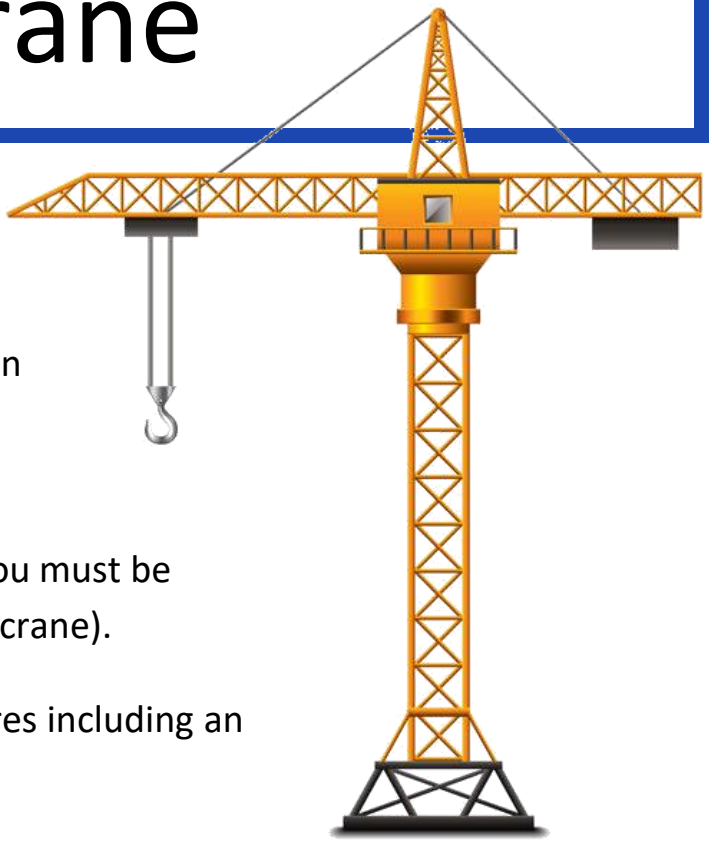
EPro8 Challenge

Engineer Problem Solve Innovate

Crane

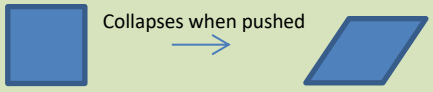
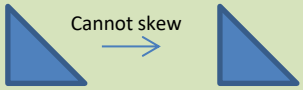
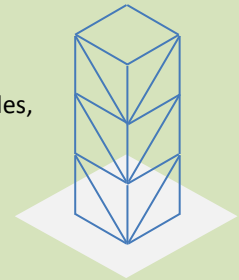


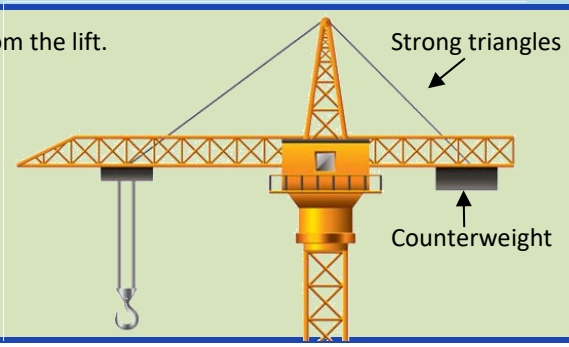
You work at a construction site building a skyscraper.

You need to construct a crane that can lift objects from the ground, rotate, and lower them to another location.

The crane must be self-supporting (you must be able to stand back and not touch the crane).

Automate the crane with extra features including an automatic stop and a warning siren.

Crane Construction		
Criteria	Build a free standing tower or structure at least 1.8m The tower must be rigid. It must need bend when pushed from the side	
Hint	Squares or cubes can skew, so they are weak:  Triangles cannot skew so they are strong and rigid: 	A diagonal brace will turn a square into two strong rigid triangles. Many cranes and towers are built with lots of strong triangles, like in this diagram: 

Boom Arm	
Criteria	An arm extends horizontally from the top of the crane by at least 400mm. A 2kg weight is attached to the end of the arm. The arm does not bend and the structure remains stable.
Hint	Cranes have counterweights on the opposite side from the lift. This balances the crane and stops it tipping over. Build the boom arm in both directions and attach a 1kg weight on the other side. Use triangles again so the boom doesn't bend. 

Manual 2kg Lift	
Criteria	A rope is attached from the 2kg weight through the end of the boom to the centre of the crane. Pulling down on the rope in the centre of the crane lifts the 2kg weight.

Crank Handle Operated	
Criteria	The weight is attached to the end of the boom. A crank handle in the middle of the tower raises and lowers the weight.

Rotating Boom	
Criteria	The boom is attached to an axle so that it can rotate around the crane. The 2kg weight can be lifted, the boom rotated, and then the weight lowered in a different location.

Motorised Crane	
Criteria	Use the online electronics simulator, code **CRAN**. The crane must be electrically operated. An operating panel must have 4 buttons: • Two that raise and lower the weight. • Two that rotate the boom from side-to-side.

Warning Siren and Auto Stop	
Criteria	Before starting to lift, a warning buzzer will automatically sound for 5 seconds. The crane will automatically stop when it reaches the top.
Hint	Experiment with the Time Delay, On/Off, and Direction boxes.

After you have attempted this challenge watch the tutorial to see our solution at www.EPro8Challenge.co.nz/Tutorial and enter the Challenge Code **CRAN**.