Year 6 – 3D Modelling

Unit introduction

Learners will develop their knowledge and understanding of using a computer to produce 3D models. Learners will initially familiarise themselves with working in a 3D space, moving, resizing, and duplicating objects. They will then create hollow objects using placeholders and combine multiple objects to create a model of a desk tidy. Finally, learners will examine the benefits of grouping and ungrouping 3D objects, then go on to plan, develop, and evaluate their own 3D model of a building.

Software and Hardware requirements

For this unit, learners will be using the free platform TinkerCAD. We recommend signing up for a teacher account which allows learner accounts to be created. TinkerCAD can be used across all devices, however learners may find It easier to use a device with a mouse.

If you've adapted this unit to better suit your school, please share your adapted resources with fellow teachers in the STEM community. Alternatively, if this unit isn't quite right for your school, why not see if an adapted version which better suits has already been shared?

Overview of lessons

Lesson	Brief overview	Learning objectives
1 Introduction to 3D modelling	Learners will be introduced to the concept of 3D modelling by creating a range of 3D shapes that they select and move. Learners also examine shapes from a variety of views within the 3D space.	To recognise that you can work in three dimensions on a computer • I can add 3D shapes to a project

		• I can view 3D shapes from different perspectives • I can move 3D shapes relative to one another
2 Modifying 3D objects	Learners will manipulate 3D objects digitally. They will resize objects in one, two, and three dimensions. They will also lift and lower 3D objects relative to the workplane, and combine two 3D objects to make a new shape. Finally learners will recolour 3D objects.	To identify that digital 3D objects can be modified • I can resize an object in three dimensions • I can lift/lower 3D objects • I can recolour a 3D object
3 Make your own name badge	Learners will develop their understanding of manipulating digital 3D objects. They will rotate objects in three dimensions, duplicate objects, and then use grouping and ungrouping to manipulate many objects at once. They will combine these skills to create their own 3D name badge. Finally, learners will consider the practicality of 3D printing the objects they have made.	To recognise that objects can be combined in a 3D model • I can rotate objects in three dimensions • I can duplicate 3D objects • I can group 3D objects
4 Making a desk tidy	Learners will be introduced to the dimensions of shapes in Tinkercad which will enable them to accurately resize and move shapes. Learners will then be introduced to placeholders which can be used to create holes in objects. Finally learners will duplicate, then resize multiple objects to create a meaningful 3D object.	To create a 3D model for a given purpose • I can accurately size 3D objects • I can show that placeholders can create holes in 3D objects • I can combine a number of 3D objects
5 Planning a 3D model	Learners will see how architects use 3D design to visualise and plan buildings and communicate with clients. They will explode 3D models of buildings to see what shapes they comprise of. Learners will then look at real world structures and identify the shapes that they include. They will then plan their own 3D building	To plan my own 3D model • I can analyse a 3D model • I can choose objects to use in a 3D model

	design, thinking about some of the ways in which real-world architects use these tools.	• I can combine objects in a design
6 Make your own 3D model	Learners will create a computer 3D model based on their design. They will explore why architects might use CAD software alongside traditional skills. They will then evaluate their model and that of another learner, before modifying their own model to improve it.	To create my own digital 3D model • I can construct a 3D model based on a design • I can explain how my 3D model could be improved • I can modify my 3D model to improve it

Request a computing ambassador

Year 6 (ages 10-11) are learning about 3D design though the Teach Computing Curriculum unit of six lessons. Within these lessons, pupils will learn how to use computer software to produce 3D models.

*Our lessons are taking place from *date* to *date* and we would appreciate someone with skills in this area to offer some real-world experience to this unit. The unit uses TinkerCAD*https://sites.google.com/ https://www.getpaint.net/*on *insert devices** and focuses on the following areas:*

- *using resize, rotate, duplicate, and group for objects in three dimensions*
- *use 3D design skills to create a 3D name badge*
- *use placeholders to create holes in 3D objects and combine 3D objects*
- *look at how computer-based 3D design is used in architecture*
- *plan and design a 3D building*

*We require an ambassador who can support in any of these areas. We are hoping for an ambassador who would be willing to join us *in the classroom/virtually* to support our learning by *providing some handy hints and tips for our projects/giving us constructive feedback on our final projects/discussing how 3D modelling is used within their profession and in the real-world**

Subject knowledge and CPD opportunities

Teachers will need to be familiar with the main concepts associated with 3D modelling. During the unit the following skills and concepts are introduced:

- Working with and viewing shapes in three dimensions
- Adding, resizing, and moving (including lifting and lowering) 3D shapes
- Rotating 3D shapes
- Combining 3D shapes
- Grouping and ungrouping objects

You may wish to use the TinkerCAD Learning Centre to develop your understanding of the above skills, with short videos such as 'Place It', 'View It', 'Move It', 'Rotate It', 'Size It', 'Group It' and more: https://www.tinkercad.com/learn/designs

Continual Professional Development

Enhance your subject knowledge to teach this unit through the following free CPD:

- Getting started in Year 6 – short course
- Introduction to primary computing remote or face to face

Teach primary computing certificate

To further enhance your subject knowledge, enrol on the teach primary computing certificate. This will support you to develop your knowledge and skills in primary computing and gain the confidence to teach great lessons, all whilst earning a nationally recognised certificate!

Progression

This unit progresses students' knowledge and understanding of creating 3D graphics using a computer. Prior to undertaking this unit, learners should have worked with 2D graphics applications.

Common Misconceptions

Whilst not necessarily a misconception, the biggest difficulty pupils often have with using 3D design software for the first time is ensuring their designs 'line up' in all three dimensions. Encourage pupils to repeatedly look at their design from different angles, and ensure it looks as expected from each. For example, a design can easily look 'lined up' viewed from the side, but from the top it becomes clear the shapes are offset. Model checking from all angles repeatedly when you demonstrate the software.

Curriculum links

Computing

- Select, use, and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems, and content that accomplish given goals, including collecting, analysing, evaluating, and presenting data and information
- Use technology safely, respectfully, and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

Education for a Connected World links

Privacy and Security

- I can describe strategies for keeping my personal information private, depending on context

Art and Design

- To improve their mastery of art and design techniques, including drawing, painting, and sculpture with a range of materials

Design and Technology

- Generate, develop, model, and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design

Maths

- Recognise, describe, and build simple 3D shapes, including making nets

Assessment

Formative assessment

Assessment opportunities are detailed in each lesson plan. The learning objectives and success criteria are introduced in the slide decks at the beginning of each lesson and then reviewed at the end. Learners are invited to assess how well they feel they have met the learning objective using thumbs up, thumbs sideways, or thumbs down.

Summative assessment

Please see the assessment rubric document for this unit. The rubric can be used to assess student's work from lessons 5 and 6.