sphero®

blueprint™

challenge cards

challenge #1

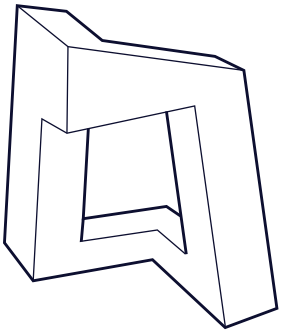
iconic skyscrapers

Nowadays, a regular tall building doesn't seem sensational enough for a skyscraper. So, architects and civil engineers try to take their creativity to the next level to build the most spectacular building.

STUDENT HANDOUT
sphero.cc/bpc1sh

YOUR CHALLENGE:

Use Blueprint to build a model of one of the three iconic skyscrapers shown on the back, or choose your own!

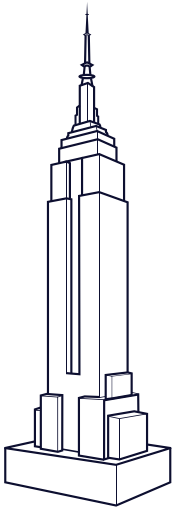


CCTV HEADQUARTERS

Beijing, P.R. China

NOTABLE FEATURE:

Two towers bent 90° to form a twisted overhang

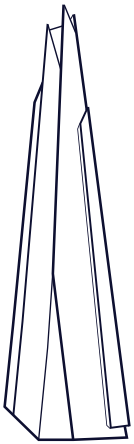


THE EMPIRE STATE BUILDING

New York, New York

NOTABLE FEATURE:

Spire on top made it the tallest building in the world for 40 years



THE SHARD

London, England

NOTABLE FEATURE:

Angled sides and 72 floors

challenge #2

bridging the gap

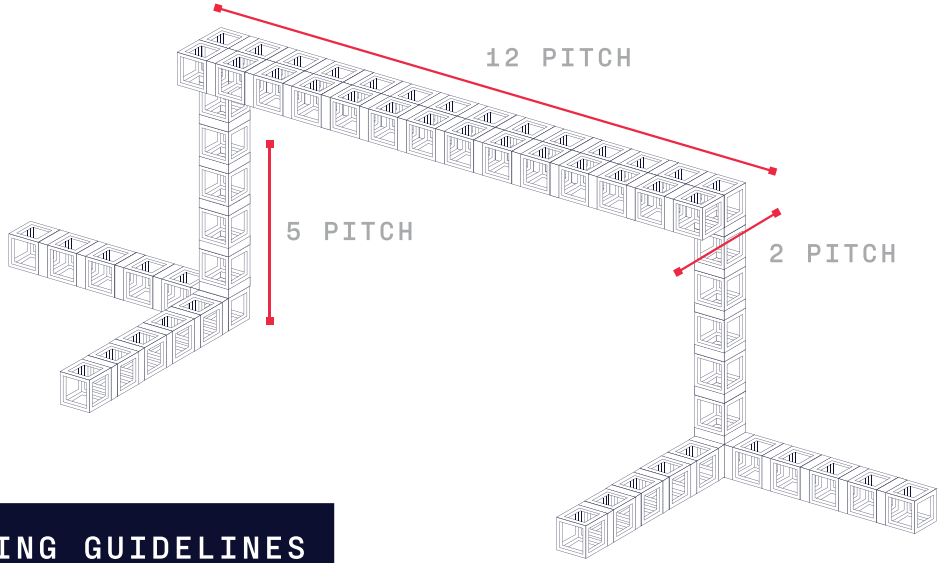
Put your design efficiency skills to the test. Can you build a Blueprint bridge with fewer parts then your peers?

STUDENT HANDOUT
sphero.cc/bpc2sh

YOUR CHALLENGE:

Construct a bridge to hold four textbooks (approximately 8 kilograms).
Your bridge must:

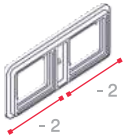
- only contain connectors, trusses, and plates
- be at least 5 pitches above the ground
- include a span that is at least 12 pitch long and 2 pitch wide with no support underneath



SCORING GUIDELINES

- every team starts with 100 points
- every Blueprint part used deducts points from your score.

EACH TRUSS PITCH
-2 POINTS



EACH PLATE PITCH
-2 POINTS

CONNECTOR
-1 POINT

challenge #3

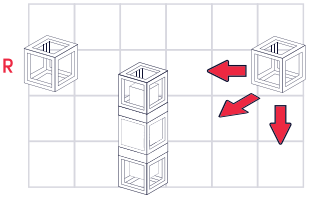
blueprint monorail

Monorails, or single-track railways, are not just in people's imaginations, they are used in cities worldwide to transport people and freight. Use Blueprint linear motion brackets and weighted trusses to design and build a monorail car that will transport passengers from one end of a track to the other.

YOUR CHALLENGE:

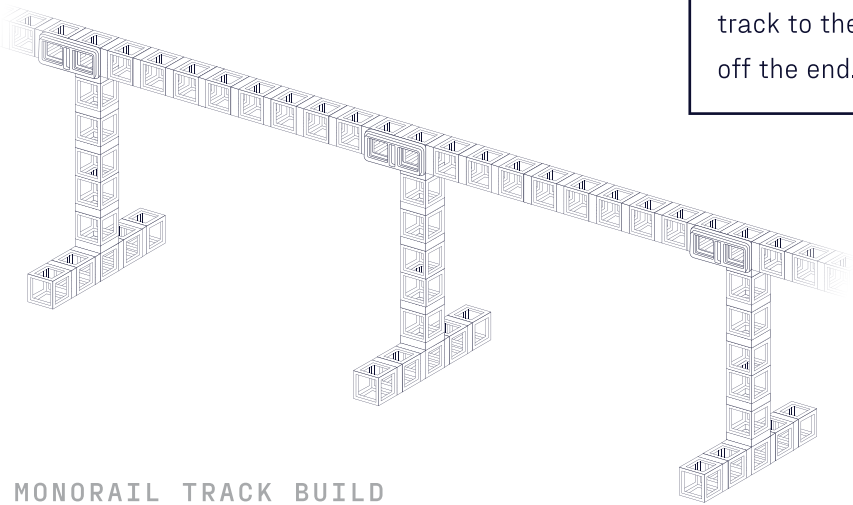
Construct a car to glide down the monorail track. The car must:

- use slides to connect to a 40 pitch track;
- hold at least 10 passengers, each represented by a pitch on a weighted truss;
- include a space for the conductor (another 1x Pitch Weighted Truss) separated by 1 pitch in all directions, including diagonals from passengers.



extend

Use a rubber band or another power source to propel your monorail car from one end of the track to the other without falling off the end.



MONORAIL TRACK BUILD

STUDENT HANDOUT
sphero.cc/bpc3sh

challenge #4

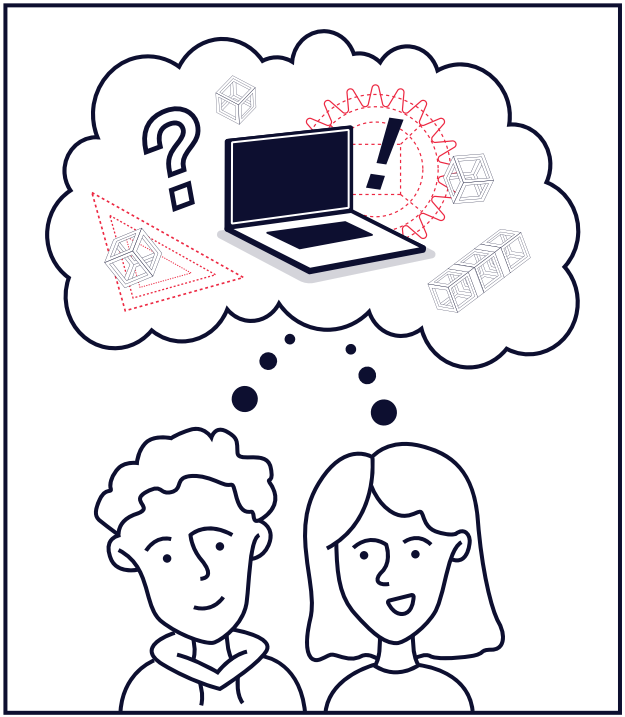
construct for the classroom

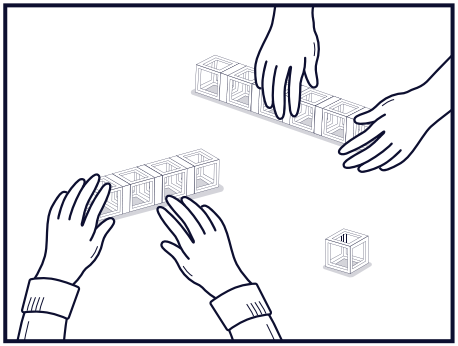
You spend a lot of time in the classroom. So why not improve your learning space to make your life easier?

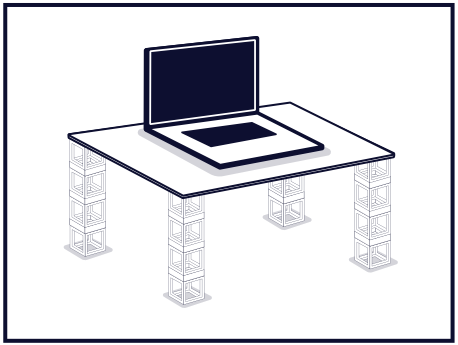
STUDENT HANDOUT
sphero.cc/bpc4sh

YOUR CHALLENGE:

Identify a classroom challenge or need, then work in teams to prototype and construct a solution using Blueprint.







challenge #5

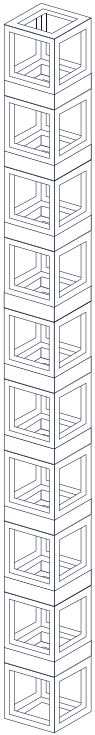
gone fishing

To catch a fish, you need patience, determination, and skill. Of course, it would help if you also had a good fishing pole! A fishing pole is a simple machine with a reel to make it easier to pull in that prize-winning fish.

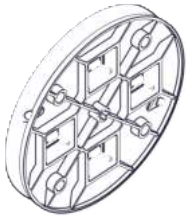
YOUR CHALLENGE:

Use Blueprint to design and build a working model of a fishing pole. Your build must meet the following requirements:

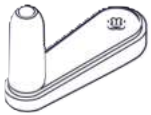
- be at least 10 pitches long from the reel to the pole's tip (25 centimeters);
- use a Hand Crank, pulley, and rope;
- be able to reel in a 3x Pitch Weighted Truss "fish" (75 grams).



10 PITCH

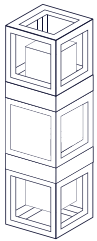


PULLEY



HAND CRANK

ROPE



3x PITCH
WEIGHTED TRUSS

STUDENT HANDOUT
sphero.cc/bpc5sh

challenge #6

blueprint driving

Many people drive or ride in a car every day. Making models of cars is a good place to start building with Blueprint.

YOUR CHALLENGE:

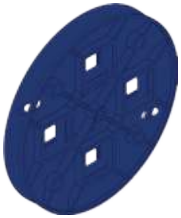
Construct a car.
The car must be able to:

- drive forward in a straight line
- drive backward in a straight line if the motor is reversed
- drive at different speeds

STUDENT HANDOUT
sphero.cc/bpc6sh

Pieces you may need:

6x Pitch Shaft



90mm Pulley

100mm Tire

Motor

Rotary Potentiometer

extend

Add a speedometer or headlights to your car. What Blueprint Bits will help you with this?

challenge #7

elevator lift off

Elevators do the heavy work of lifting people safely from floor to floor in multi-story buildings. How many people will your Blueprint elevator lift?

STUDENT HANDOUT
sphero.cc/bpc7sh

YOUR CHALLENGE:

Construct and power a Blueprint elevator that lifts as many "people" as possible. The elevator must:

- use a rack gear to climb up and down the elevator shaft
- include a floor that holds passengers, each represented by a pitch on a weighted truss
- give each passenger their own square of floor space

Pieces you may need:

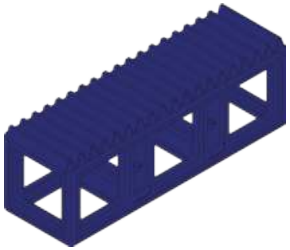
3x Pitch Truss

20T Gear

4x Pitch Shaft

Bearing Plate

Linear Motion Bracket



Rack Gear

challenge #8

ferris wheel fun

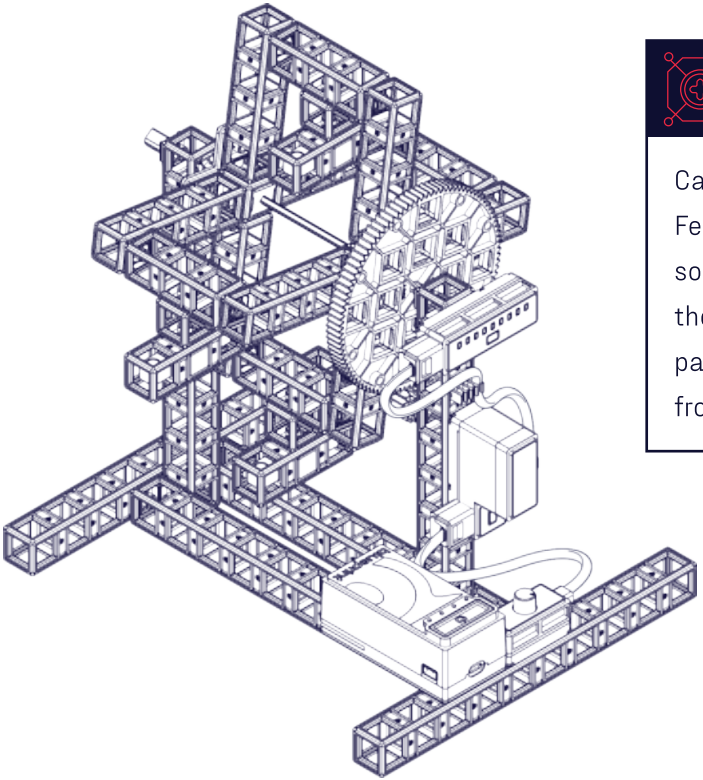
At every carnival or amusement park you are likely to see a Ferris wheel carrying people up into the sky and then back to the ground. Let's see if you can build one with Blueprint pieces!

STUDENT HANDOUT
sphero.cc/bpc8sh

YOUR CHALLENGE:

Design and build a Ferris wheel. The Ferris wheel must:

- do a complete rotation upon receiving a signal from an input Bit
- have at least 2 carts that can hold at least 4 people
- ensure all carts stay upright throughout the entire rotation of the Ferris wheel



extend

Can you add more control to your Ferris wheel? Modify your circuit so that you can start and stop the Ferris wheel, allowing passengers to load and unload from the carts.

challenge #9

stay off the tracks

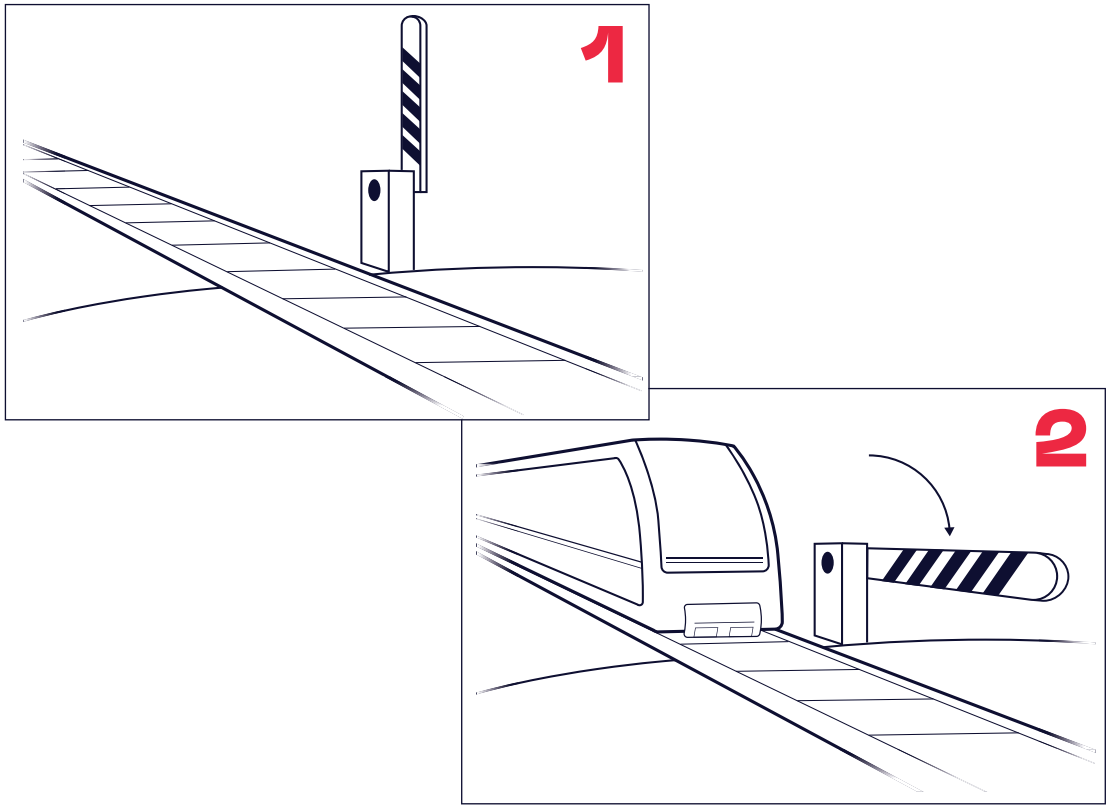
Trains are fast, heavy, and have a hard time stopping quickly. Railroad crossing gates are an essential safety mechanism that keep cars and pedestrians away from the tracks whenever a train passes. Build one with Blueprint pieces!

STUDENT HANDOUT
sphero.cc/bpc9sh

YOUR CHALLENGE:

Build an electric railroad crossing gate with Blueprint. The crossing gate must:

- lower when a train approaches
- rise when the train has passed by
- operate automatically without human input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2

challenge #10

robotic arm

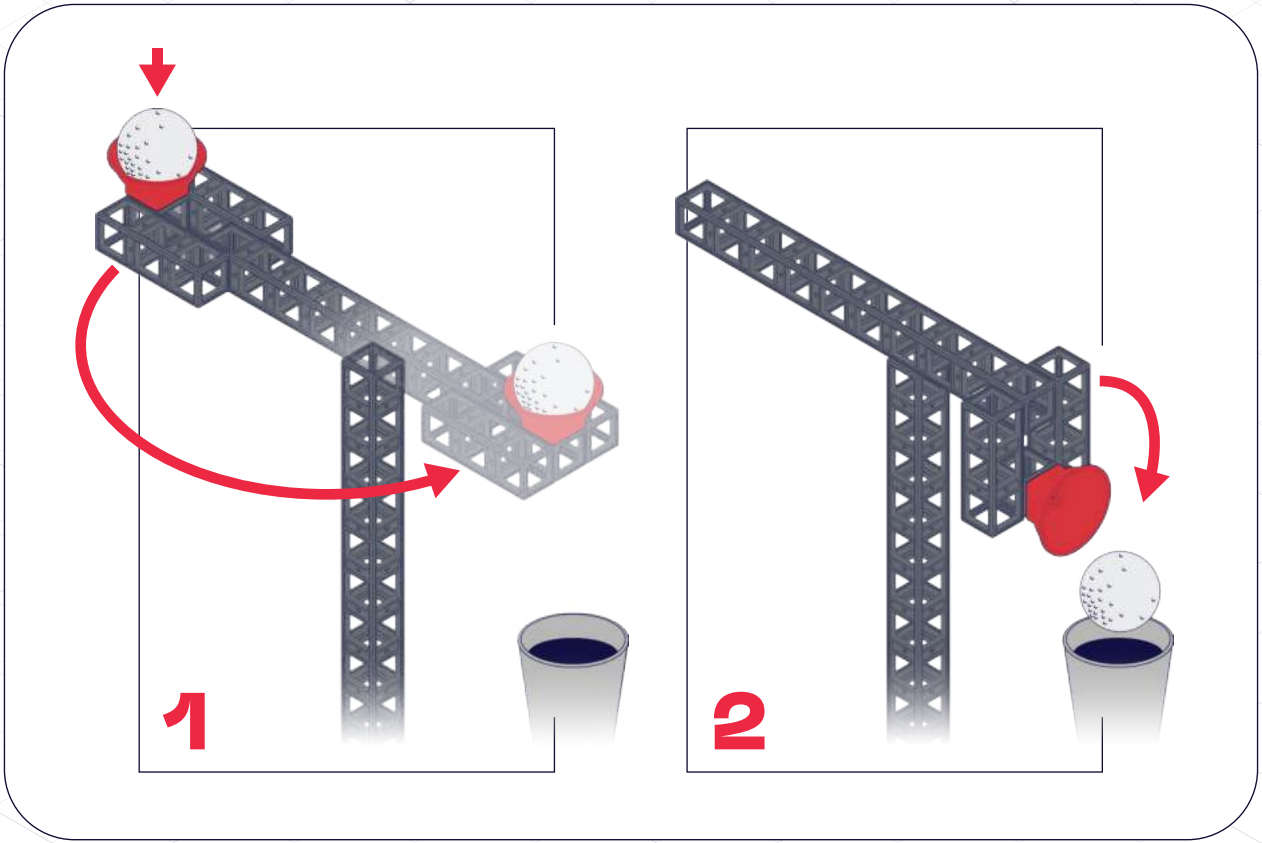
Robotic arms are used in many applications, but are often found in manufacturing to pick up objects and deliver them to a different location. Let's try making one to move golf balls.

STUDENT HANDOUT
sphero.cc/bpc10sh

YOUR CHALLENGE:

Design a robotic arm for transporting golf balls. The robotic arm must:

- use the Catapult End Effector to hold a golf ball
- have an input Bit so that you can start and stop the motion of the build
- deliver the golf ball 180 degrees (off the back of the device) and have it drop off into a cup or container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