

Unit 5.6 3D Modelling



Year Group: 5
Number of
Lessons: 4





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Introduction

These lessons use the Purple Mash tool 2Design and Make.

A [user guide to this tool](#) can be found in the [Guides and Resources area](#) of Purple Mash.

These lesson plans make use of the facility within Purple Mash to set activities for pupils which they can then complete and hand in online (2Dos). This enables you to assess their work easily as well as distribute resources to all pupils. If children have not opened 2Dos before, they will need more detailed instructions for how to do this. If your pupils do not have individual logins for Purple Mash, we can help you with this. Contact your school Purple Mash administrator or email us at support@2simple.com.

A teacher's guide to 2Dos can be found in the Teacher section: [2Dos Guide](#).

To force links within this document to open in a new tab, right-click on the link and then select 'Open link in new tab'.

Medium-Term Plan

Lesson	Aims	Success Criteria
1	To be introduced to 2Design and Make.	<ul style="list-style-type: none"> Children know what the 2Design and Make tool is for. Children have explored the different viewpoints in 2Design and Make whilst designing a building.
2	To explore the effect of moving points when designing.	<ul style="list-style-type: none"> Children have adapted one of the vehicle models by moving the points to alter the shape of the vehicle while still maintaining its form.
3	To understand designing for a purpose.	<ul style="list-style-type: none"> Children have explored how to edit the polygon 3D models to design a 3D model for a purpose.
4	To understand printing and making.	<ul style="list-style-type: none"> Children have refined one of their designs to prepare it for printing. Children have printed their design as a 2D net and then created a 3D model. Children have explored the possibilities of 3D printing.



Lesson 1 – Introduce 2Design and Make

Aim

- To be Introduced to the 2Design and Make tool.

Success criteria

- Children know what the 2Design and Make tool is for.
- Children have explored the different viewpoints in 2Design and Make whilst designing a building.

Resources

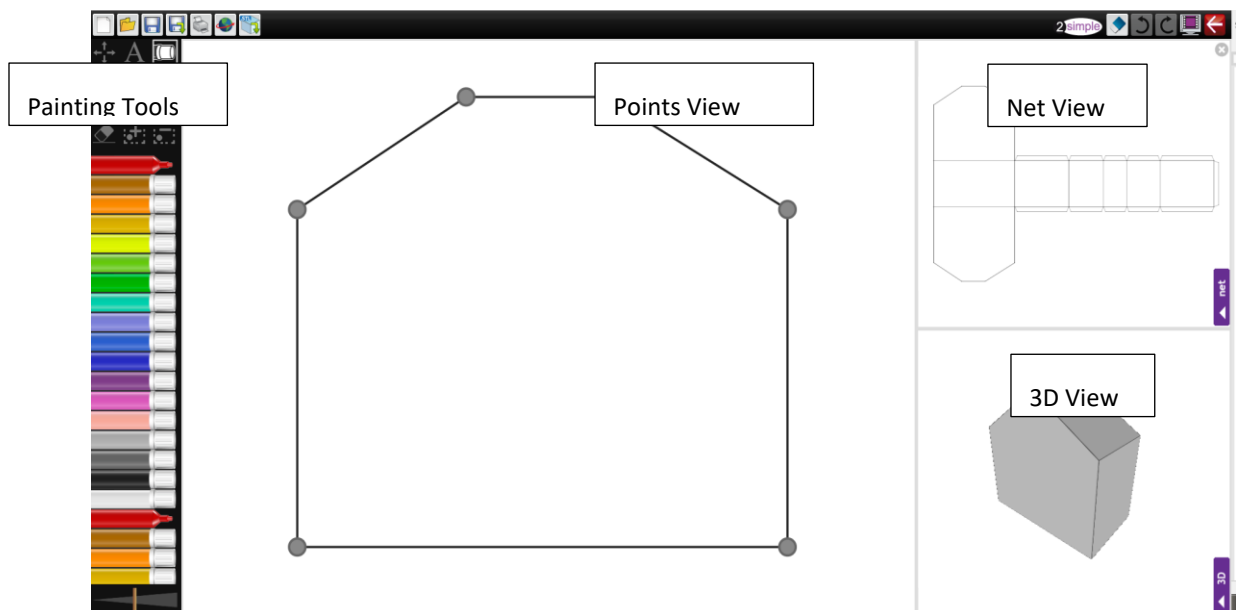
- 2Design and Make.

Activities

1. Show the children how to open 2Design and Make from the Creative Tools area of Purple Mash.



2. Look at the different types of available templates. Today, we are starting with the house; in future lessons, we will be exploring other templates and their functions.
3. Select the house and click OK.
4. Draw the children's attention to the four screen areas:
 - Painting Tools
 - Points View (the default large view)
 - Net View
 - 3D View





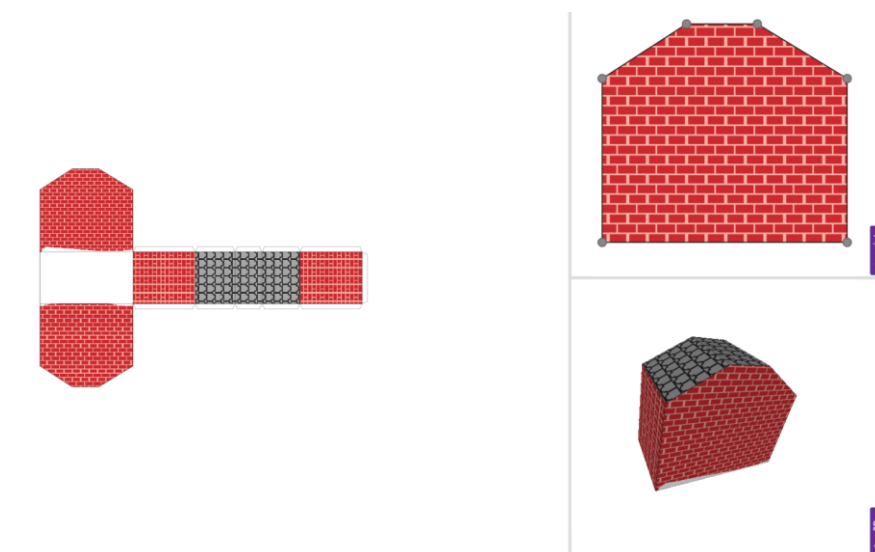
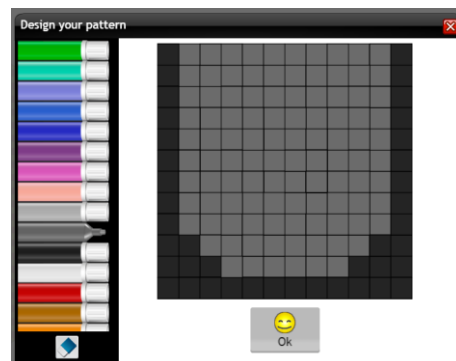
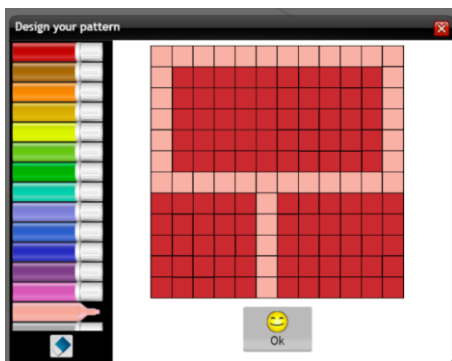


5. Show the children how to make a different view the main view by clicking on the purple tab of the view they desire.
6. Show the children how to use the zoom control for the main window and scroll around the image; this is useful for adding smaller details to the design.



7. Make the 3D View the main view and show the children how to spin the model in different directions by dragging the mouse or swiping. You can also alter the speed and stop the model moving temporarily by clicking without dragging.
8. Explore how the Net View relates to the 3D model by making the net the main view and using the Drawing tool to draw on one of the surfaces. You will see the 3D View change as well.
9. Next, demonstrate how the children could add repeating patterns to their design by using the Pattern Fill tool.

10. Click on the Pattern Fill tool icon . Click OK to accept the default image of red, green, yellow and blue squares and then click somewhere on the net. The area should be filled with the pattern.
11. You could show children how to create a brick or tile pattern, or challenge them to work it out for themselves. First clear the default pattern by using the  button on the Pattern Fill tool, then make a pattern like these for bricks and tiles:





12. Give children the chance to make their own building.
13. This week we are not focusing on moving the points in the Points View, but if the children do try this, they will find that it removes any drawing they have done. Points need to be set before adding the design. We will be exploring points next lesson.
14. Make sure that the children save their work to their Work folder.



Lesson 2 – Moving Points

Aim


- To explore the effect of moving points when designing.

Success criteria

- Children have adapted one of the vehicle models by moving the points to alter the shape of the vehicle while still maintaining its form.

Resources

- 2Design and Make
- Watch the help video 'Make a 3D model' in advance to help you decide whether to show it to the class or to use it as the basis for teaching the children about the effect of moving points. This is accessed by

opening 2Design and Make and clicking on the video button on the top right .

Activities

- Watch the help video 'Make a 3D model' or use it as the basis for teaching the children about the effect of moving points.
- Emphasise that in some templates, the points can only be moved within the pale blue boxes. This is to maintain the shape as a truck, pyramid, etc. In other templates, such as the house, there are no such restrictions.
- If the children struggle to work out which surface to draw on in the Net View, encourage them to try drawing a dot on the surface and then check the 3D View. They can then use the Undo control in the top right to remove the dot.



- In the 3D View, the slider at the top will alter the width of the vehicle.



- Ask the children to select a vehicle template from the choice of vehicles: van, car, bus, train, truck cab and end. They should try adapting the points to make their vehicle shape unique.
- Can they make a triple-decker bus or a monster truck? What about a train for giants or a racing car? Perhaps they can think of a different creative vehicle to design.



Lesson 3 – Designing for a Purpose

Aim

- To design a 3D model to fit certain criteria.

Success criteria

- Children have explored how to edit the polygon 3D models to design a 3D model for a purpose.

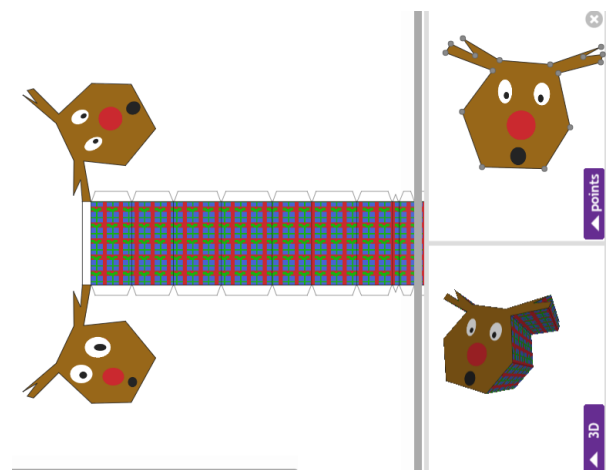
Resources

Unless otherwise stated, all resources can be found on the [main unit 5.6 page](#). From here, click on the icon to set a resource as a 2do for your class. Use the links below to preview the resources; right-click on the link and 'open in new tab' so you don't lose this page.

- You could display a selection of oddly shaped items for children to design for: a guitar, a cricket bat, some children's toys. Alternatively, children can use their imagination to decide upon an item.
- Set the [design brief activity](#) as a 2Do for the class. The design brief asks children to upload a picture of the item if possible. Using items of which images can easily be searched for online would be helpful.

Activities



- Today, the children are going to be designing packaging for an item. You could tell them the items to design for or they could select something themselves.
- Explain that it is up to the children which template they use but it needs to be something suited to the item and to the type of person who would receive it.
- Watch the help video called 'Adding and removing points'. This demonstrates that the polygon templates can be adapted to making alternative shapes. Ensure that the children understand how to add and remove points:
 - Have the Points View on the main screen
 - Click on the Add Points button
 - Click on the line where the new point should be added
 - The point will appear halfway along the line but can be dragged to a new position
 - There can be a maximum of 16 points (nodes)
- In this example, points have been added to a hexagonal prism to make a surprised reindeer covered in a repeating pattern of presents!



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5. Ask the children to fill in the design brief activity file as they go along. To have both 2Design and Make and the activity file open together, children should open a new tab on their browser and open Purple Mash on this tab as well. They should complete the sections about the design before they start using 2Design and Make. They can then insert screen prints from their finished design afterwards.
6. Show the children the Zoom tool icon at the top of the template. This will help them to be able to see the text in the template more clearly. 
7. To insert images of the item use some of the included clipart if it is appropriate, draw a picture using the drawing tools or import a picture by searching the Internet. First, save the image on your computer. In the design leaflet, click on the green arrow on an image box . Locate the file on your device and click Open. There are controls to rotate and zoom in on parts of an image on this screen. When you are happy with the image, click **Choose**.
8. How to create screenshots will depend upon which platform you are using 2Design and Make on. One way to do so is to use the Windows Snipping tool (type 'snipping tool' in the search bar on your computer to locate this). This enables you to capture a section of the screen and save this as an image file which you can then upload to the design. On an iPad, press the Home button and the Off button at the same time. Other devices will have different methods of creating a screenshot.
9. Make sure that children save both the 2Design and Make model and their design brief information sheet.



Lesson 4 – Printing and Making

Aim

- To refine and print a model.

Success criteria

- Children have refined one of their designs to prepare it for printing.
- Children have printed their design as a 2D net and then created a 3D model.
- Children have explored the possibilities of 3D printing.

Resources

- Access to a printer – preferably a colour one.
- 2Design and Make.
- Scissors and glue sticks.
- If you wish to print in 3D on a 3D printer and do not have one, you can search the Internet for local 3D printing services, though this obviously has cost implications. Many secondary schools have 3D printers. You could investigate having one of the class models printed to show children that this can be done.
- You might wish to search for a video about how 3D printers work to show the children. For example, [3D Printing](#) (please note this is not a Purple Mash video).

Activities

1. In this lesson, children will have a chance to refine and improve one of their models.
2. They will then print the net of the model and cut, fold and stick it to make a 3D model.
3. Depending upon the number and speed of your printers, you might want children to finish their models ready for printing and then print a few at a time to avoid queues at the printer.
4. Talk with the children about the possibilities of 3D printing. Instead of ink, 3D printers can print with plastic, metal and even food!



5. These printers require a file called an '.stl' file. You can save work as an '.stl' file in 2Design and Make by clicking the button. This file can then be sent to a 3D printer. The printer prints many layers of plastic to build up the 3D model. You might wish to search for a video about how 3D printers work to show the children.
6. Explain the aim of this last session and the method that you wish to use to organise the printing to the children.
7. Children should get their design ready for printing and save it. When they are ready to print, they should click on the Print button. This creates a pdf file of the Net View, which they then need to open and print on the printer.
8. They then need to cut out the net, fold it along the lines and stick their model together.



Assessment Guidance

The unit overview for year 5 contains details of national curricula mapped to the Purple Mash Units. The following information is an exemplar of what a child at an expected level would be able to demonstrate when completing this unit with additional exemplars to demonstrate how this would vary for a child with emerging or exceeding achievements.

Assessment Guidance	
Emerging	With support, children can use the ready-made templates within using 2Design and Make to design the recognisable form of a building (Lesson 1). They will evaluate, refine, edit and adapt models to suit a design brief (Lesson 2, 3 & 4).
Expected	<p>Children will use the ready-made templates within 2Design and Make to design the recognisable form of a building (Lesson 1). They will evaluate, refine, edit and adapt models to suit a design brief (Lessons 2, 3 and 4).</p> <p>Most children can design a 3D model to fit certain criteria using a template from 2Publish. They can present their work making use of screenshots incorporated within their template (Lesson 3).</p> <p>Children designs demonstrate that they have considered the brief and can discuss changes they intend to make to their designs in order to refine them for printing (Lesson 4).</p> <p>Most children will invite feedback which focuses on how well their designs meet an intended purpose, explicitly, the skill of editing existing polygons.</p>
Exceeding	Using 2Design and Make, children demonstrating great depth can use the geometric shapes and the addition of up to 24 points to design the recognisable form of a building (Lesson 1). They will evaluate, refine, edit and adapt models to suit a design brief (Lesson 2, 3 and 4).