

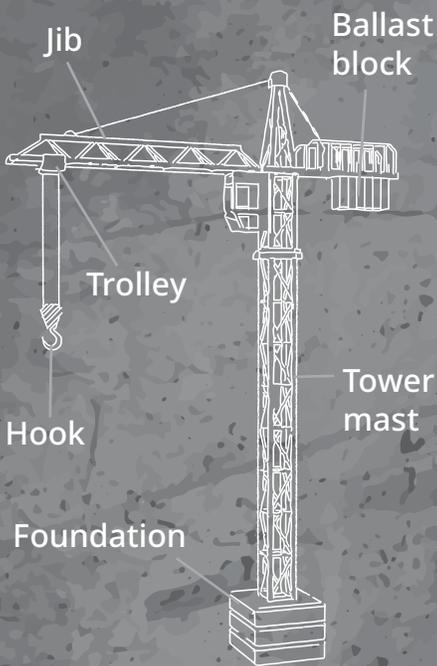


# 3

## Crane Installation

The tall tower crane has a long arm and a fixed base. The short and wide crawler crane uses its tracks to move. The crawler crane will be used to help join the heavy pieces of the Tunnel Boring Machine together, and the tower crane will lift the tunnel liner rings from the upper level to the construction pit below.

### Meet the tower crane!



### Did you know?

The tower crane on site can lift about **18,000kg** of weight, or as much as **three elephants!**



### Let's get ready!

We can use a paper towel roll and string to explore the science behind these tall and strong machines!

#### For this experiment, you will need:

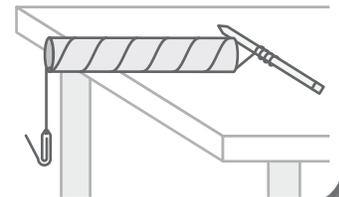
- string
- a paperclip
- a paper towel roll
- one light object (like a leaf)
- a pencil
- one heavier object (like a plastic cup)

### Let's get started

Let's see how a crane can help you lift! Cut your string four times as long as the paper towel roll. Thread it through the roll. On one end, tie the string to the pencil. On the other end, tie the string to a paperclip and open the paperclip so it can be used as a hook. You can make your crane work by rolling the string up around the pencil or moving it back and forth to raise and lower what you are carrying. Try laying your crane flat with the string hanging off the table, so you can lift objects off the floor!

#### What do you think will happen?

- What will happen when you attach something light, like a leaf or paper?
- What will happen with something heavier, like a plastic cup or hat?



### What is happening?

- When you are rolling the string on the pencil, what do you see? Where can you feel the string pulling the most?
- Try a couple of different objects to see what you discover!
- Does rolling the string feel different than lifting an object with your hand? How?

