CHRISTMAS EXPERIMENTS
Science on Stage Europe

CHRISTMAS is coming!!

A selection of experiments which can encourage discussion and be used as a basis for a “what happens next ?” quiz

from David Featonby and Urszula Rybałtowska

CHRISTMAS EXPERIMENTS



This is a series of simple science experiments which endeavour to illustrate several principles which are found in school syllabuses, using items that will be found in many homes over the Christmas period.

The experiments can be useful from the early years to most senior classes and we would encourage teachers to consider how best to present them in order to engage their pupils. They can be offered as a one off at the end of a lesson , or taken together as an end of term quiz, or even after school at home

Students may also enjoy demonstrating them a end of term parents evenings or in their homes over the Christmas period

David and Urszula

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7. **Water Beads and Christmas Message** (Refraction)

8. **Slinky Drop** (Balanced and unbalanced forces)

1. CHRISTMAS BASKET

How many times must the string/rope be wrapped around the wooden rod in order to lift the basket?

The only force lifting the basket is due to the friction between the rod and the string

It provides a great opportunity for a discussion on forces



1. CHRISTMAS BASKET

Answer: usually about 5 turns are sufficient ☺

The friction at the rod adds to the tension with each turn.

Extension:

Use **Christmas puddings** or similar instead of basket

What happens if instead of one pudding you use two puddings?

…will the number of turns be different ? How different ?

Or try using a large Christmas model/doll , (e.g. Santa Claus, etc.)



2. CHRISTMAS BOX

A box can be balanced on the edge of a table with almost half over the edge before it tips.

What happens if a helium filled balloon is attached to one edge and the box balanced again with just a small part of the other end of the box on the table?

What happens if the helium support string is cut ?

Hint : What's in the box ?

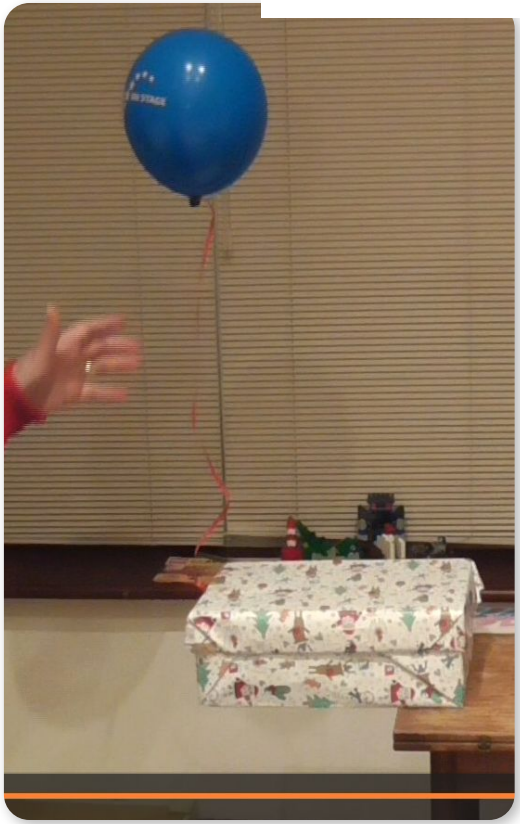


2. CHRISTMAS BOX

Answer: The box stays balanced !

Can you explain ?

(The experiment can be performed without the helium! What is inside the box? 2 tins of soup, or cans of drink which can be slid up and down inside the box, without being noticed, starting at the middle and then slid to the end which is to stay on the table).



…LOOK INSIDE THE BOX…

Two cans can be easily slid from the centre of the box

to the edge so the centre of mass is above the table.



3. TWO BALLOONS PART 1

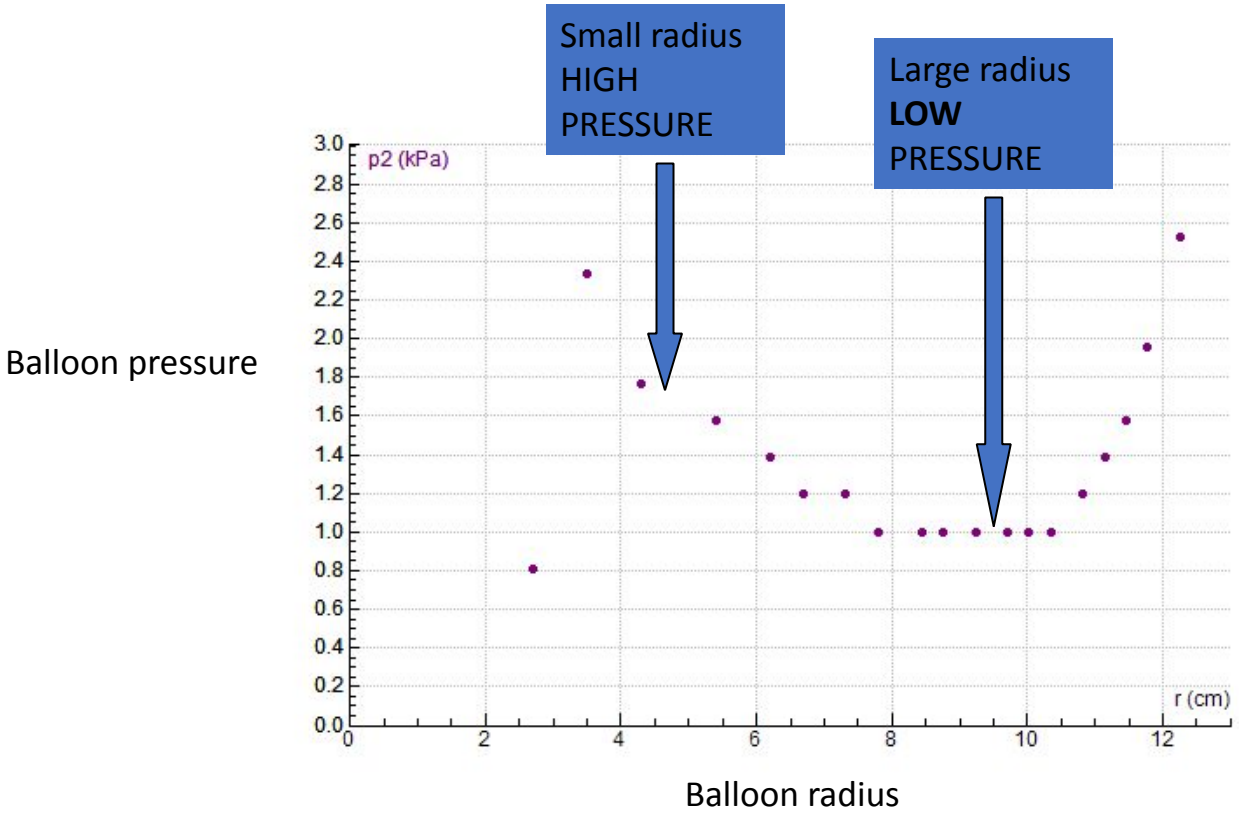
Two similar (Christmas) balloons are connected by a tube which can be sealed .
(Easiest tube is a garden hose connector with tap but you could just use a plain tube with clips at each end).

Blow one balloon to a moderate size and the other just start its expansion.



What happens when the tap between is opened?

Variation of Balloon pressure with radius of Balloon



With thanks to Zuzanah Jeskova (Slovakian Science on Stage)

TWO BALLOONS

When the tap is opened the smaller of the two balloons inflates the larger.

Children know this from their experience blowing up balloons…you have to blow hardest to get the balloon started.

The reason is that the pressure in a balloon is greatest as inflation begins . (molecular structure first unravels) The actual pressurfes are shown in the previous slide

TWO BALLOONS Part 2

Two identical christmas balloons (just different colours) are to be

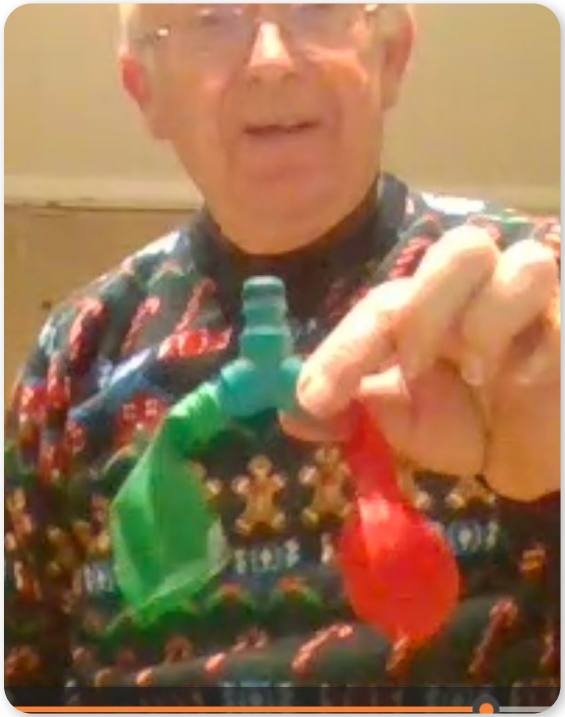
blown up with the help of a garden hose “Y” piece.

Can you blow up the two balloons together?

Answer: The pressure reduces inside a balloon once

the skin starts stretching. So the first balloon to start will

Continue leaving the other balloon as it was.



4. CLEAR BALLOONS AND POLYSTYRENE BEADS

Christmas decorations with science…

Part fill a clear balloon with small polystyrene beads...

and blow it up as shown.

What happens to the beads inside?



CLEAR BALLOONS AND POLYSTYRENE BEADS

The polystyrene beads are damp and therefore do not hold their charge, hence they fall together in the balloon.



CLEAR BALLOONS AND POLYSTYRENE BEADS

As the balloon is blow with the DRY air from the pump the inside of balloon becomes charged, charging the beads oppositely. The beads are therefore repelled from each other (same charge) but attracted to the sides of the balloon. Hence the attractive snowy pattern…a scientific Christmas Decoration.



Extra: Try bringing a second charged balloon (by rubbing) close to the balloon and note the effect of the polystyrene beads

5 INERTIA

Change an experiment into Christmas fun using Christmas decorations etc. in place of neutral items.

Here the challenge is to knock away the upturned placemat and drop the items on top into the beakers.

Christmas features on right!...you can really use anything that reminds children of Christmas ! e,g snowman





INERTIA

A sharp tap to the side is all you need.
The underside of the mat is smooth, the upper surface (in this case) is slightly rougher and will move the tubes.
The tubes are light and move easily out of the way of the objects on the top which fall into the beakers. (Newton's Laws!!!)

You can also use a beer mat on top of a small glass, with a cut off straw on top of that with a coin balancing on the very top!



INERTIA

Beer mat straw and coin

This one is one for the pub or Christmas party . You need to cut a straw and balance it on the uncut (flat) end with a coin on the other end .The mat can be flicked out horizontally with a finger and the coin will drop satisfyingly into the glass below.

- What else could you balance on the straw ? Christmas nuts ?



INERTIA

A sharp tap to the side is all you need.
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CHRISTMAS PUDDING CATCH

The 500g Christmas pudding is connected by a string to a small olive wood tree Christmas decoration depicting the nativity. ...The decoration weighs only a few grammes.



Can the small wooden decoration support the much heavier pudding?

(What is most important at Christmas ?)

CHRISTMAS PUDDING CATCH

The string is passed loosely over the handle of a wooden spoon …as shown. The decoration will be dropped and the pudding falls.

Can it stop the pudding reaching the floor?

See: https://www.facebook.com/reel/3082207688715770



CHRISTMAS PUDDING VS NATIVITY DECORATION

Answer: Yes ☺

Here we see it.

The string has wrapped around the spoon several times …due to its changing position getting closer and closer to the spoon (smaller radius as string as pudding falls)... 5 turns around the spoon handle is usually enough with a plain spoon.



WATER BEADS WITH A CHRISTMAS MESSAGE

Clear water beads (from a flower shop) and sprinkled over a Christmas Message. The round beads distort the light from the message below.

What will happen when you pour water over the beads?

Clue .....water and the beads have the same refractive index.



WATER BEADS WITH A CHRISTMAS MESSAGE

The water has the same refractive index as the beads, so there is no change as light passes between the water and beads.

The card/message below the beads is now clearly seen.



Happy Christmas to Everyone !!

EXTRA

SLINKY SPRING

A long slinky is held vertically until stationary. Links of the spring are marked including the lowest which has a Christmas passenger!

What happens when the model on the end when the spring is dropped?

Watch the `slo mo` video below.

Check out the rest of the spring and when each link starts moving.

https://www.facebook.com/100002332386345/videos/pcb.1100389297104042/3978478342239873



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