

# Station Creation

## You will need:

- Toothpicks (150)
- Jelly Babies (2 bags, 190g each)
- Paper (5 A4 sheets)

## Time: 50 minutes total

- 10 minutes: team brainstorm
- 40 minutes: build

## Team

Your team will include you and 3-5 of your classmates.

## Objective

Design and build a model of a new railway station as seen from the street. Assume that the train enters the station underground, just as it will at the on the Crossrail line through central London.

## Instructions

There are four roles in each team:

**Architects** – who will design the station's layout and appearance (1 or 2 per team)

**Field/Structural Engineers** – who will work on the structure's design (1 or 2 per team)

**Site Managers** – who will make sure construction is on schedule (1 per team!)

**Project managers** – who make sure that the others complete their tasks on time and create, introduce, and close the presentations. (1 per team!)

Read next pages for your role descriptions. Be sure to communicate with each other.

## Specifications

- Minimum station floor dimensions: 18 cm wide x 22 cm long
- Maximum station floor dimensions: 20 cm wide x 24 cm long
- Station must have minimum two levels (Ground plus at least one upper level)
- The structure must be freestanding and capable of supporting 500g on its 1<sup>st</sup> level

## Class Discussion:

**Your team will be required to prepare a 3 minute presentation for a class discussion after finishing the activity to explain your station's design and how you built it.**

## Background Information

Right now on the Crossrail project, the main focus is moving towards station construction. Tunneling is scheduled to be complete by the end of 2014, and as tunnel construction is coming to an end, station construction has just been getting started. With 40 stations on the Crossrail route, including 10 brand new ones requiring construction, the refurbishment and construction of stations along the Crossrail route is critical because without stations, how are people going to be able to use the incredible new rail service?

Every station that is being constructed starts with weeks or months of planning prior to dirt being moved. During this planning time,

- Architects design the building. What it looks like, where the doors are, where the escalators go, and other things related to building design.
- Engineers figure out how to build what the architects designed. They decide on what building materials to use and make sure the building will be safe for passengers to use.
- Crossrail engineers think about things like the need to handle hundreds of thousands of people per day, the need to be built to last for at least 100 years, and also be built so that there is minimal damage to any of the surrounding buildings, roads, rail lines, and sewers when planning how to build the new stations.
- Site Managers make sure construction work is going to plan and the designs and plans of both the architects and engineers are being followed.
- Project Managers are in charge of everybody working on the project. They make sure that everyone is doing their work and finishing on time, and makes sure that everyone is working safely.

## Architects

Congratulations! The construction of a new station on the Crossrail line has been approved by the Sponsor Board. Your job is to design the new station.



- You must design a station (You need to create drawings of floor plans for the floors your team will be constructing, as well as ‘elevation drawings’ showing what the building will look like from the outside). It must have at least two floors, and must have a footprint width between 18 and 20 cm, and footprint length between 22 and 24 cm in order to be large enough to accommodate the passenger traffic through the station.
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- You will need to explain your design during presentation. Questions to ask yourselves for the presentation are:
  1. Why did I design the station this way?
  2. Is it an appealing design (would you want to look at it or be inside it)?
  3. Is it easy to navigate/get around inside the station?
  4. Is it easy to build?

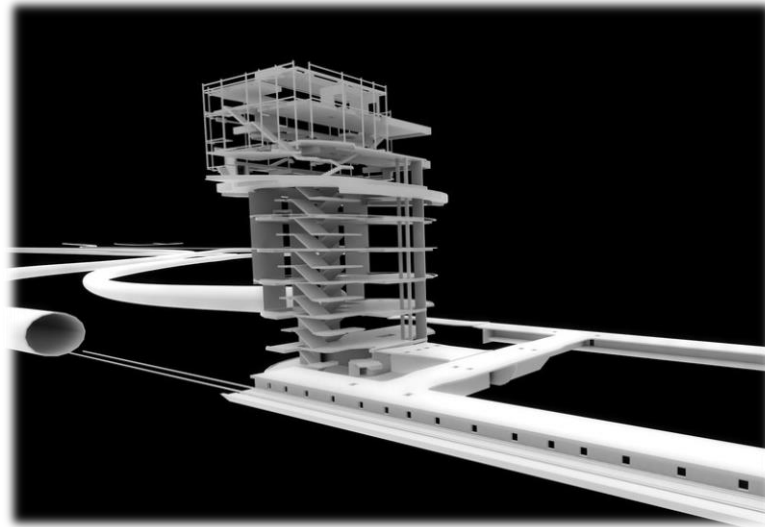
**You have 10 minutes to work with the engineers and team to come up with your plan and then 40 minutes to help construct the model and create your presentation.**

**You have the final say on the artistic design of the station!!!**

**Good Luck!**

## Field/Structural Engineers

Congratulations! The construction of a new station on the Crossrail line has been approved by the Sponsor Board. Engineers need to help the architects design become a reality.



Your job is plan how to build the structure to look like what the architect's drawing, but also to be a freestanding structure that is functional. The materials have already been chose. Now it is your job to make sure that the structure meets the following requirements:

- Strength – Is the building sturdy? Can it stand on its own? Can it hold weight?
  - Think about geometry: What shapes are the strongest?
- Design – Does it follow the architects' design?
- Construction time – How easily can the structure be built? Can it stay within budget and meet the construction deadline?

**You have 10 minutes to help the architects and team to come up with your plan and then 40 minutes to help construct the model and help to pull together the presentation.**

**You have the ability to advise the architects against design elements if they are too difficult to build and call for a redesign of any part of the station at any time!!!**

**Good luck!**

## Site Managers

Congratulations! The construction of a new station on the Crossrail line has been approved by the Sponsor Board. You are in charge of the construction site. You manage all material flow and ensure that all construction materials are being used with minimal waste. You are also in charge of making sure the construction is still on schedule and materials are available when needed to ensure on-time construction.



You will need to think about a number of factors when managing your site.

- Are all Health & Safety rules being followed?
- How many people are working on the construction site at any given time?
- Who is working on what, and when?
- Are there enough materials on site to finish each phase of the construction?
- Are materials arriving to the job site on time or do we have to place orders earlier?

**You have 10 minutes to help provide design ideas for the architects and engineers, and then 40 minutes to lead the construction of your team's model.**

**You have the power to stop construction at any time if you see problems or safety issues during the build process!!!**

**Good luck!**

## Project Manager

Congratulations! The construction of a new station on the Crossrail line has been approved by the Sponsor Board. Your job is central to making sure that all tasks are completed and the presentation is produced to a high standard. You will also introduce and close the presentation. As in *The Apprentice*, the PM has final say!



The other members of your team have the following tasks:

- Architects – Design the station
- Engineers– Plan how to build the station’s structure/framework
- Site Managers – Plan who will work on what parts of the construction phase

They will have **10 minutes** to come up with their plans and begin construction and it is your job to work with them and make sure that they complete construction in **40 minutes**.

**You may provide design ideas to the architects and engineers, and may also assist in the construction of your team’s model.**

**You are also responsible for creating, introducing, and ending your presentation. You decide how you want to present, but you must get information from all other employees on the project, and make sure your team finishes construction on time!!**

**Good luck!**