Fellside Community Primary School Computing Curriculum
Year 6 – 3D modelling

Unit introduction

During this unit, 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, including combining 3D objects to make a house and examining the differences between working digitally with 2D and 3D graphics. Learners will progress to making accurate 3D models of physical objects, such as a pencil holder, which include using 3D objects as placeholders. Finally, learners will examine the need to group 3D objects, then go on to plan, develop, and evaluate their own 3D model of a photo frame.

For this sequence of lessons, learners will be using a website called Tinkercad (https://www.tinkercad.com). Learners will need accounts to save their work and access the resources. We recommend signing up for a teacher account at https://www.tinkercad.com/join, which enables learner accounts to be created and the website accessed with a Class Code: https://tinkercad.zendesk.com/hc/en-us/articles/360026236693-Tinkercad-Classrooms. Please ensure your school's online safety policy (or similar) is closely adhered to and avoid using learners' full names when creating accounts.

Overview of lessons

Lesson	Brief overview	Learning objectives
1. What is 3D modelling?	This lesson introduces learners to the concept of 3D modelling by creating a range of 3D shapes that they select and move. They also examine the shapes from a variety of views within the 3D space.	To use a computer to create and manipulate three-dimensional (3D) digital objects

		• I can discuss the similarities and differences between 2D and 3D shapes • I can explain why we might represent 3D objects on a computer • I can select, move, and delete a digital 3D shape
2. Making changes	This lesson examines the similarities and differences between working digitally with 2D and 3D graphics. Learners initially discuss the similarities and differences they have identified so far, then move on to combine 3D shapes, including lifting the 3D object, to produce a house. Learners then colour their 3D shapes, followed by adding further shapes and undertaking further reflection on the similarities and differences between working digitally with 2D and 3D graphics.	To compare working digitally with 2D and 3D graphics • I can identify how graphical objects can be modified • I can resize a 3D object • I can change the colour of a 3D object
3. Rotation and position	During this lesson, learners will produce a 3D model of a physical object, which will contain a number of different 3D objects. 3D objects will need to be rotated and placed into position in relation to other 3D objects.	To construct a digital 3D model of a physical object • I can rotate a 3D object • I can position 3D objects in relation to each other • I can select and duplicate multiple 3D objects

4. Making holes	During this lesson, learners will produce a 3D model of a pencil holder desk tidy. The 3D model will contain a number of 3D objects that are of specific dimensions and use other 3D objects as placeholders to create holes with them.	To identify that physical objects can be broken down into a collection of 3D shapes ● I can identify the 3D shapes needed to create a model of a real-world object ● I can create digital 3D objects of an appropriate size ● I can group a digital 3D shape and a placeholder to create a hole in an object
5. Planning my own 3D model	During this lesson, learners will resize and enhance their 3D model of a pencil holder desk tidy. Learners will also plan their own 3D model of a photo frame, which will be developed during the next lesson.	To design a digital model by combining 3D objects ● I can plan my 3D model ● I can choose which 3D objects I need to construct my model ● I can modify multiple 3D objects
6. Making my own 3D model	During this lesson, learners will produce their own 3D model based on their planning during the previous lesson. They will evaluate their work and make improvements based on feedback from their peers.	To develop and improve a digital 3D model ● I can decide how my model can be improved ● I can modify my model to improve it ● I can evaluate my model against a given criterion

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.

Please see the learning graph for this unit for more information about progression.

Curriculum links

National curriculum links

Computing – KS2
- 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

Art and design – KS2
- To improve their mastery of art and design techniques, including drawing, painting and sculpture with a range of materials

Design and technology – KS2
- Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design

Mathematics – KS2 (Y6)

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

Education for a Connected World links

Strand

- Lesson 1 and Lesson 3 – Privacy and Security (Y4) – I can describe strategies for keeping my personal information private, depending on context

Assessment

Formative assessment

Assessment opportunities are detailed in each lesson plan. The learning objectives and success criteria are introduced in the slide deck 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

Within this unit, a rubric is used to assess learners' work after Lesson 6.

- Please see the assessment rubric document for this unit.

Subject knowledge

Lesson 1: You will need to be familiar with creating, selecting, and moving 3D objects in Tinkercad, including how to view them from different angles. Tinkercad's Start Learning 3D tutorials provide a good starting point (https://www.tinkercad.com/learn/designs).

Lesson 2: You will need to be familiar with resizing, lifting, and altering the colour of 3D objects in Tinkercad. Tinkercad's Start Learning 3D tutorials provide a good starting point (https://www.tinkercad.com/learn/designs).

Lesson 3: You will need to be familiar with rotating and positioning 3D objects in Tinkercad.. Tinkercad's Rotate it tutorial provides a good starting point (https://www.tinkercad.com/learn/designs) along with the Promo Ambition's Tinkercad Tutorial 2 (https://promoambitions.com/tinkercad). In order to deliver the extension task in Activity 3, the Changing workplanes teacher guidance provides further information, along with Promo Ambition's Tinkercad Tutorial 4 (https://promoambitions.com/tinkercad).

Lesson 4: You will need to be familiar with resizing 3D objects to specific dimensions in Tinkercad. Tinkercad's Size it up! tutorial provides a good starting point (https://www.tinkercad.com/learn/designs). In order to use other objects as placeholders to create holes within 3D objects, 3D shapes need to be grouped. The Group it! tutorial provides further information (https://www.tinkercad.com/learn/designs).

Lesson 5: You may wish to revisit resizing and grouping 3D objects from Lesson 4.

Lesson 6: You may wish to revisit the skills developed during the previous lessons.

Enhance your subject knowledge to teach this unit through the following training opportunities:

Online training courses
- Raspberry Pi Foundation online training courses

Face-to-face courses
- National Centre for Computing Education face-to-face training courses

Resources are updated regularly — please check that you are using the latest version.