowledge Wheel. You can quiz yourself with it to see if you remember the things that you discovered while doing your experiments.**

**And now, let's begin!**



# General Instructions for Parents and Children

**Caution!** Certain parts of this kit have pointed or sharp corners or edges related to their functions. There is danger of injury! We reserve the right to make technical changes. Keep the experiment kit out of the reach of small children.

## Dear Parents,

This experiment kit is designed for children ages 5 and up. For each experiment, first ask your child the question at the beginning of the experiment. Then present the various pictures to him or her as possible answers. In this way, your child can start to develop ideas about how to explain everyday experiences. Next, your child can follow the pictures to do the experiment mostly by him or herself, to test his or her ideas. That will let your child discover firsthand the answer to the question posed at the beginning. Finally, read your child the answer summary at the end of the experiment to confirm or correct his or her own conclusions.

Because the curiosity and powers of comprehension of children at this age are often more fully developed than their manual skills, your assistance will sometimes be needed. Support your little researchers when they need it. If an experiment doesn't work correctly, encourage your child to try it again.

**+** Please be sure to provide the children with any extra materials not contained in the box. These are designated with a red plus sign.

**Have fun experimenting!**

## Knowledge Wheel Instructions:

Please place the three rotating disks on top of each other (with the largest on the bottom, etc.) and fasten them with the enclosed 2-pronged fastener. Turn the three wheels so that the matching pictures align. If the answer dots show the same color, then the result is correct. Here is an example of a correct solution:



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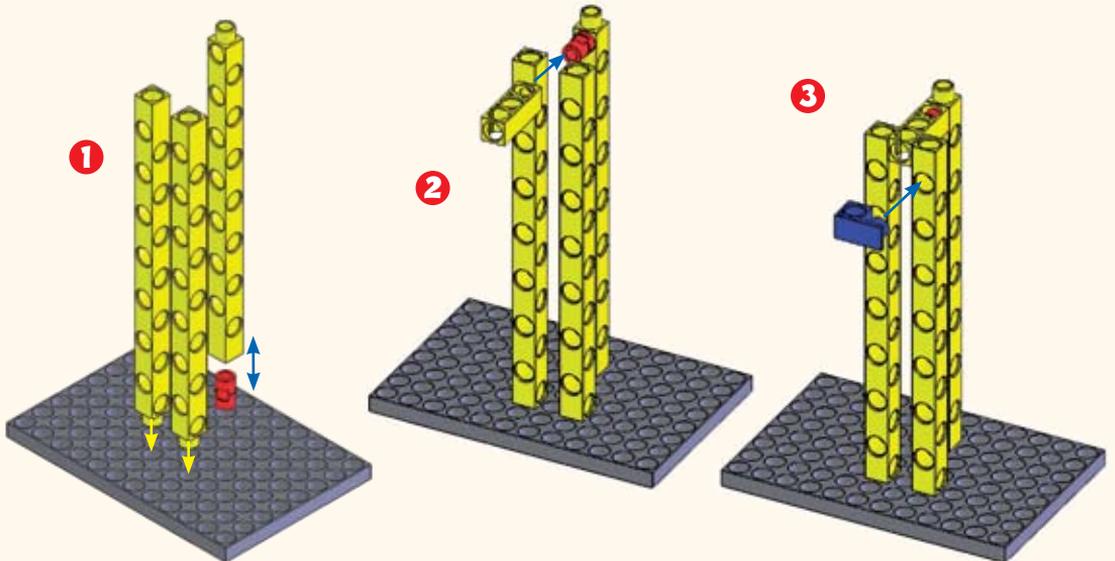
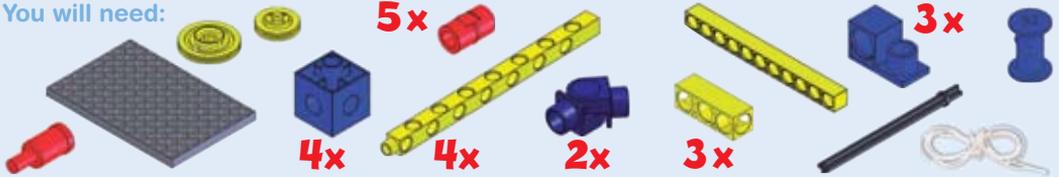
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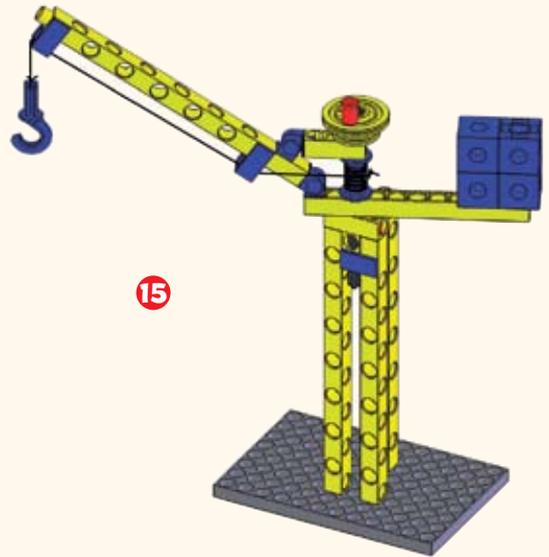
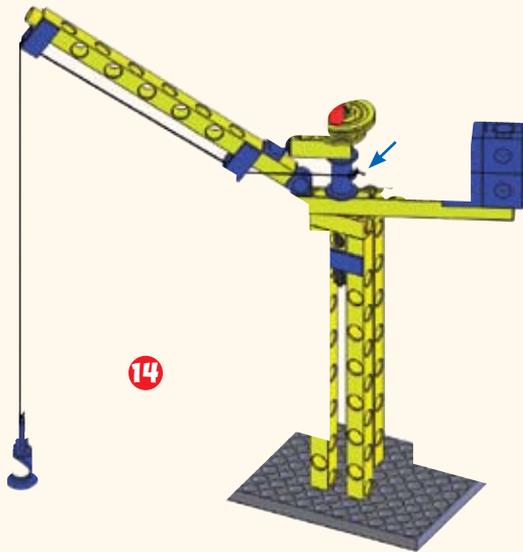


## Experiment 5: Why do we need cranes?



You will need:





### Answer:

A crane is a machine designed to move heavy things, such as building materials and cargo. A crane can move in several directions, not just up and down. Cranes are very important at construction sites and ports.

The crane you have just built is a tower crane. It consists of a vertical mast (the tower) and a long, horizontal arm (the boom). The boom may be longer than the crane is high. Cables run to a winch, which coils the cables to lift the loads.

When you turn the crank on your crane, the rope is coiled up or released, depending on which way you turn. The hook is then raised or lowered.

Simple cranes were used to build great structures as long as 2,500 years ago.