TAISCÉALAÍ

3D Printing Education for Primary Schools

Student Workbook

IRISH MANUFACTURING RESEARCH
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An Roinn Oideachais Department of Education

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Lesson 1 Introduction to 3D Printing

Introduction

Look around you and see all the different items that you have around you, like chairs, tables, cups, pens, bags and lots more. Each item has been designed and made in a factory by engineers and designers.

Before a product is made in a factory, they can see what products would look like - and test them before a final product is produced - by creating 3D printed prototypes.

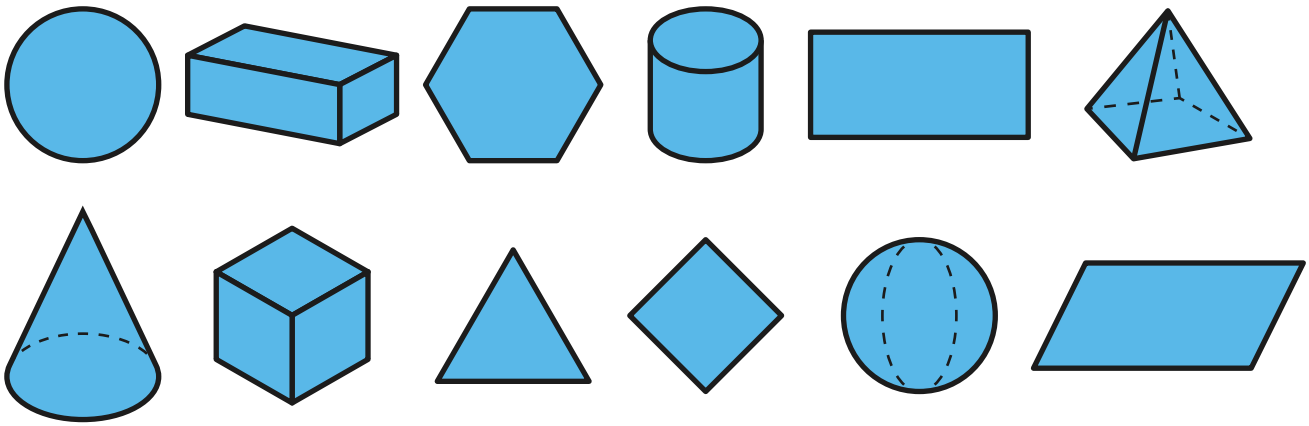
3D printing is a technology that allows you to build three-dimensional objects. What exactly does that mean? Imagine a printer that can create objects that you can touch, instead of pictures on a flat piece of paper!

During this lesson, you will work with your teacher to learn more about 3D printing. But before you do that, it's important to explore the difference between 2D shapes and 3D shapes.

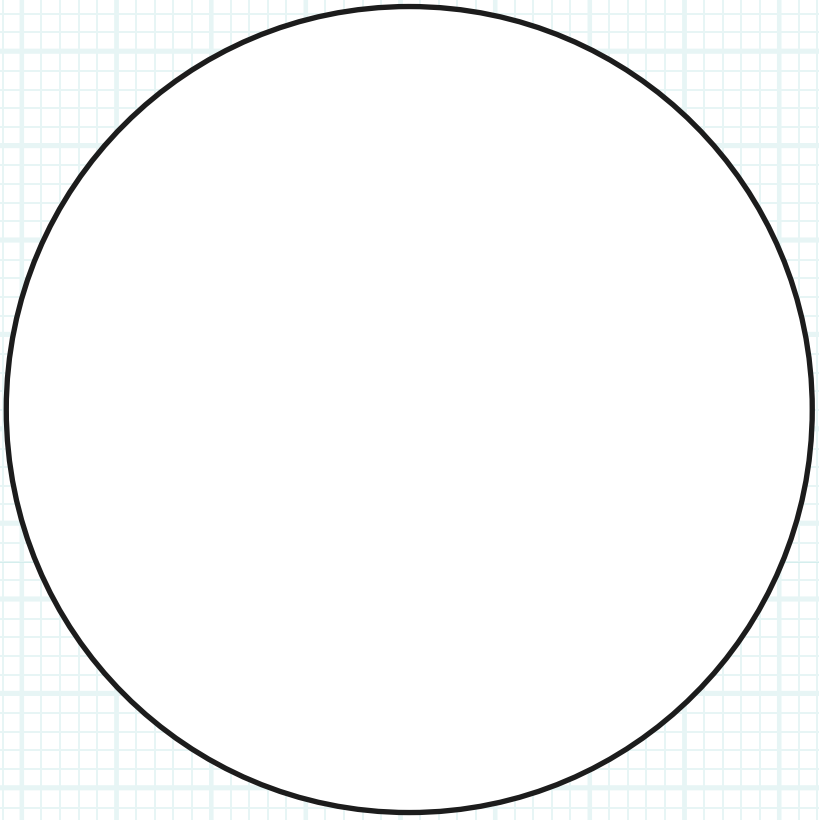
Activity 1 2D shapes vs 3D shapes

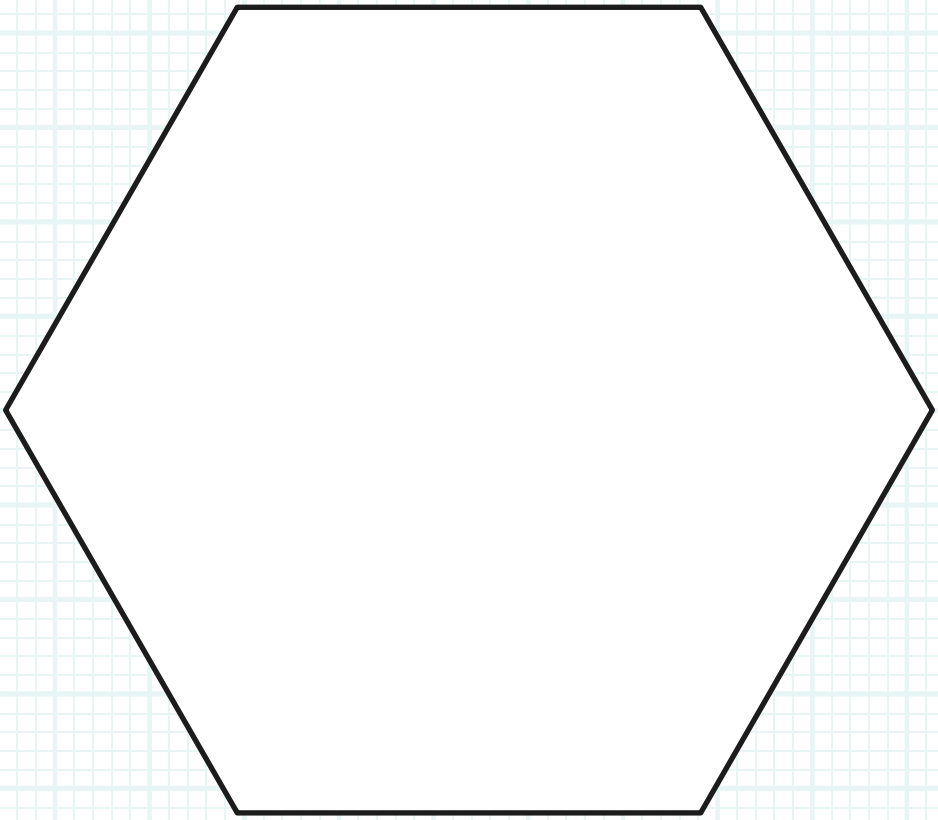
1. Cut the shapes and paste them into the correct boxes.

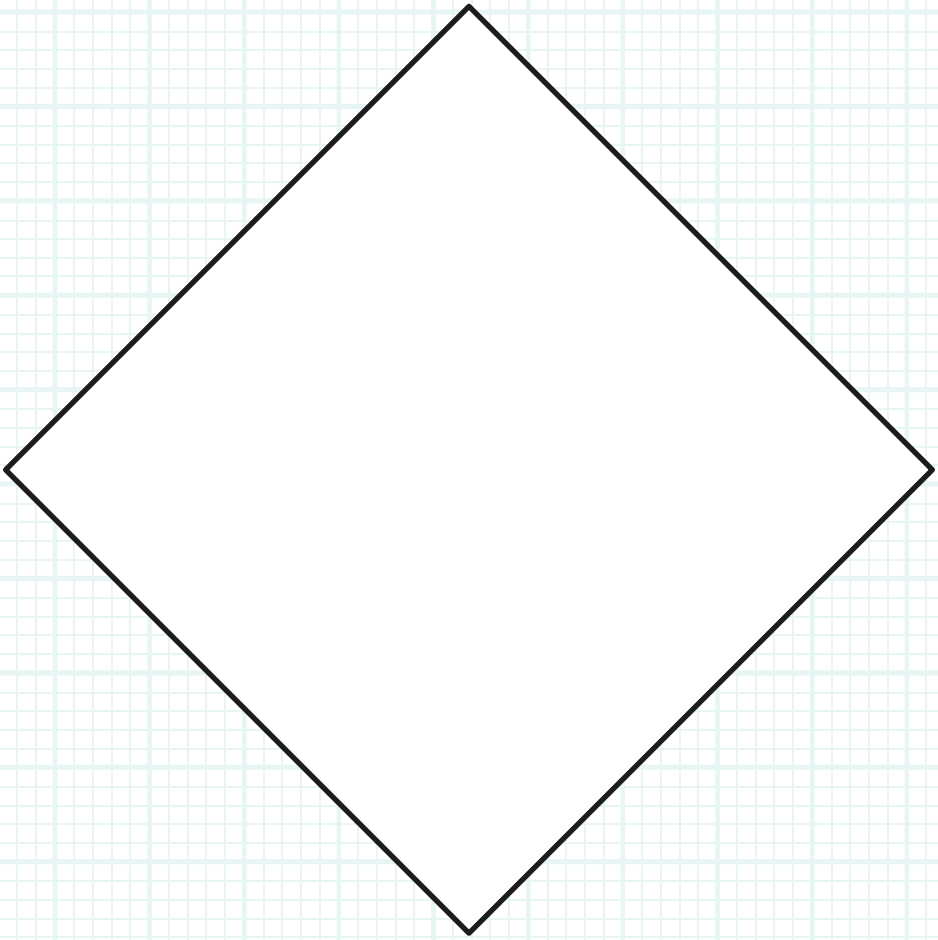
2 Dimensional	3 Dimensional



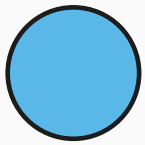
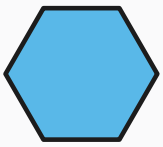
2. Use yarn to trace around the following 2D shape templates:





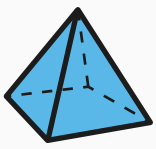


3. Complete the following table with the name of each 2D shape, the number of sides and the number of vertices. Remember a vertex is a place where two lines connect or meet. For example, the corner of a desk, the corners on the screen of a TV or the corners of a tissue box.

2D Shapes			
Shape	Name	Number of sides	Number of vertices
			
			
			

4. Complete the table with the name of each 3D shape, and the number of faces, edges and vertices. Remember:

- Edge is the line that joins two faces of a shape. For instance, the borders of a cardboard box.
- Vertice is a place where two lines connect or meet. For example, the corner of a desk, the corners on the screen of a TV or the corners of a tissue box.

3D Shapes			
Shape	Name	Number of faces	Number of vertices
			
			
			

Lesson 2 Exploring Ancient Egyptian Structures and Artefacts

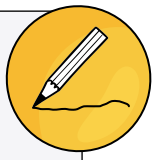
Introduction

Have you ever seen a picture of a pyramid? They were built by the Egyptian civilization around 3100 BC to 30 BC. They were incredible architects and artists and made some of the most famous structures and artefacts that still exist today!

These structures and artefacts can teach us about how they lived, what they believe in, and how their innovations and achievements still influence us today. Let's uncover the mysteries, unlock the secrets, and ignite our curiosity as we explore the wonders of ancient Egyptian structures and artefacts!

Activity 1 Create a Model of an Egyptian Artefact or Structure

1. Based on your research, which ancient Egyptian artefact or structure would you like to create a model off? Draw a quick sketch of your artefact or structure below.



2. Once you have your printed model, are there any differences you see between the real ancient Egyptian artefact or structure and your printed model?

Lesson 3 Materials

Introduction

Look around you and see all the different objects, structures, and products that we have around us every day. All of these objects, structures and products are made from different materials. For each object or product that you see, the designers and engineers picked the materials to be used to make them so that the product works best for what it is being used for. For example, a table is made out of wood so it is stable and hard, an eraser is made out of rubber which is soft and elastic so it can be used to erase pencil writing.

Activity 1 What Is It Made Of?

1. Think about when you are at home or at school, what items do you use regularly? For each item, write down the materials they are made and the properties of the material, for example, a pen, what material is your pen made of? Is it hard or soft, is it strong or weak?

Item	Material	Properties

Activity 2 Design a Cup

During this activity, you are going to design your own cup.

1. Draw a sketch of the cup you are going to make.

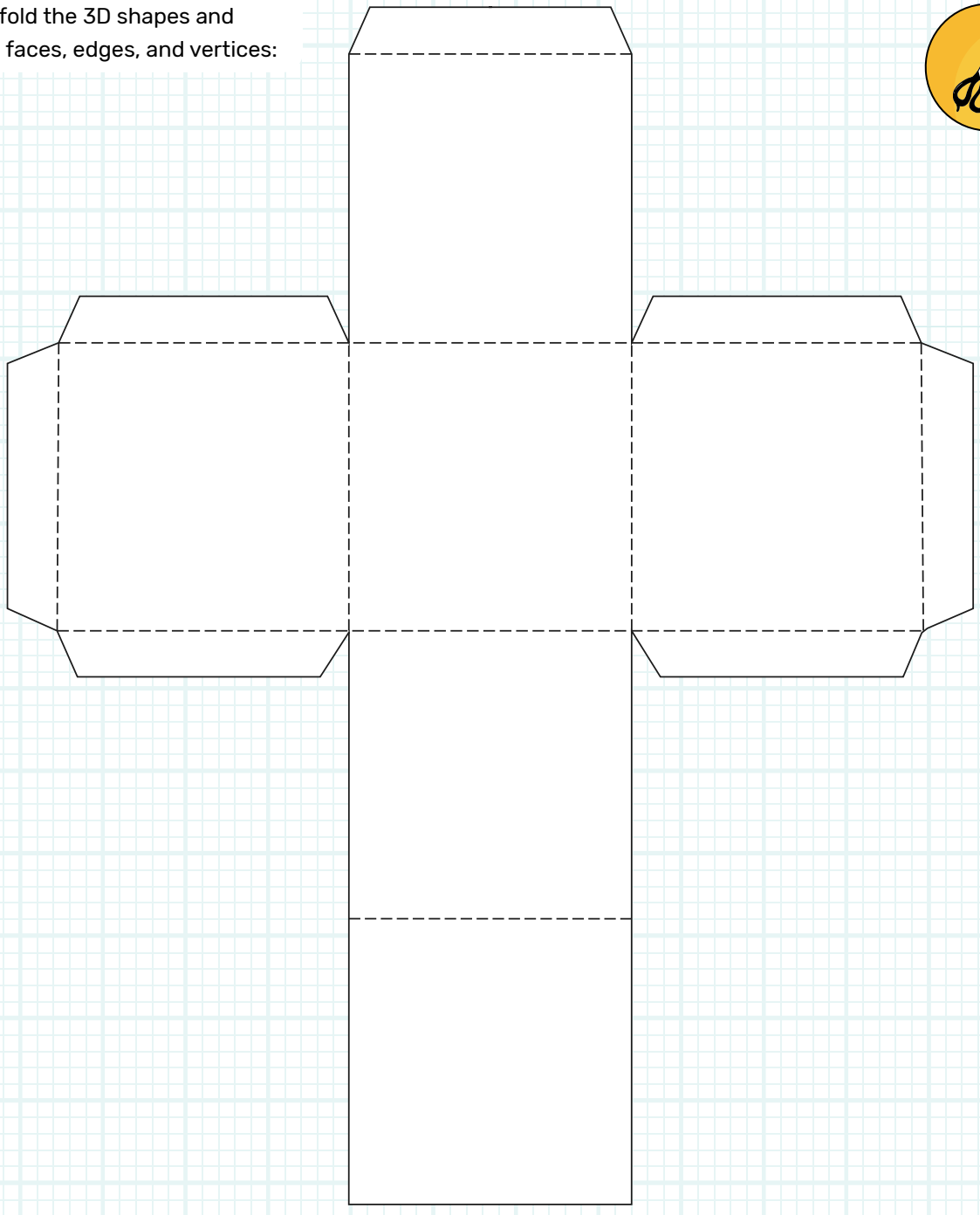
Lesson 4 Making 3D Shapes

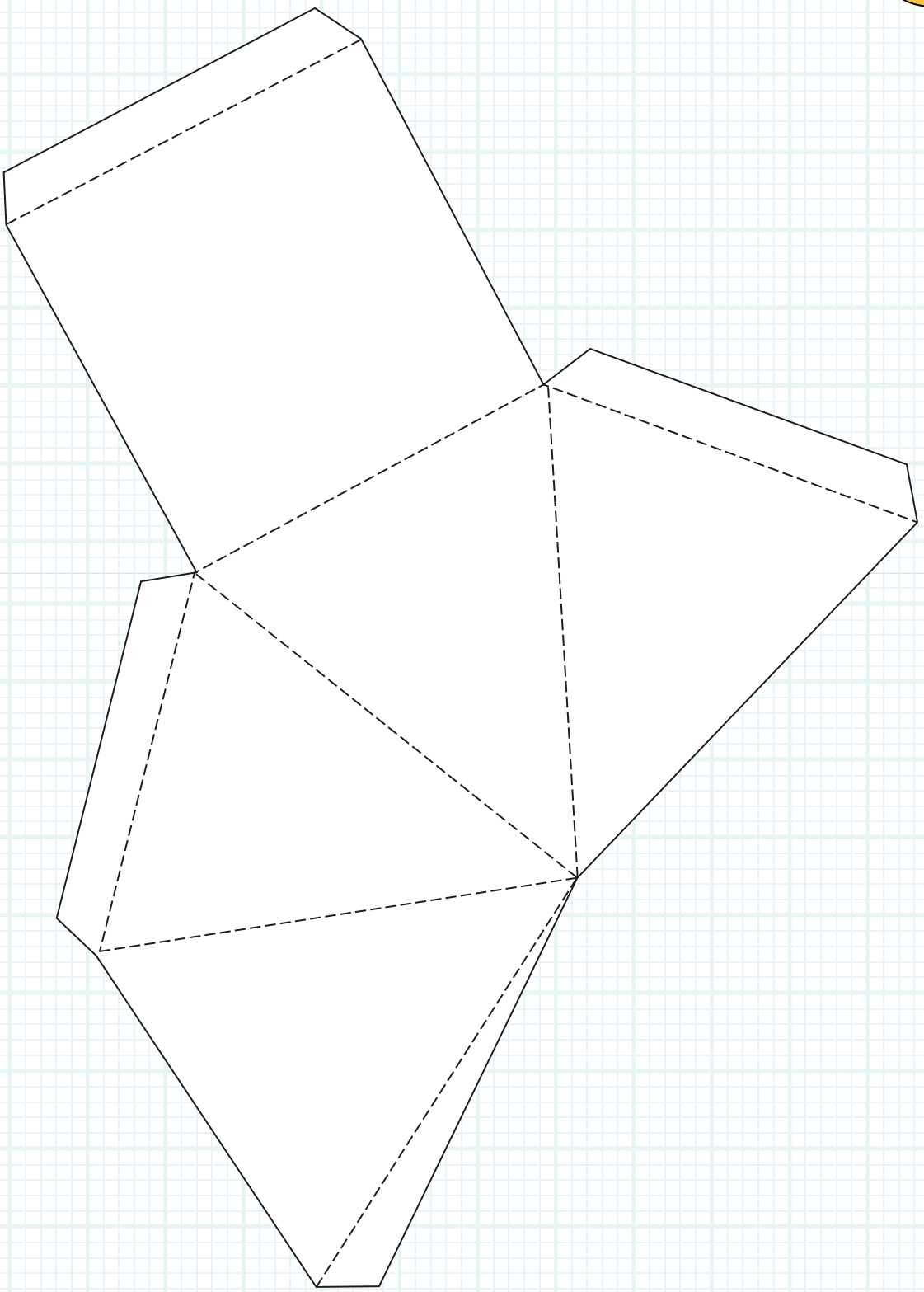
Introduction

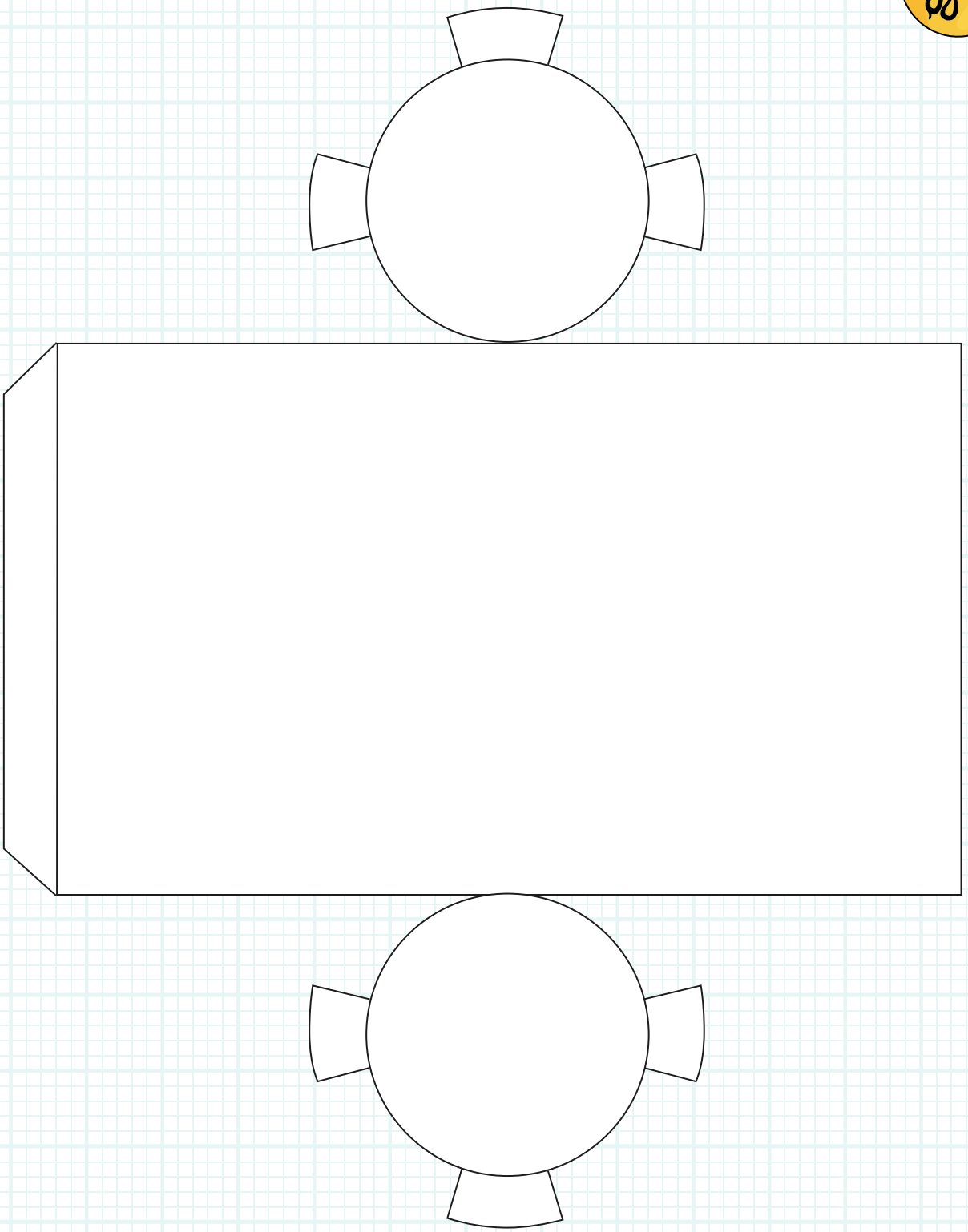
3D shapes are all around us. Every object or item that is around you is made up of different 3D shapes. By combining different 3D shapes, we can create new shapes. Let's explore and see what 3D shapes we can find?.

Activity 1 3D Shapes

1. Cut and fold the 3D shapes and label the faces, edges, and vertices:







Lesson 5 Create a Castle

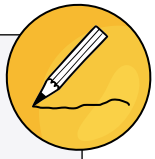
Introduction

Have you ever visited a castle in Ireland? There is a good chance that it was a Norman castle. The Normans were descendants of Scandinavian Vikings who settled in Normandy, France. They invaded England in 1066 and a century later they came to Ireland.

In this lesson we will explore Norman Castles and create our own castle.

Activity 1 Build a Norman Castle

1. In your group, draw a sketch of the part of the castle that your group has been assigned to make.



2. Write down the steps you took to design your part of the castle. Did everything go as planned? Did you make any changes to your design as you were working on it?

Lesson 6 Make a Local Chess Set

Introduction

Do you like playing board games? Have you ever played Chess? In this lesson we are going to create our own chess set but instead of using the normal pieces of the chess set, let's create our own chess pieces.

Activity 1 Build a Chess Piece

1. Based on the chess piece that you have been assigned by your teacher, how would you describe the chess piece?

2. Think of historical buildings or people. Can you think of a historical building or historical person in your town or area that could represent your chess piece? For example, for the tower chess piece, is there a tower in your local area build your chess piece to look like that tower. What building or person can you think of?

Lesson 7 Building with 3D Printing

Introduction

When you look around you and look at buildings or things you find outside, can you see what shapes they are made of? Most buildings or items that are made are started off with a small design called a prototype so you can see what the building will look like before you build the whole building. In this lesson we will create a building or structure as a prototype.

Activity 1 Create a Building or Structure

1. What type of structure of building are you going to build? What are some of the main features of this structure?
2. Draw a design of your structure below.

3. Write down the steps you took to design your structure. Did everything go as planned? Did you make any changes to your design as you were working on it?

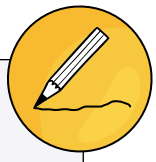
Lesson 8 Creating 3D Artworks

Introduction

How would you like to be an artist and create your very own piece of 3D art? In this lesson you get to design your own 3D art.

Activity 1 Be an Artist

1. Draw your design for your 3D artwork below.



Lesson 9 Local Buildings and Landscapes

Introduction

What are some of your favourite places about the city of town where you live? Let's explore our cities, towns and landscapes and discover the buildings and places and how they have developed over time.

Activity 1 Local Buildings and Landscapes

1. Can you think of some buildings or landscapes in your local area? Pick one building or natural environment. What makes this building or environment special? How can you describe this building or natural environment?

2. Draw a model of the building or natural environment that your group has chosen.

3. What are the shapes that you have used to draw your building or natural environment?

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