Classroom activity:
Engineering Precision: The Marble Run Challenge

Introduction: Design activity, where pupils design a marble run that allows a marble to run seamlessly around the plate.

Suitable from 10 years of age and up, or younger with additional help. Takes around 5 to 10 minutes.

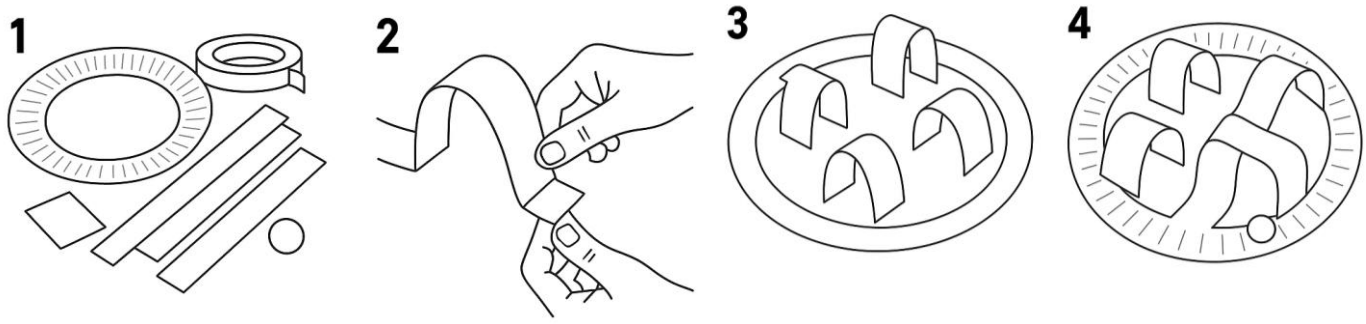
Aim: Pupils design a precision marble run.

Curriculum links: STEM, especially engineering, design and problem solving.

Real world context: Pipework must be aligned to allow substances to flow through.

Equipment you will need:

- Paper plates
- Marbles
- Coloured strips of paper
- Sticky tape
- Start/finish labels already on the plates



Risk assessment:

You will need to carry out your own risk assessment for your setting and your young people, and it's helpful to practise in advance. Think about:

- Age of the pupils
- Paper cuts
- Choke hazard from the marble – only you must have these, do not give them to the children.
- You must place them on the marble run and test their efforts.
- You must collect them up after the challenge. Always know how many you started with and how many you have left.
- Slip hazards if marbles scatter on floor - make sure you keep your area tidy and hazard free.

Engineering process

1) What is the problem that pupils will need to solve in this activity?

Lining up the tunnels in their maze correctly to allow the marble to run around the plate easily, freely.

This represents engineers lining up pipes correctly to allow substances to flow through. In day-to-day terms, it's like how pipes are plumbed together in homes but on a much larger scale. It won't just be water flowing through pipes; it could be gases, chemicals, food and drink as well.

2) How will they investigate?

i. Children will be given a paper plate, strips of coloured paper, sticky tape and a marble.
ii. They create 4 to 6 'tunnels' out of the coloured paper and stick them around the plate.
iii. They need to get the marble to go through all the tunnels. If they have not aligned the tunnels, the marble won't run!

3) What do they need to consider to improve their solutions?

Discussion about lining up the paper tunnels.

Trial and error to improve the flow of the marble.

Example of set up

In the real world:

Chemical and process engineers need to consider safety and sustainability; and precision is the key when they are designing:

- packaging so it doesn't leak
- manufacturing plants so gases or liquids don't leak out of pipes
- transporting of water where pipework must link together over considerable distances and so on

Overleaf is a page that can be shown on a screen or printed as a reminder of the activity.

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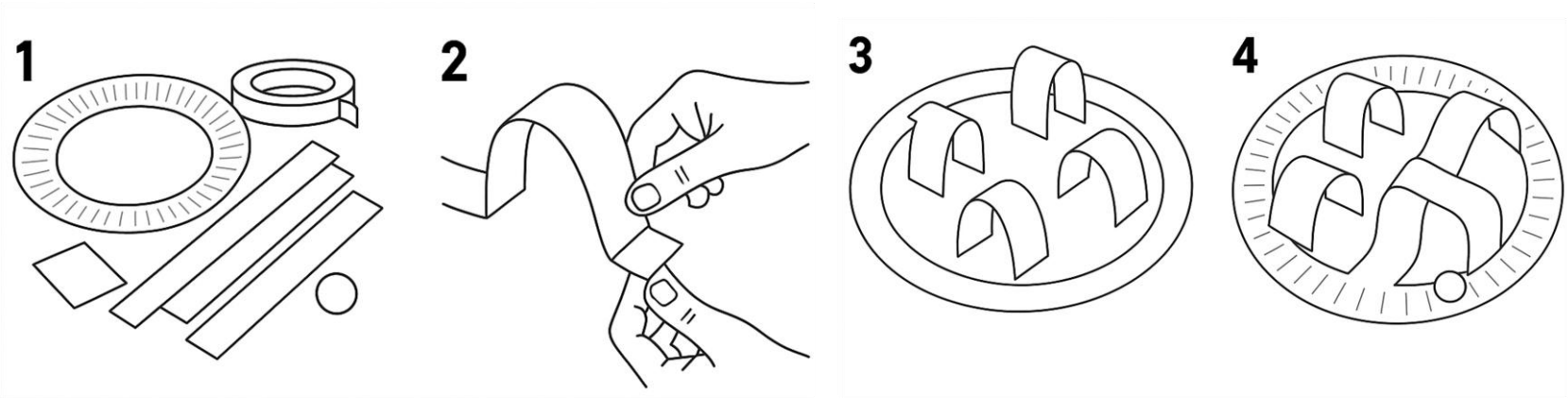

Be creative! Your marble must be able to run freely around the plate

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