scitech

Newspaper skyscrapers

ACTIVITY SHEET

Have you ever been to the top of a skyscraper and wondered how something so tall doesn't seem to sway in the wind? Or maybe you've looked from below and wondered how all that metal and concrete, and all those people, stay supported so far off the ground.

Building a skyscraper is not easy! The engineers who design and build them must think about the effects of gravity, wind forces and design.

To overcome the forces of gravity and wind, skyscrapers need a strong **foundation** at the base and a strong internal structure. This ensures that the building is stable by evenly spreading the forces of wind and gravity across the building.

The foundation of a skyscraper goes deep underground. Long cylinders of steel or reinforced concrete, called piles, go right down to the **bedrock**, a hard layer of rock that lies underneath the soil. Above the piles, a shallow foundation of reinforced concrete, called a **raft**, covers the whole footprint of the building. This helps spread the weight more evenly and provides a strong base for the **skeleton frame**.

There are many ways to keep wind forces from damaging the building. One method is to keep the skeleton frame tight. Other methods include using a strong core in the centre of the building or designing a gentle twist in the structure as it rises, to disrupt wind patterns.

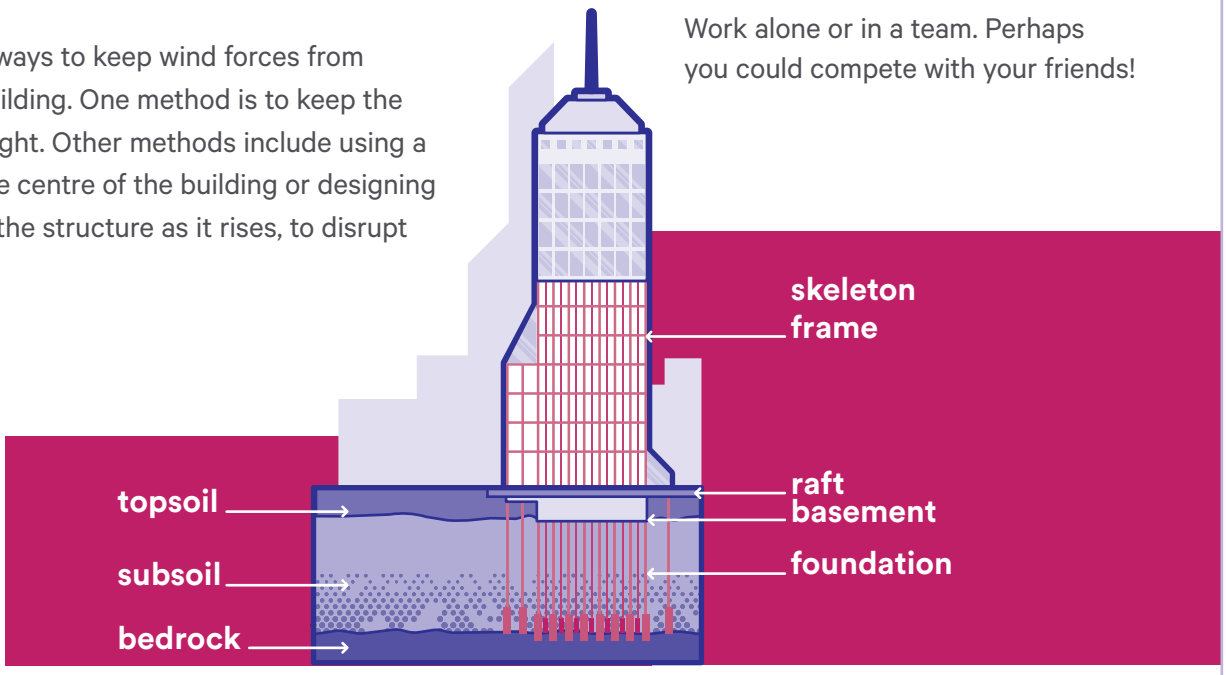
Your Challenge

The government wants to hire an engineer to build a new skyscraper in the city. To win the contract, you must impress them by building the tallest tower prototype you can.

Engineers have to overcome design challenges and work with limited resources and time. Here are the rules for your challenge:

- **You must build your tower using only newspaper and sticky tape.**
- **Your time limit is 30 minutes.**
- **The tower must be able to stand by itself for a minimum of 3 minutes**
- **The tower needs to withstand being blown with a full breath of air from 50cm away.**

Work alone or in a team. Perhaps you could compete with your friends!



What you'll need

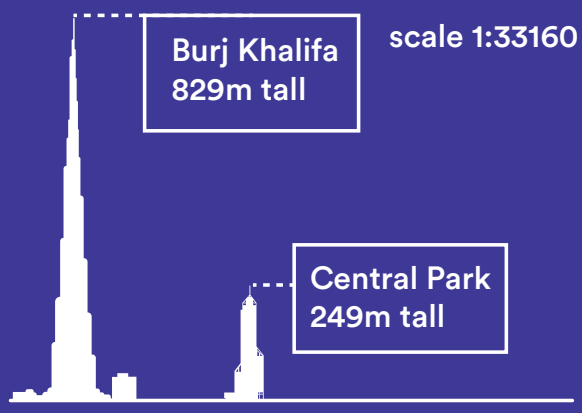
- **Old newspaper**
- **Sticky tape**
- **Scissors**
- **Ruler or tape measure**
- **Timer or clock**

STEP 1: Plan it!

1. Get inspired! Search for images of different skyscrapers around the world.
2. Below are some design questions you might like to consider:
   - **How will you make your tower stable?** What shape will it be? What will the foundation look like?
   - **How tall will your tower be?** Are you going to try and make it as tall as you can in 30 minutes? Or will there be some method to your madness?

Did you know?

The tallest skyscraper in Western Australia is Central Park (aka the Rio Tinto building), which is 249m tall. The tallest building in the world is currently the Burj Khalifa in Dubai, which stands at 828m tall. That's 3.3 times taller!



STEP 2: Design it!

Think like an engineer and design your very own tower. Will you play it safe with a simple structure? Or will you make a wacky, wobbly wonder and hope that it can withstand the forces of gravity and wind?

Remember: although skyscrapers have underground foundations, your tower needs its foundation to be above ground.

Draw your design:

STEP 3: Build it!

3. Gather your resources, put on your hard hat, set a 30-minute timer, and get building!
4. After 30 minutes, measure your tower's height using a ruler or tape measure and take a photo of it.
5. Make sure your tower is not attached to the floor, a wall, or anything else that might support it. Does it stand on its own for at least 3 minutes?
6. Stand 50cm away (roughly at arm's length) and blow a big breath towards the top of your tower. Does it stay upright?

If this was a competition, who has the winning tower?

STEP 4: Level up!

We know that engineers often have to work with constraints. To come up with truly creative ideas, however, it can be fun to imagine new designs and solutions without limitations.

Imagine what a city of the future might look like, using any materials and features that you want. Draw it below or try to build it!

Draw your future city:

STEP 5: Share it!

Remember to share your newspaper skyscraper with your friends and family. Teach them about the forces of gravity and wind that act on tall buildings. Your parents or carer might even like to share photos on social media – tell them to include

#ScitechAtHome

Staying safe

Ask an adult to help you when using scissors.

When testing out your designs, make sure no one is 'downwind' of the test area, just in case anything goes flying!

Developed in partnership with