Mini STEM Showdown

An Adelaide University, School of Education
STEMpire program

Engineering

Name:_____

Mini STEM Showdown is a series of STEM (Science, Technology, Engineering and Maths) activities to complete. Have fun!

What is an engineer?

An engineer is someone who designs and builds things to solve problems or make life better. Engineers use their knowledge of maths, science, technology and creativity to design things like bridges, buildings, machines, and even computers. They use the engineering design process which involves thinking about how things work, making plans, and repeatedly testing their ideas to make sure everything works safely and properly.

There are lots of different types of engineers; some of these engineers are:

- **Civil engineers** design things that don't move (or shouldn't) like roads, bridges, and buildings.
- **Mechanical engineers** design things that move like engines, pulleys and machines.
- **Software engineers** design code and apps for computers and phones.
- **Electrical engineers** design electrical circuits and components.
- **Mechatronic engineers** design robots using software, mechanical and electrical engineering skills.

No matter which type of engineer it is they all use the engineering design process.



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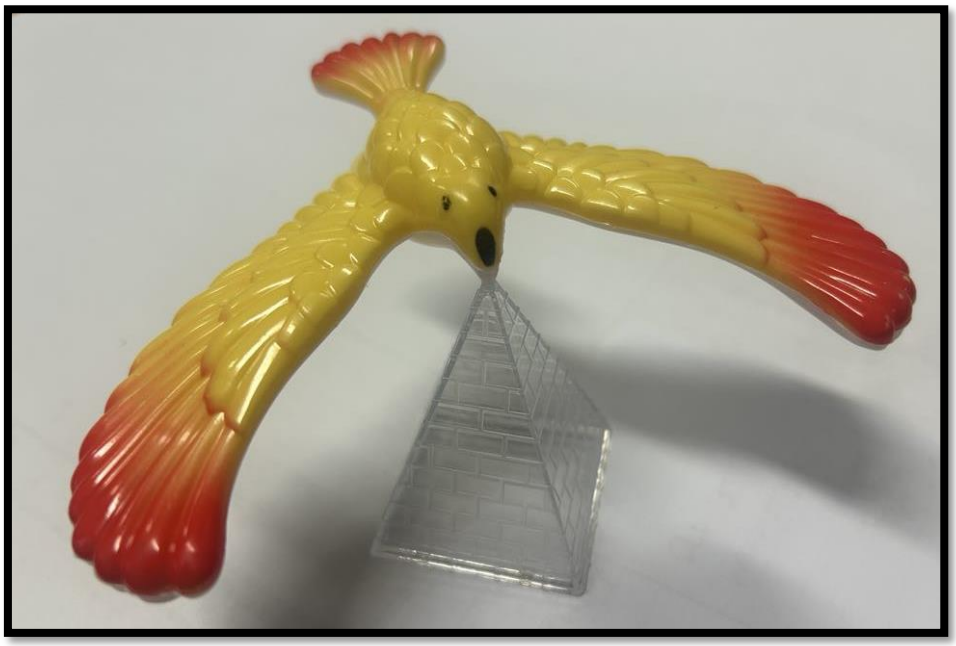
Task 1 – Balancing Act

Task – Can you make a balancing bird?

Today we will be looking at a toy that has been engineered to balance. This balancing toy doesn't just stay upright; if you bump or tip it, it sways and swings before coming back to where it started.

Have a look at the balancing bird and get it to balance on the pyramid, then on your finger.

Label where you think the weights in the bird are on the picture below.



Now you will be engineering your own bird out of toothpicks and modelling clay and trying to get it to balance. Just like an engineer you will be you need to refine your design to keep making it better.

Engineer your own balancing bird

Equipment

- 3 toothpicks
- Modelling clay

Now that you think you know where the weights are, use the 3 toothpicks and modelling clay to design your own balancing bird device. This may take several attempts to get it to balance.

Can you get your bird to balance on the flat end of a pencil? *Tick yes or no below.*

◯ Yes ◯ No

Can you get your bird to balance on the pointy end of the pencil? *Tick yes or no below.*

◯ Yes ◯ No

What other objects can you get your balancing bird device to balance on?

_____

Balancing Beaks

Engineer a perch for your bird design to balance on.

Equipment

- 3-6 toothpicks
- Modelling clay

Now that you have a balancing bird, make a perch for it to rest on using only toothpicks, and modelling clay. **What is the smallest number of toothpicks you can get it to balance on?**

_____

Task 2 – Can you make a bigger bird?

What equipment in your classroom could you use to make a larger balancing bird?

_____

_____

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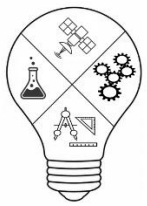
If you have time and supplies, try it and see if it works.

Here are some examples.






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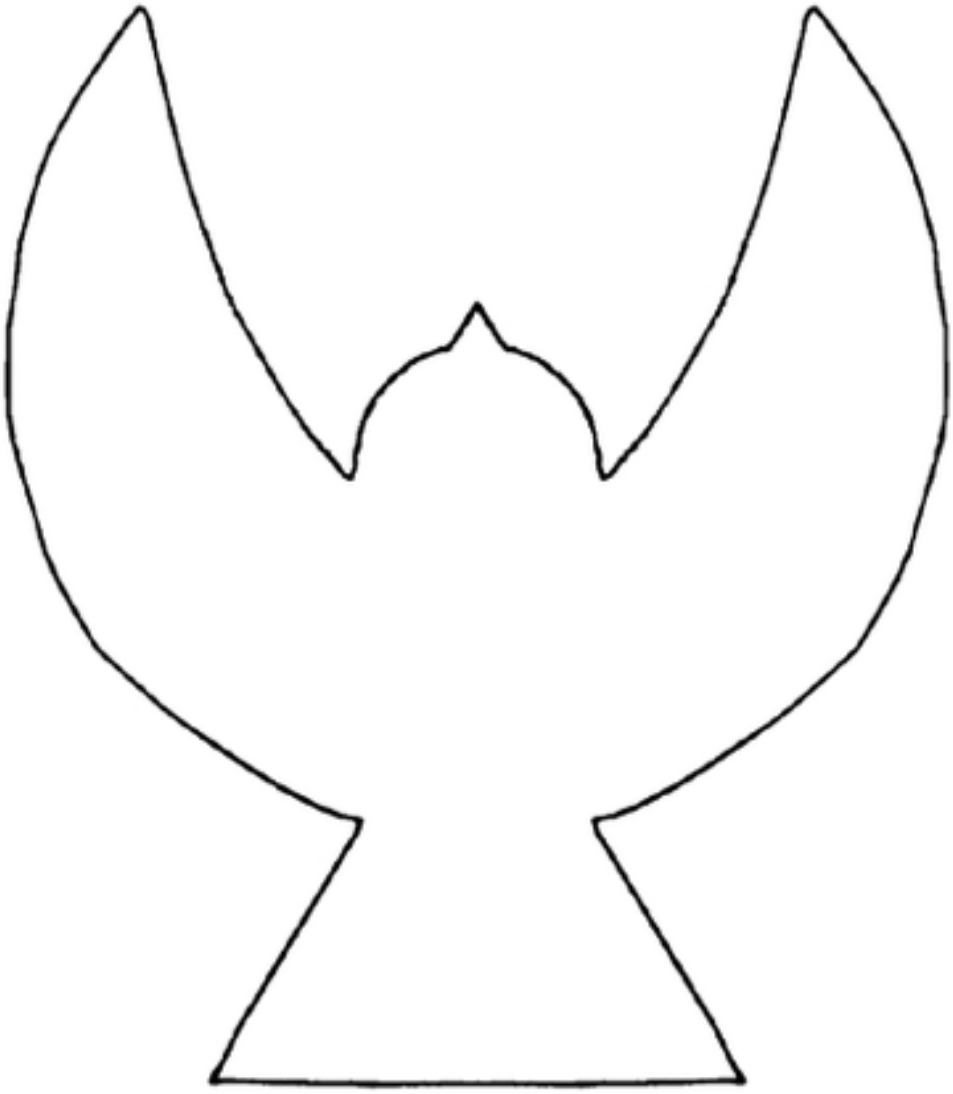
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Extension Activity – Try it yourself

Make your own paper balancing bird – just add Blu-tac

Instructions

1. **Colour your bird –** Use crayons, textas or pencils to make the paper template below bright and colourful.
2. **Cut it out –** Carefully cut along the black outline. Ask an adult for help if needed.
3. **Bend the beak –** Gently bend the bird's beak down slightly. You can use a little piece of sticky tape to make it stronger if needed.
4. **Add the Blu-tac –** Roll two small balls of Blu-Tac and stick one near the tip of each wing. Make sure they are about the same size and in the same spot on both wings.
5. **Time to balance! –** Place the bird's beak on your fingertip and see if it can balance. Try balancing it on other things too.
6. Have fun experimenting with your balancing bird.



Alternatively you can use small washers or coins taped on the wings.
To make a stronger version cut the template out of cardboard.