

Mathematics/Design Art Project: The Shrink Ray and Little Rooms

Suitable for KS2 (adaptable to KS3)

Key learning areas:

Maths: accurate measurement - introducing millimetres, centimetres and metres; understanding scale/ratio; multiplication and division; 2D and 3D shapes; patterns

Art/Design: Colour choices; 3D construction; mood boards; interior design; motor skills; line; shape; space; composition

Other: Working to a design brief; presentation; problem-solving; imagination; critical selection; persistence; self-discipline

Overview:

The aim of this project is in understanding how maths skills can be applied to creative tasks. There are two main activities here – the first is to introduce the idea of scaling measurements down and employing multiplication and division to do so. This will aid in the second activity – making a scale model of a room in the house, redesigned by your child.

The second activity is quite involved, and will include some maths tasks as well as creative mood board making, and building a model. Scrap cardboard is fine to build out of – you need something sturdy for this task. It's aimed at mixing maths and art skills into a fun creative project! There are picture examples and tables to help breakdown these tasks.

A room in your house is just one idea – when I originally designed this project, the school were designing and making an emergency shelter camp outside. It could be a room in a school/museum/party house/activity centre – anything you wish!

Items you will need:

Metal tape measure, ruler, paper, pens, pencils, compasses, a cardboard box (or shoebox, or piece of scrap cardboard), tape (masking tape is ideal, Sellotape/gaffer tape are also fine), glue, scissors, any of the following – old magazines/books, scrap paper/wrapping paper, scrap fabric, paints, felt pens, feathers, beads, gems.

Activity 1: The Shrink Ray

(N.B. – it's helpful if you have a prop shrink ray, such as a water pistol, to hand for this – or your learner could make a shrink ray as a fun start to the exercise!)

- You have invented a shrink ray to make things as small as you wish. You can change the settings of the shrink ray.
- Take measurements of certain objects around the house, e.g. a chair, a window, a water bottle, a person. It's more fun to do one item at a time.
- Write down the height of the item (in cm and mm). Choose how many times you want to shrink it down by. If this was a 50cm object, and you wanted to make it 5 times smaller, this would be 10cm. If you wanted to make it 10 times smaller, it would be 5cm. If you wanted it half the size, it would be 25cm etc
- I find it helps to talk about 'real world' and 'scale world' in this exercise e.g 'If this table is 80cm tall in the real world and I shrink it to 4 times the size, how big would it be in the scale world?

Below is a table of some useful measurements in this game, for reference (choose a scale that is appropriate to the ability of your child):

Actual height of object (in the real world)	2 times smaller	4 times smaller	5 times smaller	10 times smaller	50 times smaller
10cm	5cm	2.5cm	2cm	1cm	0.2cm
25cm	12.5cm	6.25cm	5cm	2.5cm	0.5cm
68cm	34cm	17cm	13.6cm	6.8cm	1.36cm
100cm (1 metre)	50cm	25cm	20cm	10cm	2cm
200cm (2 metres)	100cm	50cm	40cm	20cm	4cm
500cm (5 metres)	250cm	125cm	100cm	50cm	10cm

Activity 2: Little Rooms

Now that you have mastered the shrink ray exercise, you will be making a scaled-down model of a room in your house, to redesign. This is the chance for your child to reinvent a room in the house as they would want it to be, make improvements and radicalise the interior design!

Decide what room in the house you would like to redesign, given the chance. You can choose whatever colours you like, whatever furniture or fun things to add – your budget is limitless! **Think about the function of the room though – what is essential to happen in it?** (e.g. a bedroom needs somewhere to sleep, a kitchen needs places to cook and store food).

Task: Mood Board



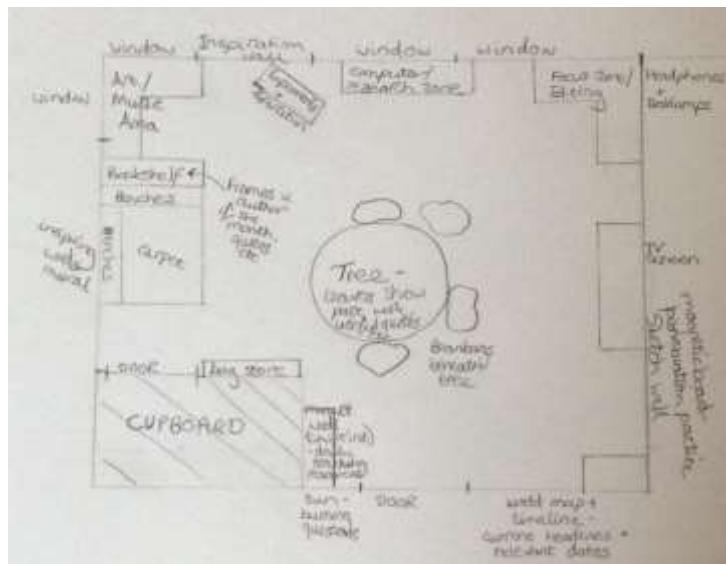
When you have decided the room, make a mood board to expand your ideas. Use sketches, paints, colours, patterns, collage from old magazines/scrap paper/old fabric. Try not to write down too much.

What to include in your mood board:

Feature	Tasks/Prompt Questions	Examples
A colour scheme	Draw a 9cmx9cm square and divide it equally into 9 sections. Add 9 different colours that you would like to use into the sections. What colours look good together? What colours are your favourite? What colours suit the function of the room? (e.g. what colours would be good for a room to relax in?)	 (not to size)
Shapes	What shapes will look good in or enhance the function of your room? What shapes will the furniture be (e.g. do you want a round, square, hexagonal table)? What shapes might look good on the wall?	What shape table – rectangular? Round? Square? Why this shape?
Textures and patterns	What sort of room is this? What textures and patterns reflect this?	Do you need to focus in this room? What patterns might help you focus?

		Is it a cozy room? What textures would be good?
Fabrics and materials	How do these reflect your room design?	e.g. fur, leather, vinyl, feathers, beads, tiles, wood
Furnishings and accessories	What does your room need to include?	e.g. storage, light sources, floorings, fun accessories?
Room Features	How do doors/windows/stairs work in your room?	Is there a slide instead of stairs? How do the doors open? Is the window the size of the entire wall?

Task: Ground Plan



Take the measurements on the room you wish to redesign (you will need a tape measure). Suggested stages of this are advised below:

Basic measurements	Width and height of all walls
More challenging measurements	Door frame width and height, where it sits in the wall Window frame width and height, where it sits in the wall
Extra details measurements (depending on the room being measured)	Fireplace width and height, where it sits in the wall Light switches, where they sit on the wall Cupboard size, interior measurements Skirting boards

On a piece of paper, make a ground plan on the room that is **10 times smaller** than its original dimensions (or 20 times smaller, depending on how big your paper is).

On your ground plan, draw some rough ideas of where would you like furniture items to go. You can have anything you like, as long as it fits. Think about how big the furniture is – do you need some measurements to help plan it better?

Task: Making your little room



You are now ready to start making your model room! Using your room measurements, cardboard, scissors, and a ruler, make a box of your room that is 10 or 20 times smaller than the actual room measurements (depending on how large you want the model to be). You can alter a cardboard box or shoe box to be the right dimensions, or make one from scratch from scrap cardboard. Don't forget to leave either the ceiling or a wall open so you can see inside.

Use strong glue or tape to secure the sides of the box

Be careful of cutting cardboard with sharp scissors

Using your mood board for reference, decorate the room to your ideal standards. Cut out holes for your ideal doors and windows. Use whatever scrap and craft materials are available – magazine cuttings, scrap coloured paper, old wrapping paper, feathers, beads, paints, felt tips, string, ribbon, scrap fabric, old t-shirts etc. Make furniture items out of scrap cardboard.

Present your room to your admiring audience 😊