



The Brixton Learning Collaborative and the Windmill Cluster of schools together with Fotosynthesis and Creative Sparkworks delivered a series of creative workshops to 240 year 4 children in Lambeth. The workshops were designed to help increase children's understanding of mathematical concepts, particularly shape and measurement, through photography and art.

This is what they did

Pinhole Cameras



- Made a pinhole camera involving precise ruler measurements!
- Calculated the exposure time and distance from the subject.
- Took photographs with the cameras we had made!
- Developed our photos in the darkroom.

Treasure Hunts!



- We took digital cameras on treasure hunts around school to find angles, shapes, and objects of different weights and lengths.



Polyhedrons:

- We made 3 D shapes called polyhedrons from flat card and paper, using our measuring and ruler skills.

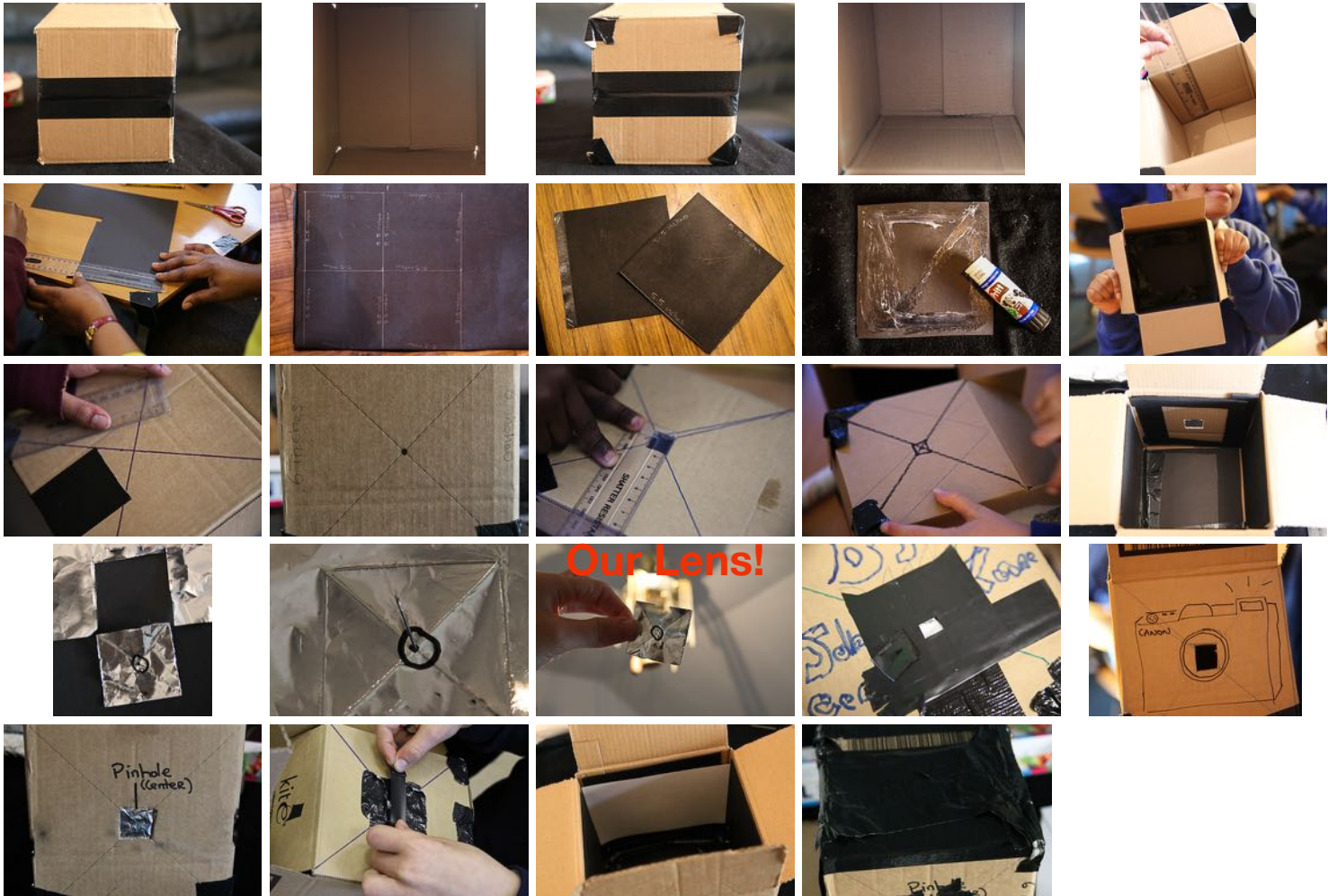
How to make a pinhole camera



EQUIPMENT NEEDED

- A can /box
- Foil/piece of can
- 1 sheet black card or black paint
- Black Tape (masking & electrical)
- Straight pin/needle
- Marker & Pencil
- Masking Tape
- Ruler
- Utility knife, or box cutter
- Photographic paper or a negative

All the steps to follow!



Now the camera is ready!

Measuring the distance



DO YOU KNOW HOW TO ESTIMATE 1 METRE?

If you open your arms, they will measure 1 metre approximately if you are an average height.

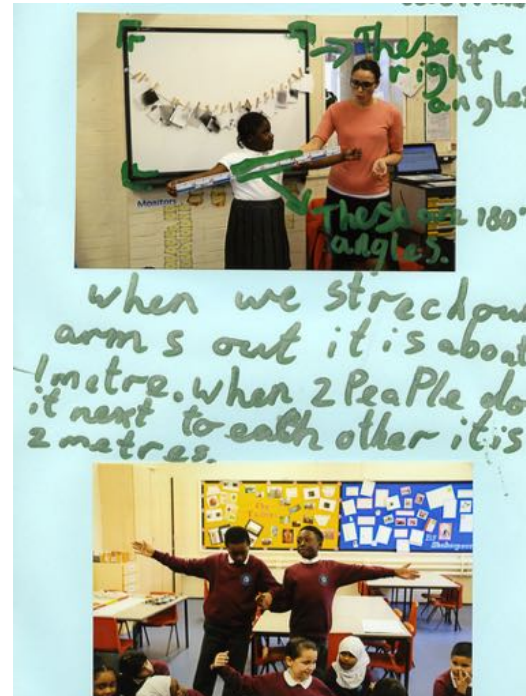
If 2 people open their arms next to each other, they will measure roughly 2 metres.

Distance (depending on the size of the pinhole, you have to try before):

To get a full body photo you need to stand 2 metres away from your subject.

To get a half body you need to stand about 1 metre away from your subject

To take a landscape you need to stand 2 or 3 metres away



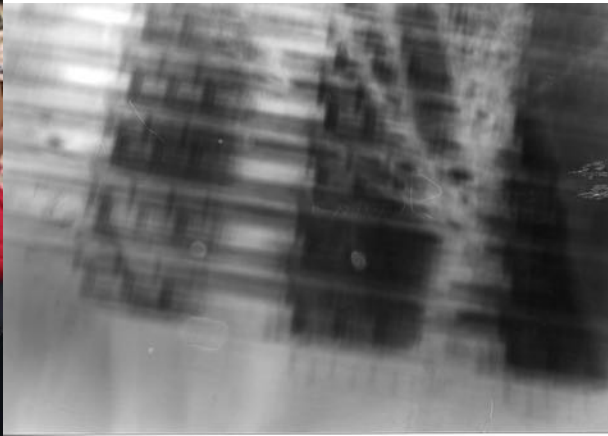
How not to do it!



The picture isn't clear because we have to hold the camera perfectly still for a long time and that's too difficult against our body



When we held the cameras against our bodies our pictures looked all blurry and not sharp





**The best way to keep
the camera still**



We were able to keep our
camera perfectly still and the
models (subjects) were also really
still so the picture came out well!



Exposure time:

The length of time we let light into our pinhole camera box



Sunny Day: 45s

Shadow: 1.30mins or 90s

Grey day: 3mins or 180s

Rainy day: 4mins or 240s

These timings are only approximates, exposure times can vary depending on the size of the pinhole in your camera.

The smaller the hole, the longer the exposure time as it needs more time for the light to get into the box and expose the paper.

*"Not being jealous.
Patience.
Self-control."*

Things we learnt when our pictures didn't come out right



"When we faced the sun our pictures were exposed to too much light"



This picture was exposed to too much light so the image is completely black. Next time we should leave the lens cap open for less time and/or face away from the sun.

It could also mean that the camera was leaking.



"I did not exposed the paper for long enough. I needed more light."



This picture was not exposed to enough light so the image is completely white. Next time we should leave the lens cap open for more time and/or stand in a sunnier spot.

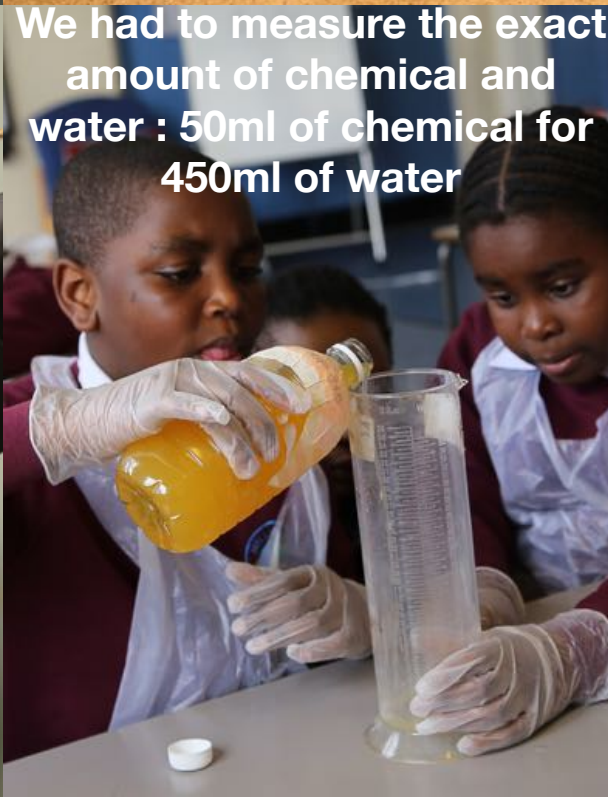
These pictures were developed in 3 different chemicals.



Pictures appearing!



We had to measure the exact amount of chemical and water : 50ml of chemical for 450ml of water



We had to wear gloves and aprons.

Developing our picture “in the darkroom” or the “ spaceship”



“Some of them have developed well without too much or not enough light.”

"Maths is easy,
Photography
is hard."

"I needed
to focus."

"If you get
something
wrong you
might get it."

" Scary"
but I
would do
it again!"

"Magic"

“Stand still for 240 seconds.”

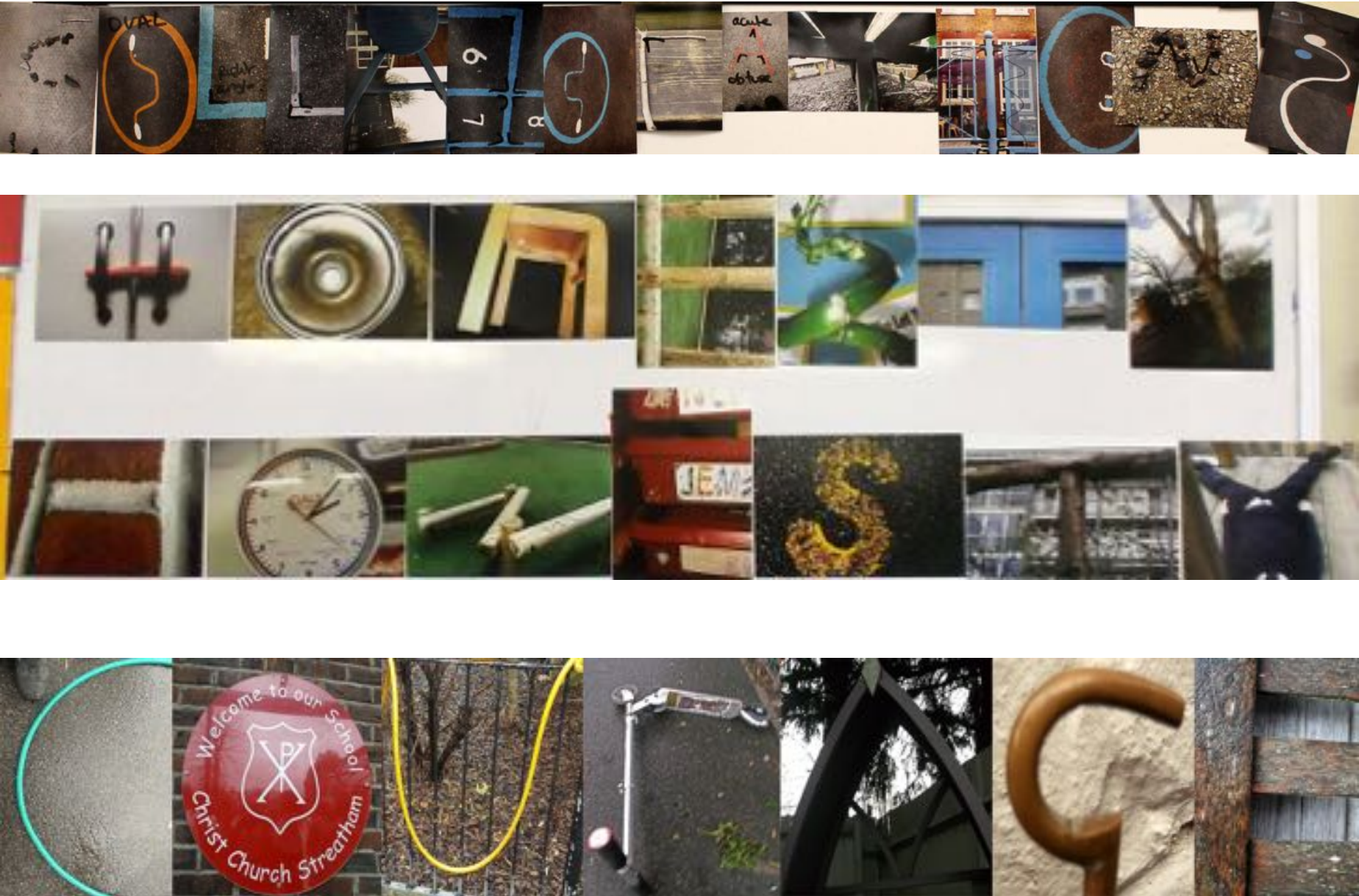


Negative image



Positive image. Both images are inverted and symmetrical

We started to see shapes, angles and symmetry in things around us



**We were able to make words with the shapes that we found -
can you spot what we have written?**



“Anything around us are shapes”

“I learnt how easy it is to find letters and shapes outside”

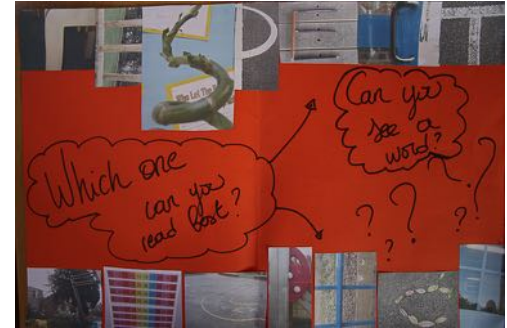


*“I learnt that something you see shapes that might not look like a letter A.
C can look like a square .”*

Getting ready to take good photos for the treasure hunt



"I learnt that a photo have to be in focus and the right degree of angle to be perfect"



"When you compose a picture, get close to your subject and respect the lines."

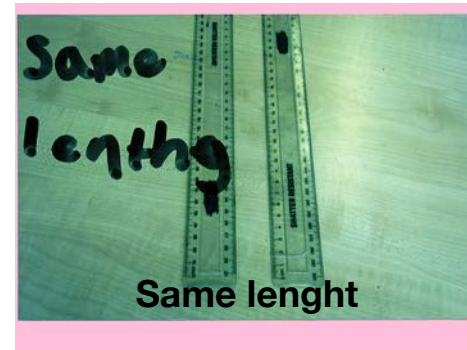


"Work together with my partners."





Measuring



This is **3 metres** away from me

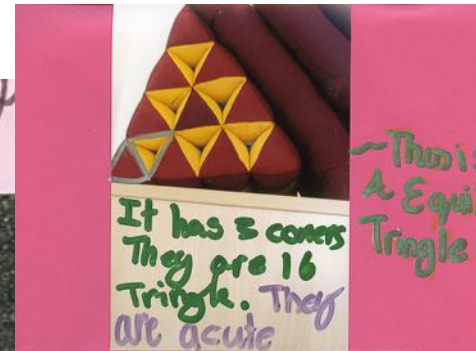
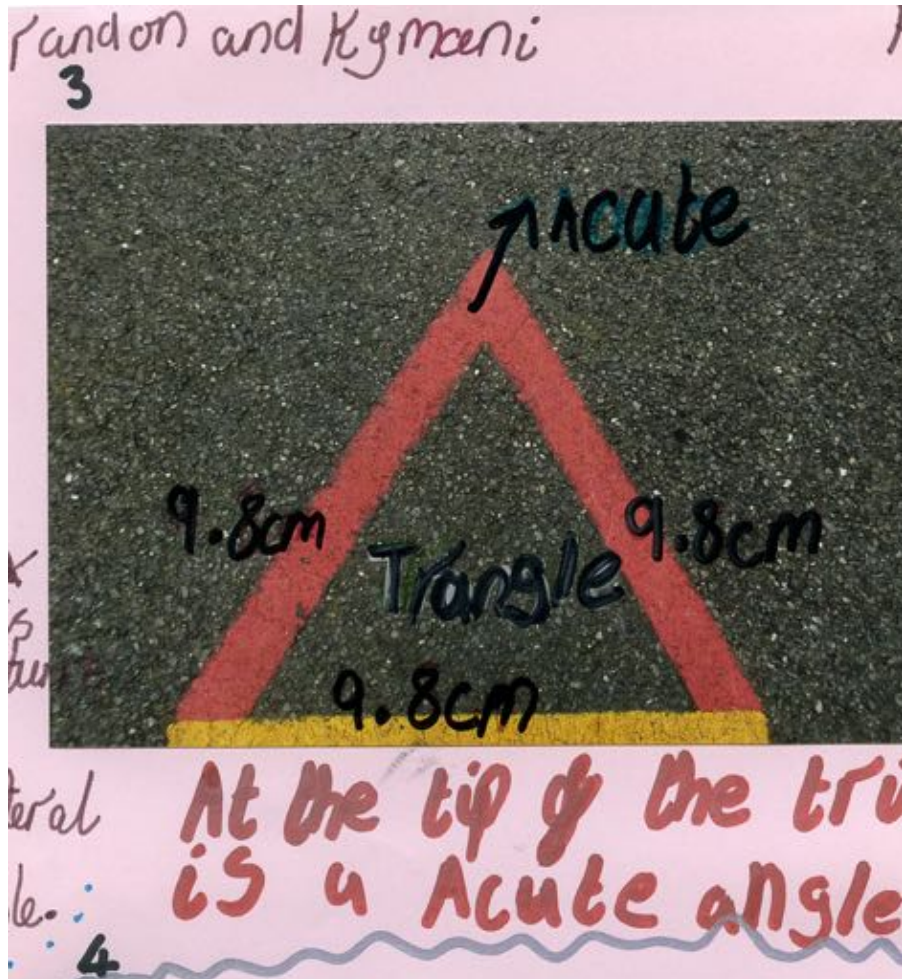
Our Maths Treasure Hunt



"I learnt that me and Lola arms are the same length!"



An **Acute Angle**: an angle smaller than 90°



An **Obtuse Angle** is more than 90° but less than 180°

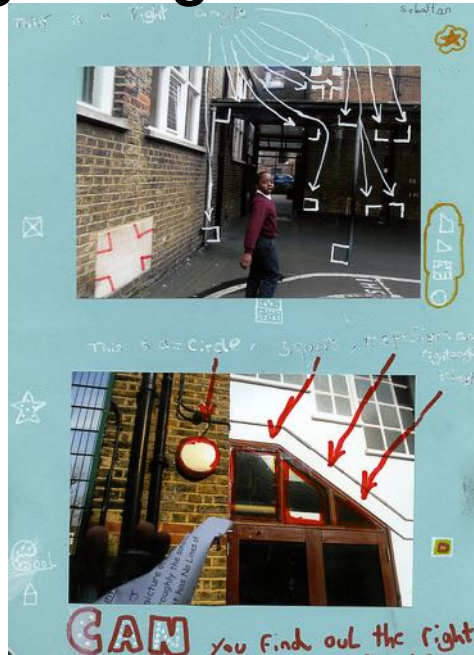


"I know that a 45 degrees angle is half of a 90 degree angle and I learnt what a degree is."

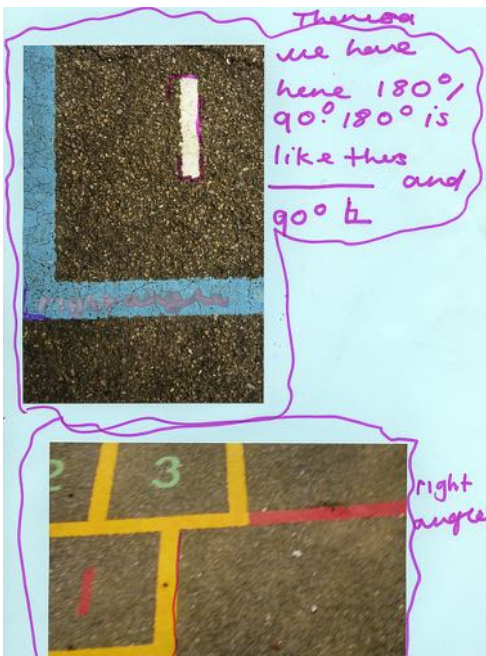
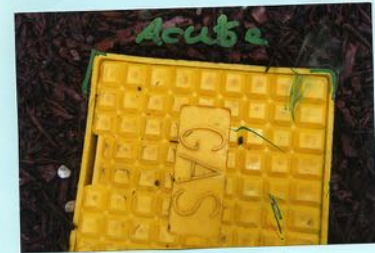
Right Angle: 90° angle



What can you see?



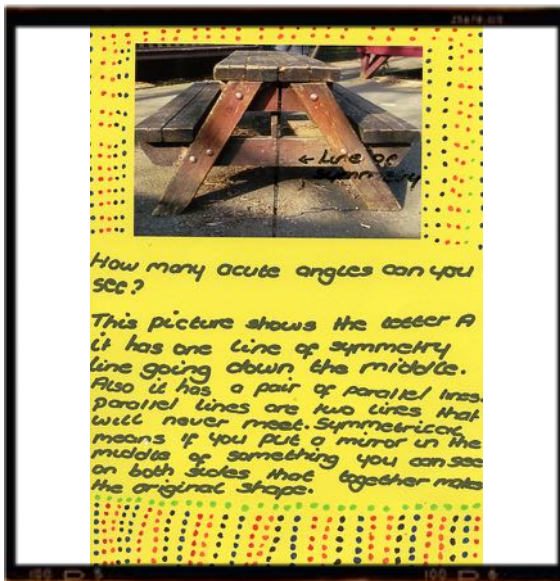
this picture is a acute but look like a right angle.



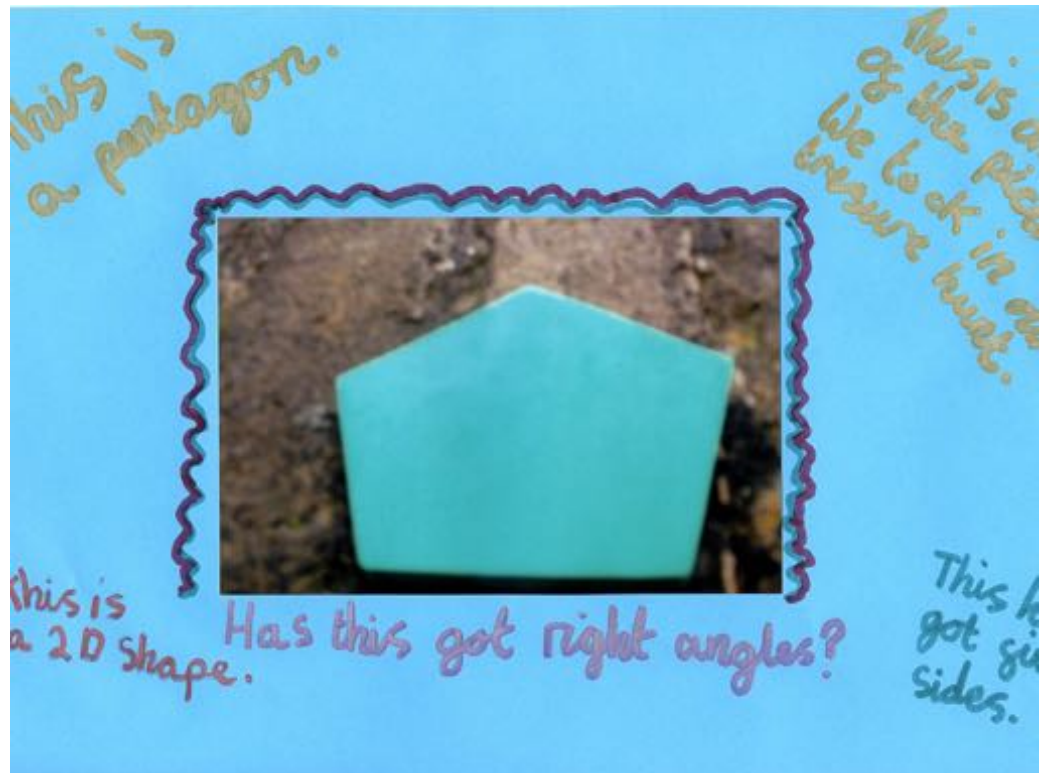
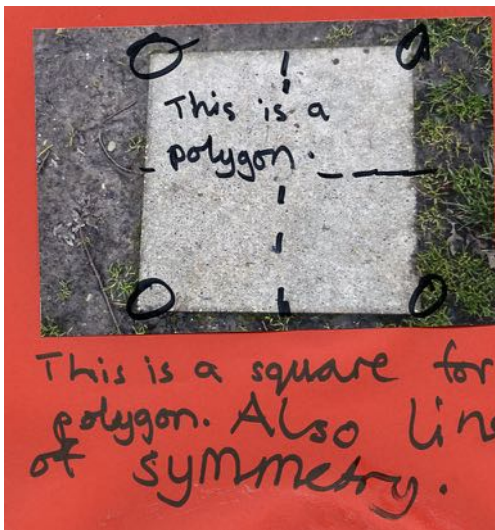
Squares & rectangles
always have 4 right
angles



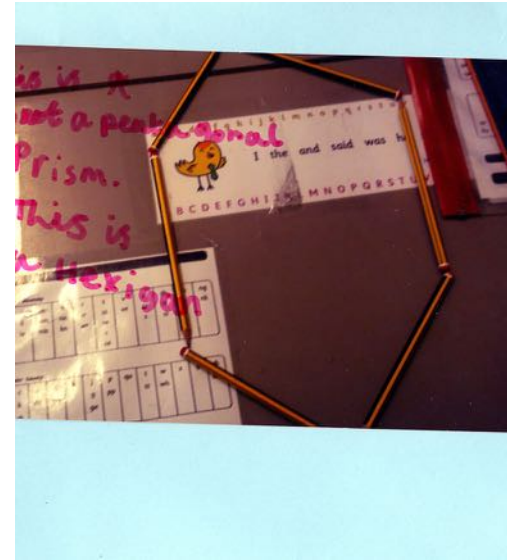
What type of angles can you see?



Polygons are 2-dimensional shapes



They are made of straight lines, and the shape is "closed" (all the lines connect up).

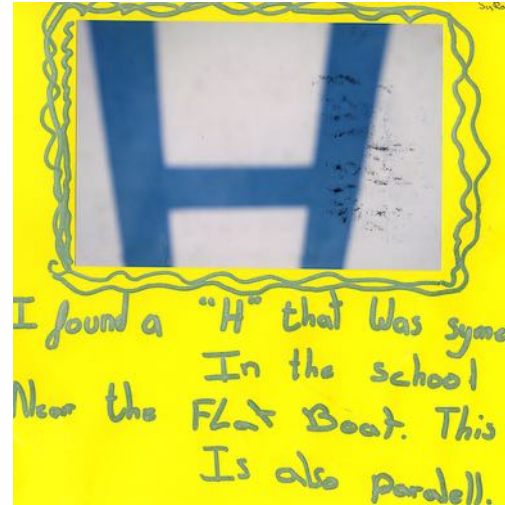


" I have learnt what cuboid, straight, right angle and prism mean"

Parallel lines



a letter
but i look i



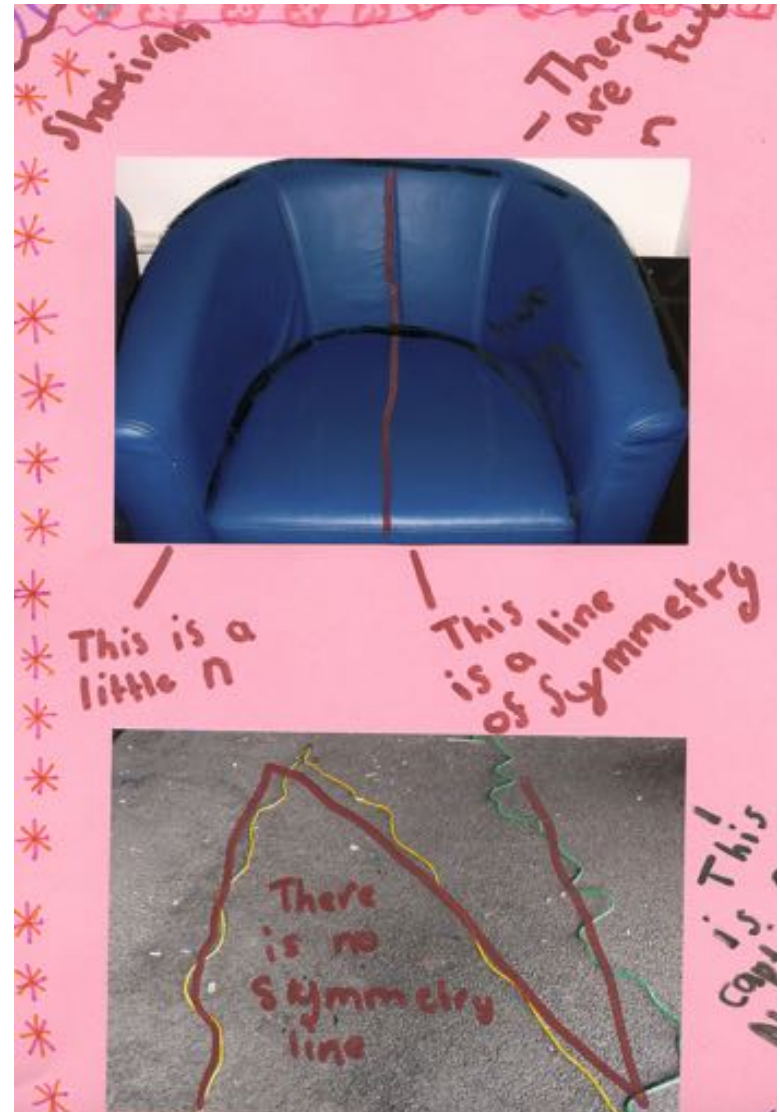
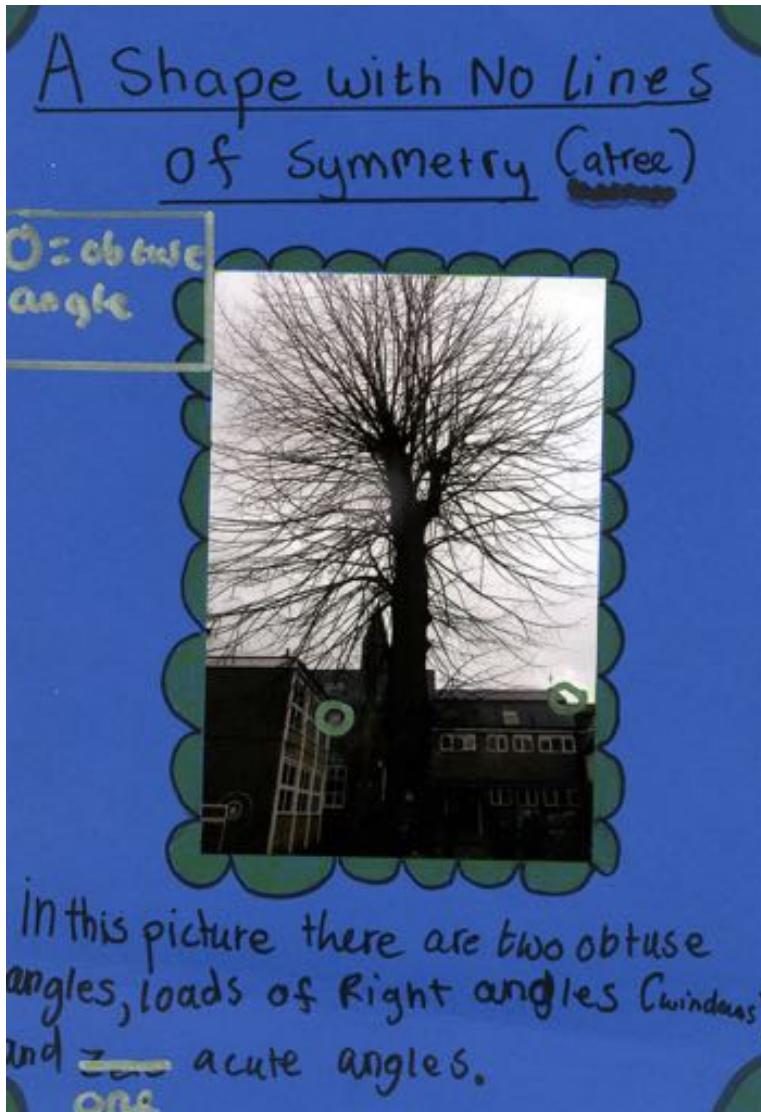
I found a "H" that was syme
In the school
Near the Flat Boat. This
Is also parallel.



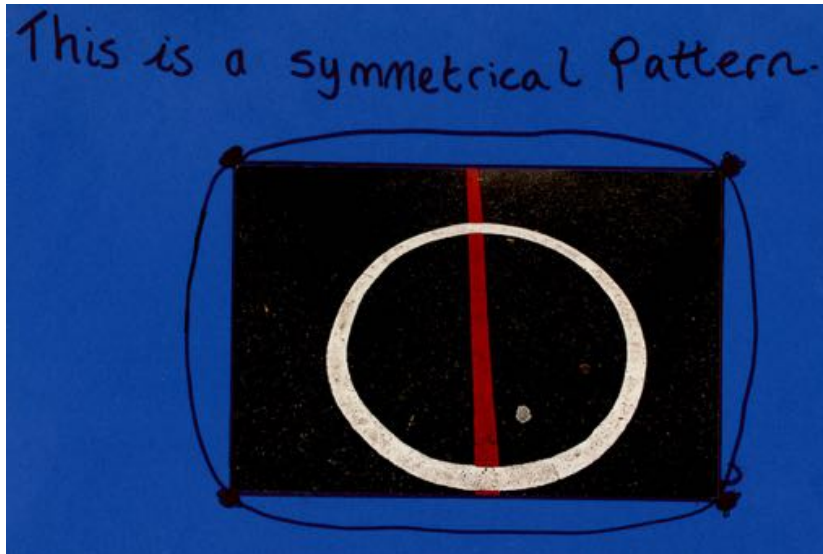
Parallel lines are always the same distance apart and never meet.



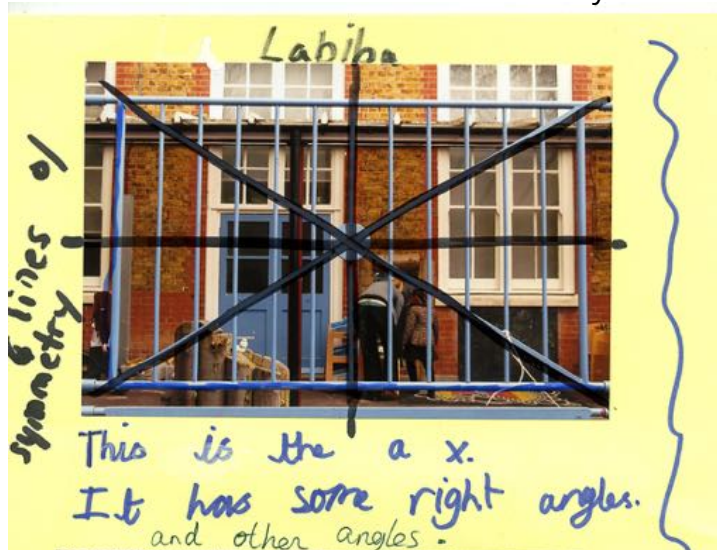
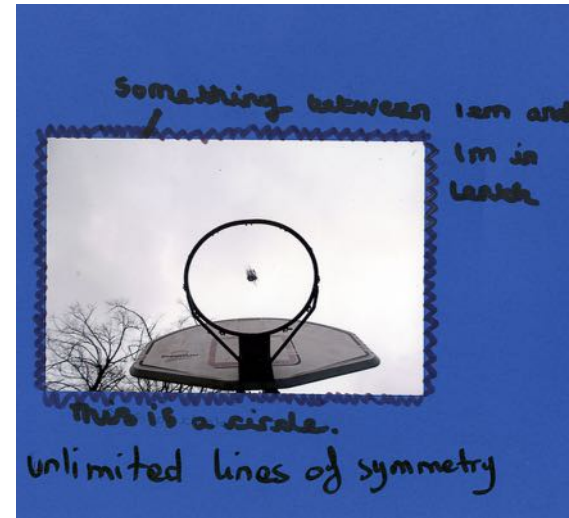
Shapes with NO lines of Symmetry



Shapes with Lines of Symmetry



Circles have **infinite** lines of symmetry.



Rectangles have **2** lines of symmetry,
not 4



Squares have **4** lines of symmetry.

Weight



We had to guess the weight of something heavier than 2kg.

We think that these objects are heavier than 2kgs.

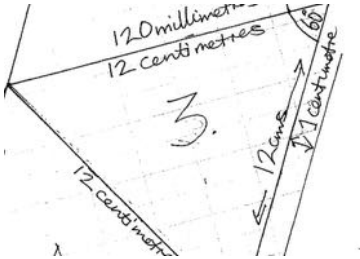


Which is a better estimate for the weight of a pen? 8 grams or 8 kilograms?

Find an object that is the same weight.



Polyhedrons: A solid / 3D shape with flat faces/sides



Measure each side at 12 centimetres long and the flaps at 1 centimetre height.

Look for Equal sides of the triangles polyhedrons



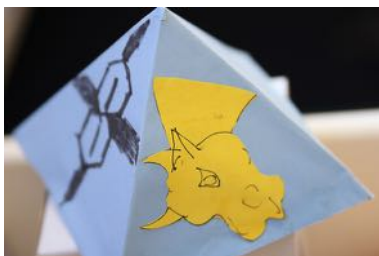
Cut out your polyhedron taking care to cut along the lines and angles you just measured.

Lay it onto your special coloured construction paper.



Fold your scored lines over using your thumb and forefinger to smooth down.

Roll out glue stick onto the flaps and press the edges together and hold in place



We have made a Tetrahedron!

The angles inside these triangles are right angles, obtuse angles and acute angles.



Treasure Hunt 1

1. Take a picture of something big looking small
2. Take a picture something small looking big
3. A triangular based pyramid
4. A polygon
5. Something that weighs more than 1kg



Treasure Hunt 2

1. Find a number in the 6 times table and take a picture of it!
2. A Cube
3. Letter T
4. A geometrical shape with at least 1 Obtuse angle
5. Something with Symmetrical pattern

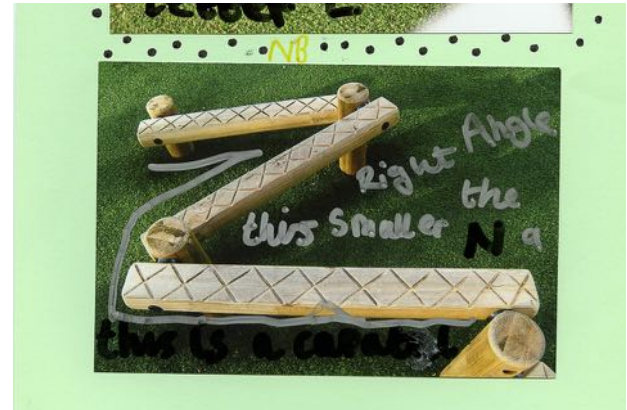


Treasure Hunt 3

1. Something with a Right angle
2. A geometrical shape with at least 1 Obtuse angle
3. Something that weighs more than 1kg
4. Square Based Pyramid
5. Something longer than 1 metre

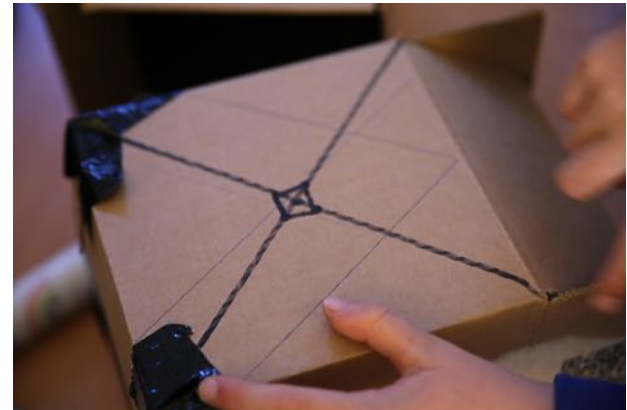
Treasure Hunt 4

1. A Sphere
2. Something between 1cm and 1m in length
3. A geometrical shape with at least 2 acute angles
4. A shape that has 3 Lines of Symmetry



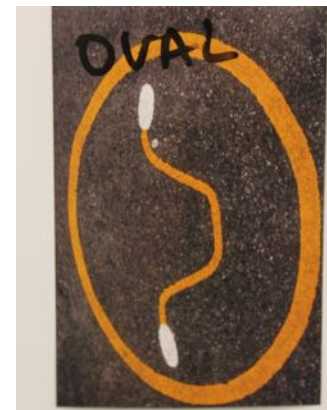
Treasure Hunt 5

1. Take a picture of a diagonal
2. Take the picture of a capital letter W
3. Take a picture of something that is 3 metres ahead of you
4. Take a picture of something curved



Treasure Hunt 6

1. A Circle
2. An oval shape
3. Equilateral triangle
4. Take a picture of something big looking small





Treasure Hunt 7

1. Something flat
2. Hexagonal prism
3. Something with a Right angle
4. Something shorter than 1cm



Treasure Hunt 8

1. A cube
2. Take the picture of a capital letter L
3. Something that is 3 metres ahead of you
4. Something curved
5. Take a picture of something that is twice bigger than your foot



Treasure Hunt 9

1. Take a picture an hexagon
2. Take a picture of something with a right angle
3. Take a picture of a shape that has 3 Lines of Symmetry
4. Take a picture of 1 diagonal line
5. Take a picture of a Cylinder

Links of websites on HOW TO MAKE A PINHOLE CAMERA

- http://www.exploratorium.edu/science_explorer/pringles_pinhole.html
- <http://www.kidzworld.com/article/4756-make-your-own-coffee-can-camera>
- <http://www.instructables.com/id/How-To-Make-A-Pinhole-Camera/>
- <http://www.diyphotography.net/23-pinhole-cameras-that-you-can-build-at-home>
- www.google.co.uk/search?q=pinhole+cameras&tbm=isch&tbo=u&source=univ&sa=X&ei=jZDzUoyKDoTChAeZ4IH4BQ&ved=0CDYQsAQ&biw=1436&bih=780
- <http://www.dailymail.co.uk/sciencetech/article-2321333/Art-graduate-designs-flat-pack-cardboard-camera-make-cereal-box.html>

Where to buy the darkroom and photography materials:

www.silverprint.co.uk, 120 London Rd, London SE1 6LF, Elephant and Castle
<http://www.harmanexpress.com>

Chemicals and equipment needed:

There are different brands, Ilford is the easiest to find. Dilution instructions are different for each brand. ASK an ADULT to supervise and do it for you.

1. Photography Paper developer
2. Stop Bath
3. Paper Fixer
4. Water

Photographic darkroom paper RC

Developing Trays (any second hand online shop)

Measuring jugs

Tongs

Gloves and apron, timer or clock, tissue paper

Black cloth/rubbish bags/ foil.....anything to cover the windows of the room

Darkroom safelight lights:

<http://www.bltdirect.com/darkroom-safelight-red-15-watt-bc?gclid=CKSQioimt7wCFSSCwwodXiUA5A>

<http://www.ag-photographic.co.uk/darkroom-safelights--lighting-71-c.asp>

<http://www.theimagingwarehouse.com/Products/Safelights>

<http://www.calumetphoto.co.uk/product/paterson-darkroom-safelight/167-652B/>



Darkroom Health & Safety

1. You must not put your fingers or any part of your body into the chemicals
2. No eating or drinking
3. No running or jumping
4. No water or chemicals near electricity!
5. Please wear the lab coat, rubber gloves and safety goggles when printing a photograph
6. Use the tongs provided to pick up your print
7. Do not drip water/chemicals onto the floor
8. Wash your hands
9. Do not open the door without permission as daylight would come in
10. If you feel dizzy or unwell please tell an adult
11. If you have a cut or a graze on your hands protect it with waterproof plaster and remove it when you finish as it may have chemicals on it.
12. HAVE FUN!



Designed using Adobe Photoshop Lightroom