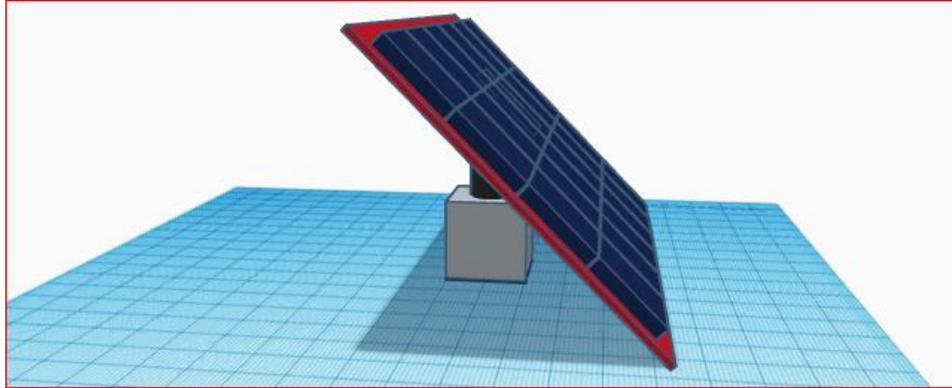


# Creating a 3D model of a solar panel: 1 hour lesson



## Overview

Learners will create a digital 3D model of a solar panel. They will use different shapes and move these around. They will learn how to duplicate the shapes and save their work.

## Learning objective

- To construct a digital 3D model of a solar panel

### “I can” statements:

- I can select, move and edit 3D shapes
- I can group and duplicate multiple shapes to increase efficiency
- I can rotate and lift shapes above a flat plane

### “I know” statements

- I know that I can join more than 1 shape together to create a new (compound shape)
- I know that I can duplicate shapes to increase efficiency

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*(Note: adapt the above to fit in with the structure of your own lesson plans)*

## Key vocabulary

Select, move, rotate, edit, group, duplicate, plane, snap (to grid), save

## Preparation

**Software:** [Tinkercad](#) is an online application that works on a range of browsers and on a range of devices. Teachers will need to create a [FREE educator account](#). Once created, students that join will be in 'safe mode'. Once enabled students will not be able to share projects publicly, post comments, upload images, collaborate with other Tinkercad users, or contact customer service. Once you have a educator account you can create your own [classes of students](#).

### Subject knowledge:

- An understanding that digital 3D shapes can be moved, edited, and duplicated.
- An understanding that 'shortcut keys' are useful to the user and that commands on a tablet may be different to those on a laptop/desktop. Useful [help sheet](#).

### You will need:

- A Tinkercad account so you can model the creative process
- [Video 1](#) and [Video 2](#). These can be used to model the creative process to the students or used as an online resource to support the students to work independently.

## Assessment opportunities

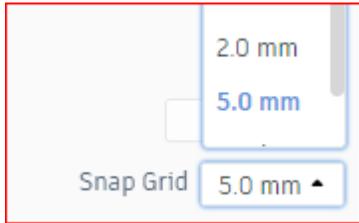
- **Activity 1:** Learners can demonstrate their understanding of how 3D shapes can be manipulated. (e.g., copied, pasted, edited, grouped)
- **Activity 2:** Learners can show their knowledge of 3D modelling tools by producing a 3D model of a solar panel.

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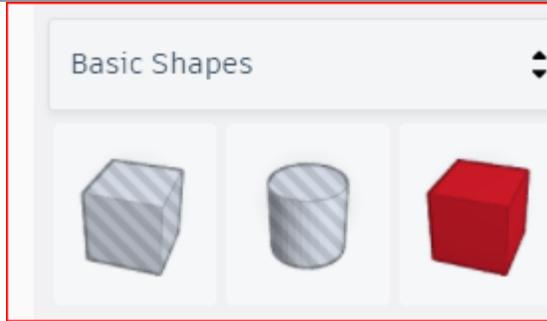
## Outline plan (1 hour: adapt to suit your own situation)

<p><b>Introduction</b></p> <p>5 mins</p>	<p>Explain that 3D objects can be made from materials such as cardboard, clay or paper. Alternatively, a <b>digital model</b> can be created using software. This is called <b>Computer Aided Design</b> (CAD). The computer aids (helps) you to create a design.</p> <p>Show the learners the lesson objective and explain that they will be creating a 3D model of a <a href="#">solar panel</a>.</p>
<p><b>Getting started</b></p> <p>5 minutes</p>	<p>Students will need to log in to a Tinkercad account. The safest way is to use <a href="#">classes of students</a>.</p>
<p><b>Activity 1</b></p> <p>10 minutes</p>	<p><b>Changing the snap guide value and using cuboids as a basis for the solar panel.</b></p> <p>Explore the snap guide (near the bottom of the screen). This ensures that the shapes can only move to certain points on the grid. At the start 5mm is the best choice because learners can see the shape 'jump' 5mm at a time.</p>  <p>Drag a <b>red cube</b> from the right-hand menu on to the workspace in the centre</p> <p>Explore how height, width and depth can be <u>edited</u> to create a <b>cuboid</b></p>

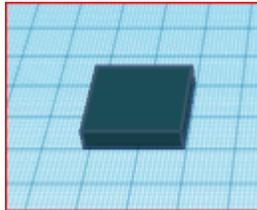
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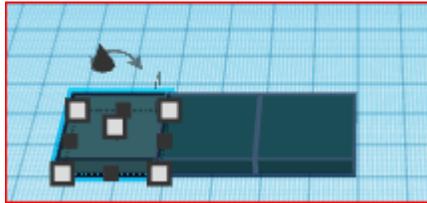
Encourage learners to change the colour of the cuboid to dark blue. This represents a solar cell.



## Activity 2

## Duplicating 3D objects

10 minutes



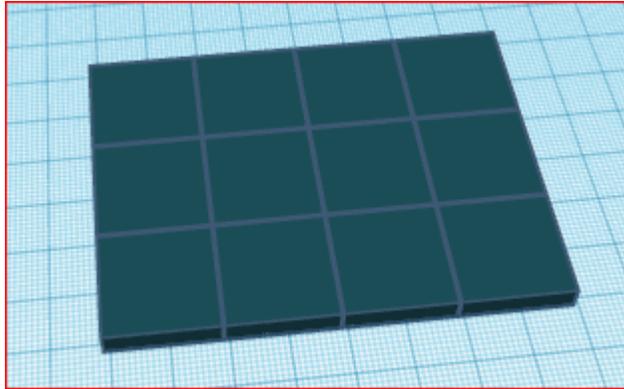
Explain to the learners that using the '*Duplicate and repeat*' tool (near top left) produces a copy of the 3D objects overlapping the existing 3D objects. The copy can then be dragged immediately to another position (on a laptop the arrow keys can be used).

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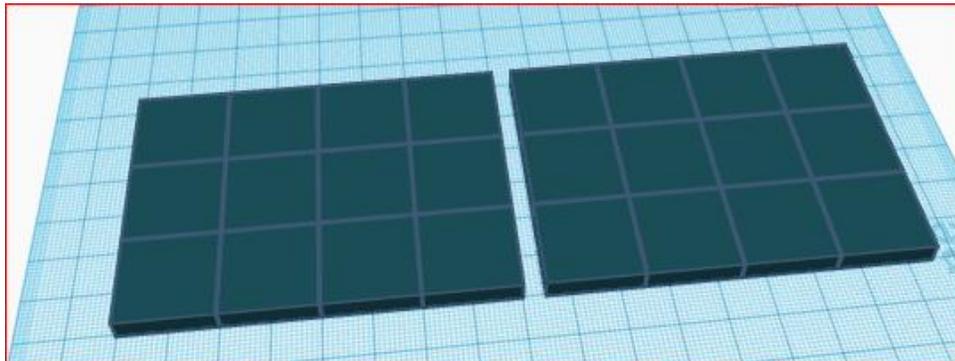
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More than one cuboid can be highlighted, then using the 'Duplicate and repeat' these can be replicated.



**This solar module consists of 12 solar cells.** (Wikipedia [diagram](#))

The solar module can be duplicated to create a whole **solar panel**.



### Activity 3

The solar panels will need to be mounted on a backing board. This can be of a different colour and can be thinner than solar panels.

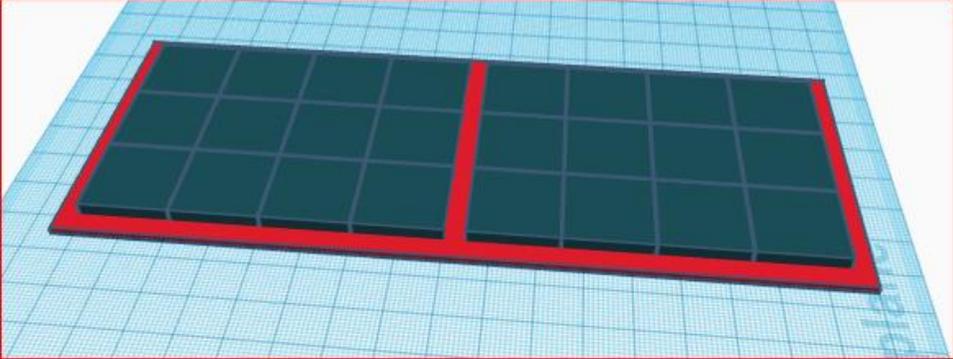
10 minutes

This is explained in [video 1](#) and consists of a thin cuboid that surrounds the solar panels.

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<p><b>Activity 4</b></p> <p>15 mins</p>	<p><a href="#">Video 2</a> explains how the solar panel can be</p> <ol style="list-style-type: none"> <li>1. Rotated to increase efficiency of energy creation (away from the horizontal position)</li> <li>2. Mounted on a stand using other shapes (eg a cylinder)</li> </ol> <p>Projects will be saved</p>
<p><b>Plenary</b></p> <p>5 mins</p>	<p>Review of the lesson objective and key vocabulary</p> <p>A personalised family account can be created for Tinkercad  <a href="https://www.tinkercad.com/join">https://www.tinkercad.com/join</a></p>

Created by Richard Smith [www.amazingict.co.uk](http://www.amazingict.co.uk)

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