

SCIENCE IN MY POCKET

STRUCTURED SCIENCE ACTIVITIES TO SUPPORT
TEACHING ASSISTANTS WORKING WITH CHILDREN
WITH EMOTIONAL AND BEHAVIOURAL NEEDS

Guide for teachers and teaching assistants

SAMPLE UNIT: HOVERCRAFT



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A Primary Science Teaching Trust Resource

INTRODUCTION

From its simple beginning as a magnet in a teaching assistant's pocket, Science In My Pocket has grown into a comprehensive resource. The ideas and materials have been developed to empower and support teaching assistants working on a one to one basis with children with emotional and behavioural difficulties.

'Isaac's Story' on page 6 will undoubtedly resonate with any primary teacher or teaching assistant who has grappled with how best to support a similarly challenged child. Outcomes of the trial of Science In My Pocket show that carefully designed, simple science activities can help children with these difficulties to learn to self-regulate their emotions and behaviour. The activities provide a temporary outlet or distraction for the child, enabling them to return to a whole class setting more ready to learn and participate. The activities also develop social skills as they present a context for the child to communicate positively with their peers.

Science In My Pocket is a welcome addition to a teaching assistant's toolkit. More than just a set of activities, it offers a whole new way of working and increases the confidence of teaching assistants to engage children in scientific discussion. Its principles can be applied to other curriculum areas, particularly maths.

At the Primary Science Teaching Trust we very much hope that science subject leaders, classroom teachers, and most of all teaching assistants, find Science In My Pocket to be an indispensable resource.

The Science In My Pocket resource box includes:

- 10 numbered drawstring cloth pockets, each containing a set of instruction cards. Each pocket is based on a particular theme
- A guidebook for Teachers and Teaching Assistants
- A poster to guide Teachers and Teaching Assistants with choosing a pocket

The instruction cards all include:

- The BIG questions
- A list of equipment and materials that need to be added to the pockets before they are ready to use (NB these are all inexpensive everyday items)
- Supporting background knowledge and notes for the Teaching Assistant/Teacher

To find out more about
Science In My Pocket, or to
buy a copy, please [click here](#).

WHAT IS SCIENCE IN MY POCKET?

Science In My Pocket is a set of 10 structured activities primarily for teaching assistants in primary school to use on a one-to-one basis with individual children who need emotional and behavioural support. Each activity has a set of printed cards which are designed to be kept in a drawstring bag (the pocket) along with the equipment needed.

This sample unit contains:

- **Background information - Isaac's story, rationale, aims, outcomes of the resource trial, and scope of Science In My Pocket**
- **Summary of the 10 pockets and guidance for using them**
- **Sample Pocket 7: Hovercraft - teacher notes**
- printable instruction cards for the pocket

ISAAC'S STORY

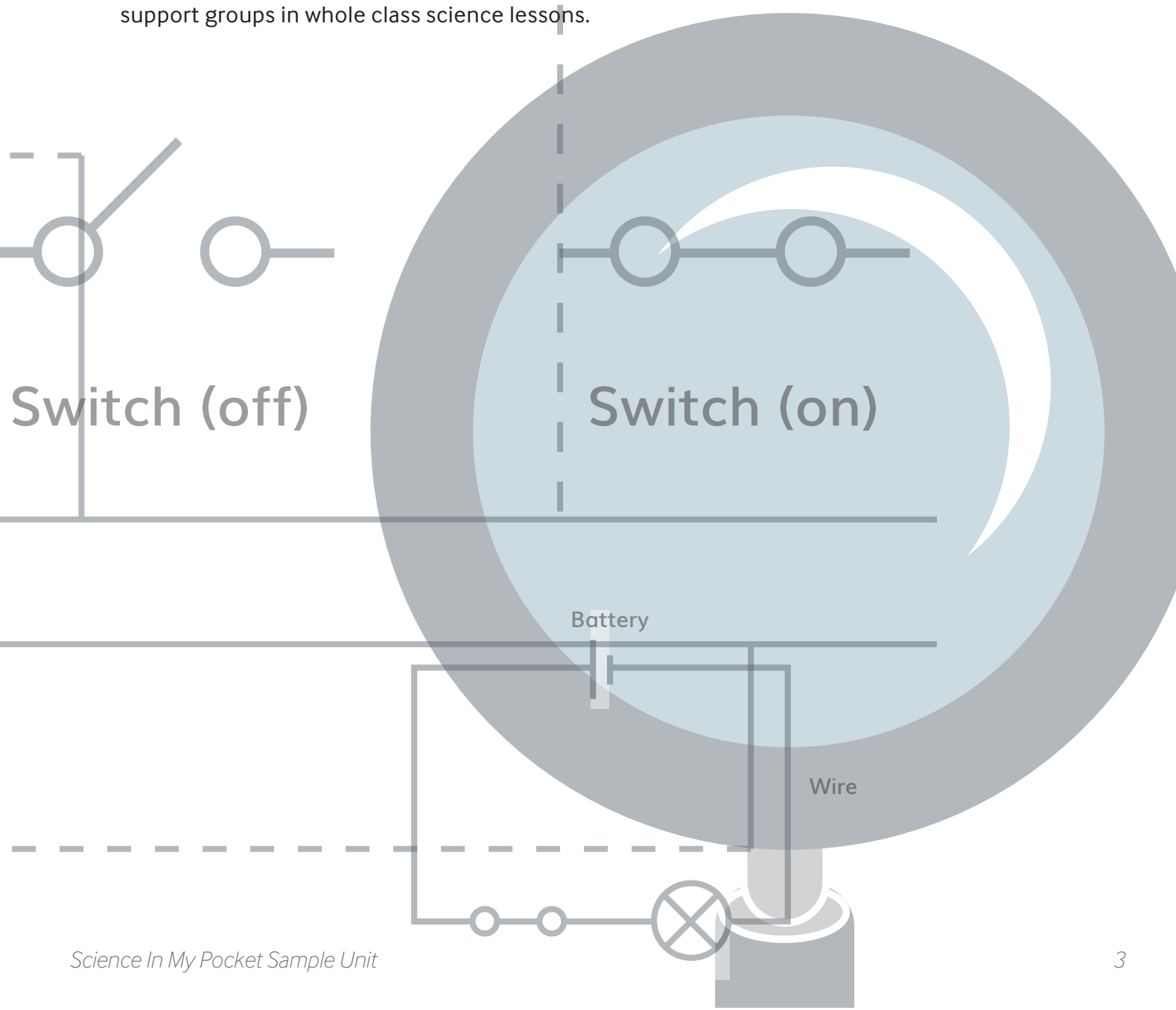
Science in my pocket began with Isaac and a magnet in a teaching assistant's pocket. Isaac was a child whose autism caused severe and persistent behavioural difficulties. He had one-to-one support from a teaching assistant. In most lessons he would end up outside the classroom with the teaching assistant, where he might or might not complete the work set. Over time, Isaac's ability to manage his own behaviour did not change; if anything it got worse, and his academic progress was similarly negative. One day his teacher, recognising that Isaac was entirely disengaged with the task set (and that the process of trying to finish it would have little value, and potentially cement his feelings of failure), decided to try something different. She gave Isaac a magnet from her pocket and said he and his teaching assistant were going on a walk around the school. She asked him how many things he could find that the magnet would 'stick' to. The teaching assistant then observed a remarkable change in Isaac. He took ownership of the activity and posed his own questions and challenges. He independently categorised the different objects that he found into those that were and were not magnetic. He also communicated with the teaching assistant throughout the walk, and at the end of the session he gave feedback to his class about what he had found out. In the next session after break, Isaac wanted to re-join the class where he then completed the activity set. This was the first time the teaching assistant could remember that he had shown he could successfully self-regulate and had chosen to opt back in.

Isaac's teacher was Nina Splisbury. After the success of the magnet experience, Nina gradually put together a bank of science activities that the teaching assistant could use with Isaac to help him re-engage. These early activities created for Isaac, have since been widely trialled and developed into the comprehensive resource that is **Science In My Pocket**.

RATIONALE FOR SCIENCE IN MY POCKET

When children work on a one-to-one basis with a teaching assistant they can sometimes lack engagement and motivation. In an attempt to remain positive, teaching assistants often give undeserved or unqualified praise, or repeatedly cajole the children, which results in the development of a learned helplessness. Science In My Pocket generates independent thinking and gives the children a sense of purpose for what they are doing. Throughout the activities the children are encouraged to take responsibility for making decisions about what to do next.

For teaching assistants, Science In My Pocket is a non-threatening introduction to doing effective practical science with individuals. Training for teaching assistants includes little or no science and they tend to report low confidence with leading scientific activity, even on a one-to-one basis. When presented as a simple activity which provides a shared learning experience with an individual child, they feel more empowered. They recognise that the “What if?” exploratory nature of the activities offers the child multiple opportunities to discover for themselves, and that it is not about the right answers, or having to know lots of science. Longer term benefits include greater skill and confidence of teaching assistants to support groups in whole class science lessons.



SCIENCE IN MY POCKET – THE AIMS

FOR THE CHILD

- to develop the personal skills and habits of mind to enable them to be self-regulating and motivated learners
- to use engagement with science to help deal with their own emotional and/or behavioural difficulties
- to explore science concepts through small focused practical activities with one to one support
- to develop skills of working scientifically through their explorations

FOR TEACHING ASSISTANTS

- to develop new strategies to work on a one-to-one basis with children in their care whose emotional/behavioural difficulties prevent them from accessing the curriculum in the classroom
- to develop confidence to support the development of the skills of working scientifically through open-ended exploration
- to develop confidence to facilitate children's activity and discussion in science lessons
- to offer professional support to other teaching assistants and teachers

FOR SCIENCE SUBJECT LEADERS

- to build capacity for teaching assistants to become facilitators of science with individual children and with small groups

FOR THE SENCO

- to provide clear guidance on how to support teaching assistants with working with children with EBD in science
- to offer strategies to support children with EBD in the immediate, short and longer term

OUTCOMES OF THE RESOURCE TRIAL

EFFECT OF SCIENCE IN MY POCKET ON THE CHILDREN

Each time the teaching assistants trialled a Science In My Pocket activity, they used a simple 1-5 number scale to assess the child's levels of well-being and involvement. They recorded these levels at the start and end of each activity, and then again at the start of the next school session. Table 1 shows the changes in levels of well-being and involvement from the start of the activity to the start of the next school session. These data suggest that the Science In My Pocket activities have a very beneficial effect on self-regulation of emotions and behaviour, and also on motivation and engagement with learning.

table 1

% change	well-being	involvement
improved	73	80
no change	17	10
worse	10	10

data taken from 12 case study children across a total of 48 activities

WHAT THE TEACHING ASSISTANTS SAID ABOUT SCIENCE IN MY POCKET

"I really noticed just how much his involvement in the task has impacted his well-being."

"He is happier to come in in the mornings and is working better overall."

"The child I worked with – it made her feel special as she got to show her classmates what she had done."

"I've noticed that when my child runs from the classroom, I feel so much more confident to deal with it as I have distraction to re-engage her."

"I have more confidence to do science with children."

"This has made me think more about what happens to the children when they are removed from the class."

"The whole TA team are looking forward to using this resource."

Teaching assistants also reported that they tended to use the activities as a distraction in the first instance. They recognised that there was a possibility of the activities being so well received that they would end up being seen by the child as a reward for bad behaviour. They mitigated against this by using the activities as a negotiating tool as well as a distraction, e.g. "Finish your writing and then we will go and get a science pocket." The promise of sharing the activity with a group or the whole class was also a motivating factor for the children, and may also explain why the activity was viewed as so successful in helping the children start their next session more positively.

WHAT THE CHILDREN SAID ABOUT SCIENCE IN MY POCKET

"I like everything about it! My favourite was how much the small spinner rotated."

"I liked trying to hit the target."

"It was fun going round the school and going to different places."

"I loved checking whether things were magnetic."

"I learned what switches do and what some circuit symbols are."

"We have started collecting feathers now so we can share what we find every day."

"It was so nice as I got to show other children what I did and they all liked it."

ACKNOWLEDGEMENTS

Grateful thanks go to Alex Farrer (Achieving for Children) and to the teaching assistants, science subject leaders and children from the following schools who took part in the 2017 trial: Hampton Hill Juniors, Holy Trinity Primary, Kingston Community Primary, Malden Parochial, Marshgate Primary, Meadlands Primary, Sacred Heart Primary, Sheen Mount Primary, The Queen's Primary and Trafalgar Infants. Thanks also go to Kate Leeks and Gillian Nottingham at Malcom Sargent School who helped develop the original activities.

THE SCOPE OF SCIENCE IN MY POCKET

Science In My Pocket is a highly versatile resource. The activities in the pockets can be used with children from nursery up to year 6. They can be used once or repeated multiple times. They can be used indoors and outdoors, and most involve moving around which suits the needs of many children with EBD.

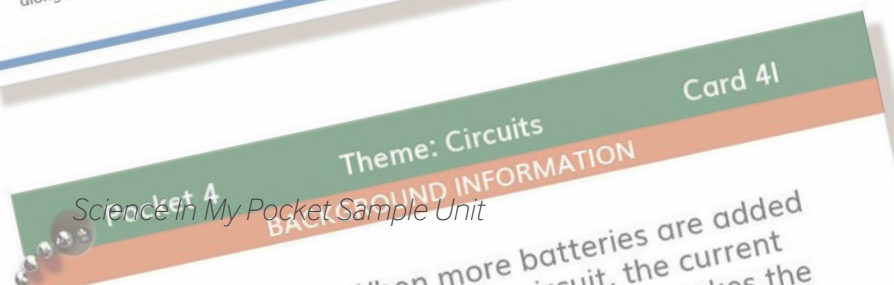
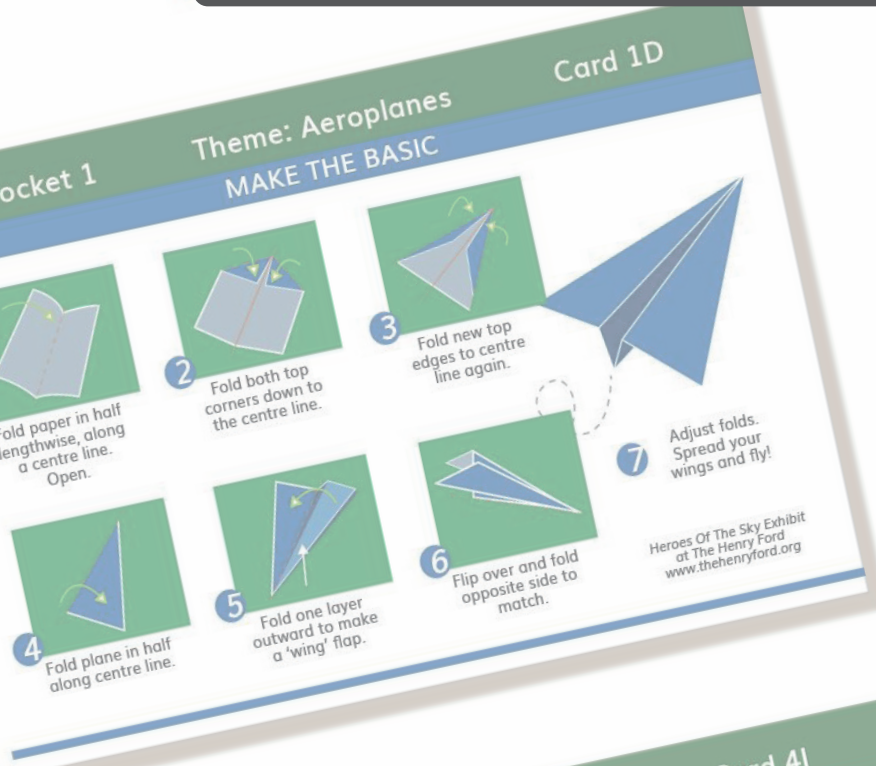
Science In My Pocket activities have also been shown to be effective in other situations:

- Speech and language development
- EAL – accessing scientific vocabulary in a safe environment
- Short term emotional disturbance, e.g. if a child arrives at school upset
- Extension work, e.g. children might design their own pockets
- Homework activity
- Development of specific personal habits of mind, e.g. independence, negotiation, resilience
- Developing thinking skills across the curriculum
- Support for effective group work

SUMMARY OF THE 10 POCKETS AND GUIDANCE FOR USING THEM

The pocket you choose will be based on the child's interest and what you have done before. Your choice will also depend on how long you have and whether you prefer to go outside or stay inside. The table below gives you a quick guide to how long you need and where best to go. Times given are the minimum time needed to do one of the activities from the pocket, i.e. they are not times for doing the whole pocket. A copy of this table is included in the pack as an A3 poster which can be displayed in the area where the pockets are stored.

No	POCKET	Minimum time needed (minutes)	INSIDE OR OUTSIDE
1	Aeroplanes	10	Inside better. Good to try outside but will be hard if it is windy
2	Colours in nature	15	Outside
3	Paper spinners	15	Inside better. Good to try outside but will be hard if it is windy
4	Circuits	20	Either
5	Magnets	5	Either
6	Sound	20	Either
7	Hovercraft	20	Either. NB there needs to be a flat surface to work on
8	Penny drop	15	Either
9	Life outside	15	Outside
10	Balloon rockets	20	Inside



9 Them
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SAMPLE POCKET 7: HOVERCRAFT

INTRODUCTION

In this activity, the child makes a simulation of a hovercraft. This is a brilliant way to introduce forces to a child and to get them to think about air power and friction.

THE BIG QUESTIONS AND MORE BIG QUESTIONS

How does a hovercraft work?

Can you use air to make a CD move like a hovercraft?

Does the surface you put the hovercraft on affect the speed at which it glides?

Can you make it speed up or slow down?

SUMMARY OF ACTIVITY

As a starter activity, blow up a balloon, let it go and talk about what happens. If the child does not know what a hovercraft looks like, find a picture to show them.

Help the child to construct a simulation of a hovercraft using the CD, balloon, water BluTac® and bottle top (the hinged bottle tops are best because they can be pushed down to hold the air in the balloon and pulled up once the hovercraft is ready to be tested).

- Roll the BluTac® into a sausage shape and press it down onto the CD round the centre hole in a circle.
- Push the bottle top down onto the CD so that it sticks to the CD with no gaps for the air to escape.
- Blow up the balloon until it is almost full then stretch it over the bottle top with the lid shut. If you are using a non-hinged bottle top, twist the bottom of the balloon round several times while you stretch it over the bottle top – this it make sure that the air doesn't all come out while you do it.
- Undo the bottle top (or untwist the balloon) and you're off. Try pushing your hovercraft gently and watch how far it glides!

FURTHER QUESTIONS TO ASK THE CHILD

Why do you think your hovercraft hovers?

Why do you think it moves around?

What forces are making it hover?

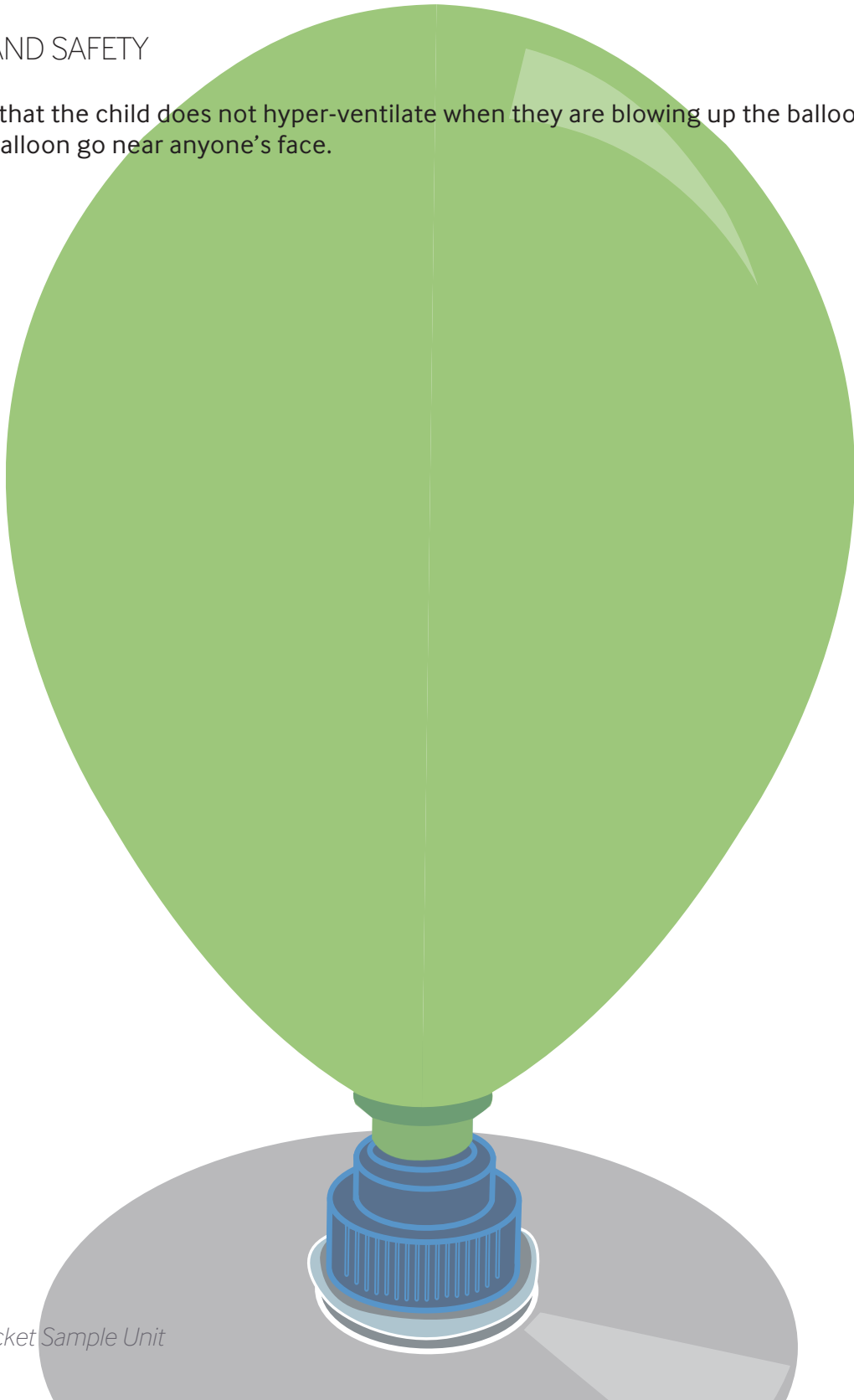
What force is making it move around?

Can you make it hover above the table but not move about?

Why is this so difficult to do?

HEALTH AND SAFETY

Make sure that the child does not hyper-ventilate when they are blowing up the balloon, or let the balloon go near anyone's face.





BIG Questions

How do hovercrafts work?

Can you use air to make a CD move like a hovercraft?

WHAT YOU WILL NEED

Hovercraft

Balloon

CD

Water bottle top from a sports bottle, ie one with a hinged lid that can be opened and closed

Blutack

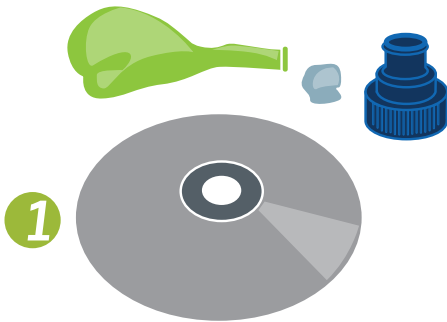
BACKGROUND INFORMATION

Hovercrafts are known as **amphibious vehicles** which means they can travel over land and water. The hovercraft engine moves it forward but it is also used to power fans. The **fans blow air downwards** underneath the hovercraft to cause it to lift off the ground.

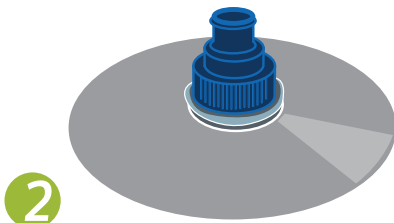
A fabric skirt around the base of the hovercraft stops the air escaping. This creates an **air cushion** between the ground and the hovercraft. When it moves forward, it is now **moving across air**, rather than over the ground or through the water. This dramatically **reduces friction** and means the vehicle is much more fuel efficient and can go much faster.

The action of a hovercraft can be mimicked using a CD, a bottle top, a balloon and some blutack (see instructions on card 7D). The air coming out of the balloon blows downwards under the CD which causes it to lift off the table. Unlike the hovercraft, in this model there is nothing creating a forward motion. The CD moves around because the angle of the air coming out of the balloon slightly varies and also the CD does not stay level. If it was perfectly vertical and the CD was level, it would just hover on the spot.

CD HOVERCRAFT

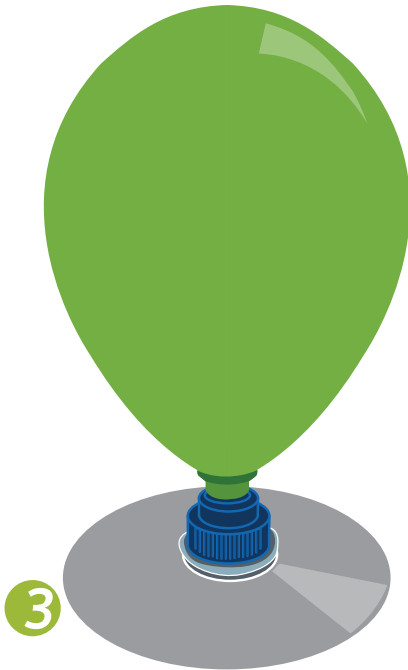


Roll the bluetac into a sausage shape and press it down onto the CD round the centre hole in a circle.



Push the bottle top down onto the CD so that it sticks to the CD with no gaps for the air to escape.

CD HOVERCRAFT



Blow up the balloon until it is almost full then twist the bottom round several times (so the air doesn't all come out while you're attaching it to your hovercraft base!)

Stretch the balloon over the bottle top, untwist the balloon and you're off. Try pushing your hovercraft gently and watch how far it glides!

MORE BIG Questions

Does the surface you put the hovercraft on affect the speed at which it glides?

Can you make it speed up or slow down?

See the Guidebook
for other ideas for
how to feedback after
this activity

