

## Making irregular shaped polystyrene objects

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Following the technology project method, design and construct irregular shaped objects which your classmates can use to analyse the different viewpoints: plan, elevation and profile. You must take the following points into consideration:

### Compulsory

1. Use expanded polystyrene (EPS).
2. Design at least three objects each.
3. Make sure the sides of the object's surfaces are between 4 cm and 8 cm long.
4. Make at least two different models, one of them with a curved surface.
5. Use a hot metal thread trimmer.

### Optional

1. Decorate the objects in an original way.
2. Design irregular shaped objects that you can use to make scale models of devices such as a telephone handset, a hair dryer or a clothes peg.

### Documents to be presented with your project

1. **The project report.** This should mention: any problems encountered during the project and solutions found to them, the number of hours it took to complete, and an evaluation of the end result.
2. **Diagrams.** The following plans should be submitted:
  - A three-dimensional outline of each object.
  - A dimensioned representation of the plan, elevation and profile.
  - A dimensioned diagram of each component of the object, drawn to scale.
3. **A list of all the materials needed** to make the objects and a description of how to obtain them.

## Description of the project

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The design and construction of models and prototypes are two very important stages in manufacturing. The stages allow us to evaluate the suitability of an idea before, for example, beginning to produce the item in series.

In this year of study, making models out of different types of plastic gives students the chance not only to develop their abilities and their creativity, but also to practise their skills in using the tools available in the classroom/workshop.

- Students work in pairs or groups of three. This helps them to develop an understanding of the importance of teamwork, and also allows them to gain confidence in their own ideas and to develop their own style.
- By following the technology project methodology, students can apply the basic techniques required for working with plastics. Therefore, it is essential that the students have at least elementary knowledge of basic descriptive geometry and geometric drawing, as well as of different types of plastic and techniques for working with them.

### Methodology

During the activity, it is essential to follow procedures in a methodical way, and to take into account basic principles of health and safety.

The students should read and follow these instructions:

- Keep hands clean and dry.
- Wear clothing that is comfortable, but not too loose, as it could get caught in machinery.
- Tie back long hair.
- Understand the operating instructions for each tool and piece of machinery you will use.
- Use the correct tool for each task.
- Check that tools are in perfect working order. Check that handles are protected and secure.
- Have a specific task to complete. Work carefully and avoid distractions.
- Take special care when you use pointed or sharp tools to prevent cuts and other injuries.
- Be very careful when you use adhesives.

## Description of the project

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### Timing

#### 1st & 2nd lessons

1. Hand out the project instructions and clear up any student queries.
2. The groups start the design phase of the task by practising drawing, in three dimensions, the forms of the irregular blocks on paper.

#### 3rd & 4th lessons

3. The students continue and finish the design of the models.

#### 5th & 6th lessons

4. Remind the students that they will have to make scale models of at least two of the proposed designs. They also need to calculate their measurements, and to make an exploded view drawing showing each component to scale.
5. Share out the tasks amongst the students. Look at the possibility of using recycled materials, and also consider what materials might need to be bought for the project.

#### 7th lessons

6. The students carry out an inventory of the materials.
7. The students check the feasibility of the chosen projects in relation to the materials available, and make any changes necessary.
8. The students start the construction of the models by outlining the measured pieces on a polystyrene sheet.

#### 8th, 9th & 10th lessons

9. The students continue the construction process for each of the pieces: outlining, cutting and, if necessary, painting.
10. The students put the pieces of each object together.
11. They repeat steps 9 and 10 to construct the remaining objects.

#### 11th lessons

12. The students evaluate their objects.

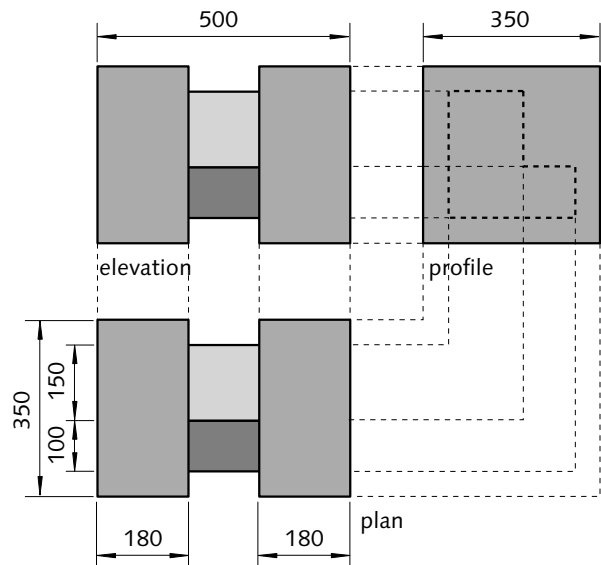
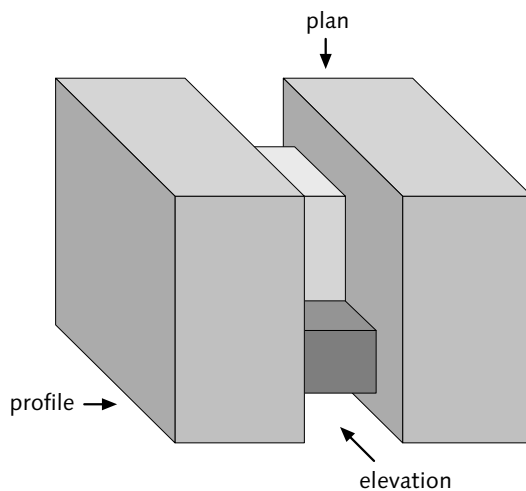
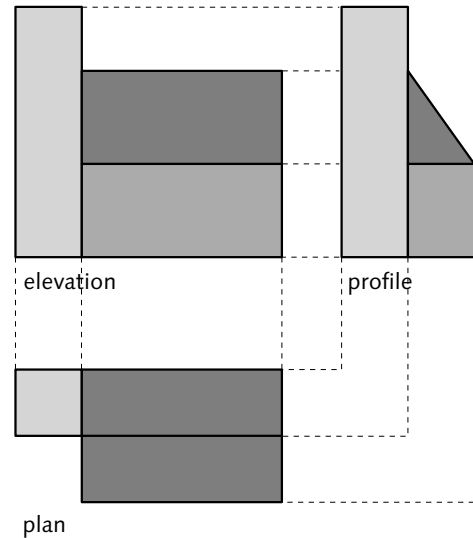
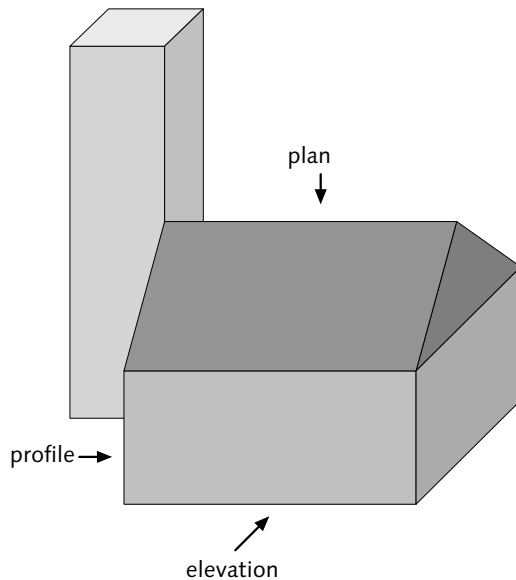
#### 12th lessons

13. Each group of students presents their objects to their classmates.

## Description of the project

### Suggestions for realisation of the project

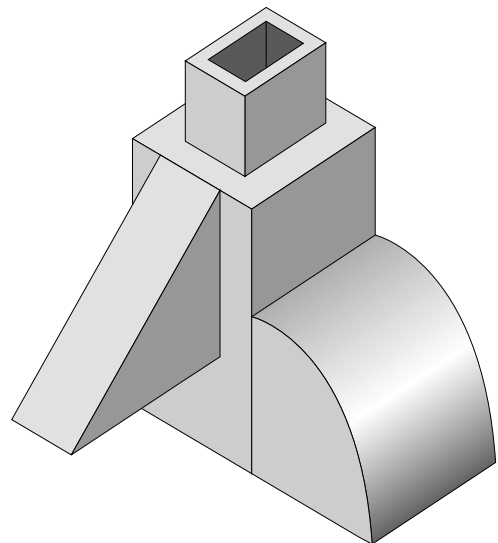
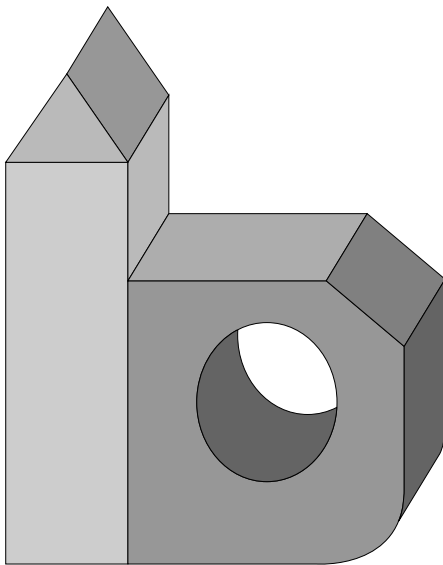
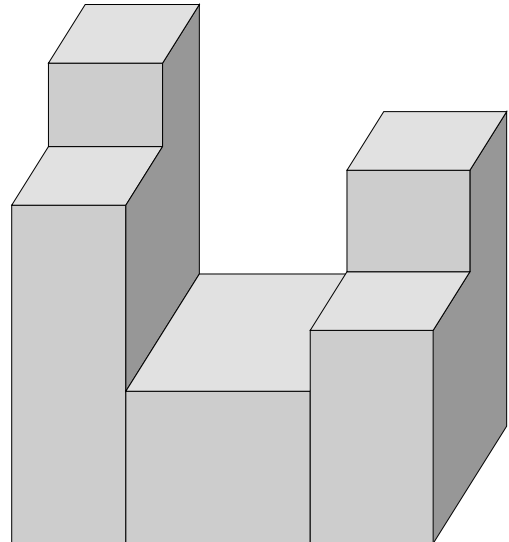
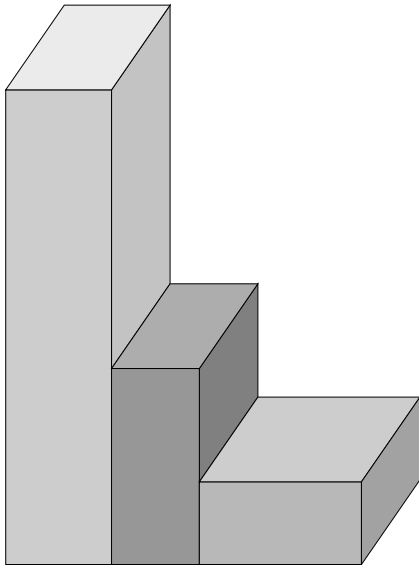
1. Revise some basic aspects of geometric drawing with the students; for example, how to draw regular polygons, parallel and perpendicular lines, how to draw shapes in perspective, and how to represent the main views of an object: plan, elevation and profile.



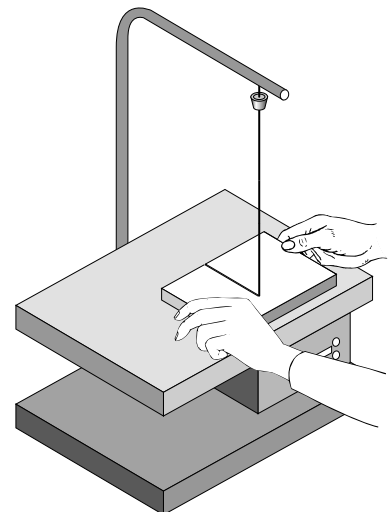
2. It is important to encourage student participation in group work in order to build confidence and self esteem, and to develop an *esprit de corps* amongst the students.
3. Use **permanent markers** and **acrylic paints** to draw and paint on the polystyrene sheets and blocks.

## Description of the project

4. The models can be made of separate pieces which are painted in different colours.



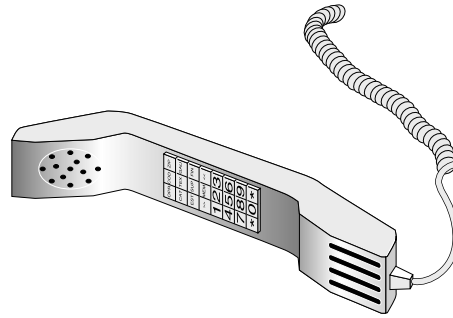
5. In terms of cutting machines, it is advisable to use a **hot metal thread trimmer**. Switch on the machine, then wait for a few minutes for the trimmer to become hot. Then cut the pieces gently and carefully, following the cutting line.
6. To glue surfaces to each other, **contact adhesives** are recommended as they stick instantly.



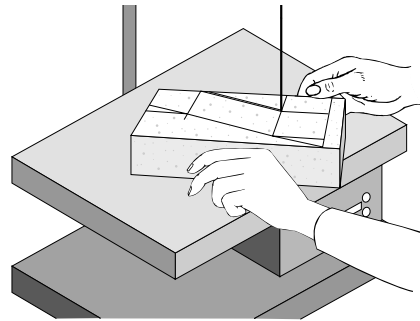
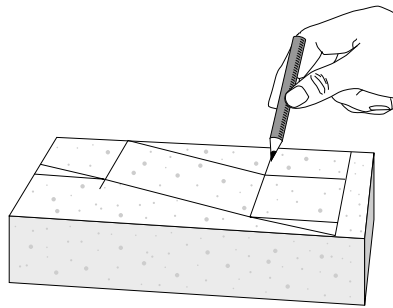
## Description of the project

### Example: drawing a telephone handset

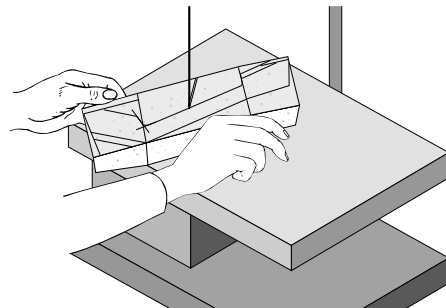
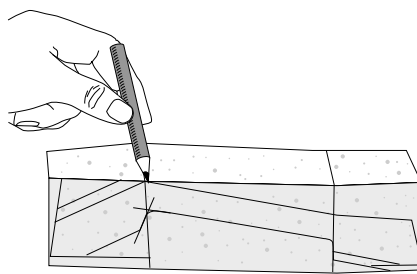
A well-constructed model should have the same size, shape and surface finish as the object it represents. This way, we can test its functionality and appearance, and check its dimensions, proportions and so on.



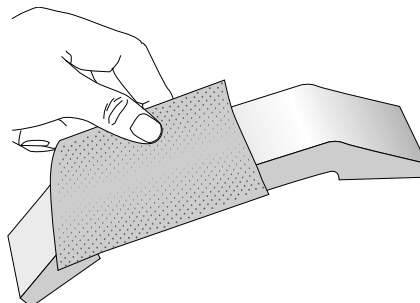
1. First, make a dimensioned sketch of the design and then transfer the drawing of the base of the piece onto the polystyrene block.
2. Cut around the outline of the piece with the hot metal thread trimmer.



3. Next, draw the profile of the object on the side of the block, and cut along the outlines.

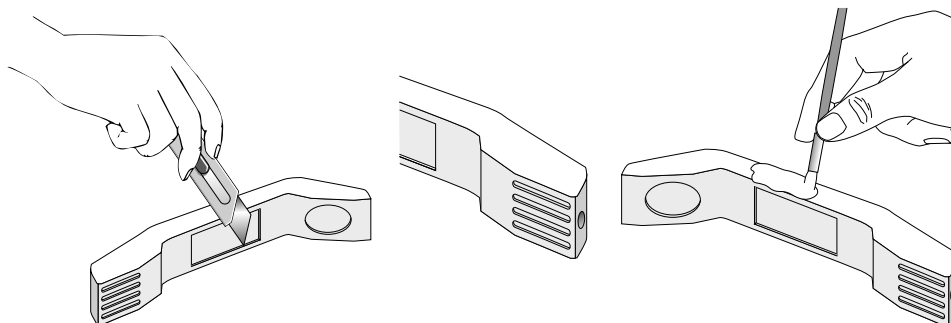


4. Use sandpaper to form any rounded edges of the model.



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5. With the cutter, make shallow cuts in the material to make the different parts of the handset: the speaker and the keypad.
6. Carefully, with a sharp, pointed tool, make a hole in the lower part of the model for the telephone cable. Obviously, this is not necessary for a cordless telephone.
7. Finally, paint the model.

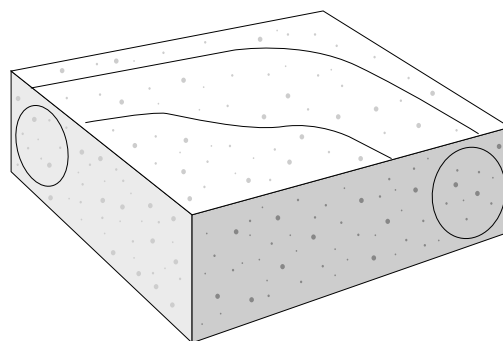


## Suggestions for making other models of gadgets and devices

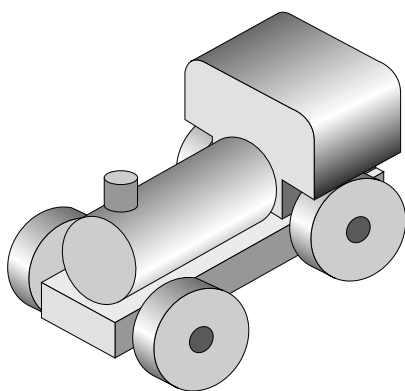
Expanded polystyrene is particularly suitable for making models. However, harder materials, such as methacrylate and wood, may be more appropriate for making some objects.



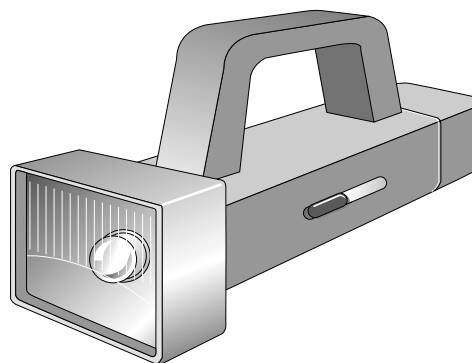
Hair dryer.



Outline of hairdryer drawn on a polystyrene block.



Engine.



Torch.