

Introduction to product design for KS2 and KS3

Overview of the workshop task:

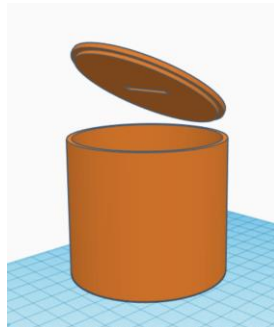
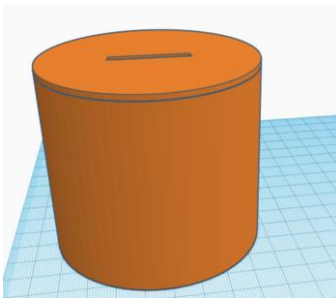
This task introduces the basics of using a simple CAD software to design a functional product.

Pupils will consider what is involved in designing a money pot that works with all the different UK coins - so every UK coin must be able to fit through the slot in the top of the money pot.

To ensure that the slot in the money pot is the correct size, pupils will take measurements of either real coins, or they will do internet research on the [Royal Mint website](#) and record the measurements of each coin.

Once they have coin measurements, they will follow either a written or video tutorial and draw a simple money pot design in Tinkercad. In advance of the lesson, the teacher can download scaled models of UK coins ([see slide 9](#)) and pupils use these to test whether the coins fit through the slot of the top of the money pot.

There is the option of an extension task where pupils design their own money pot.



Task to Design a money pot using Autodesk Tinkercad

Overview of resources for use by teachers and pupils

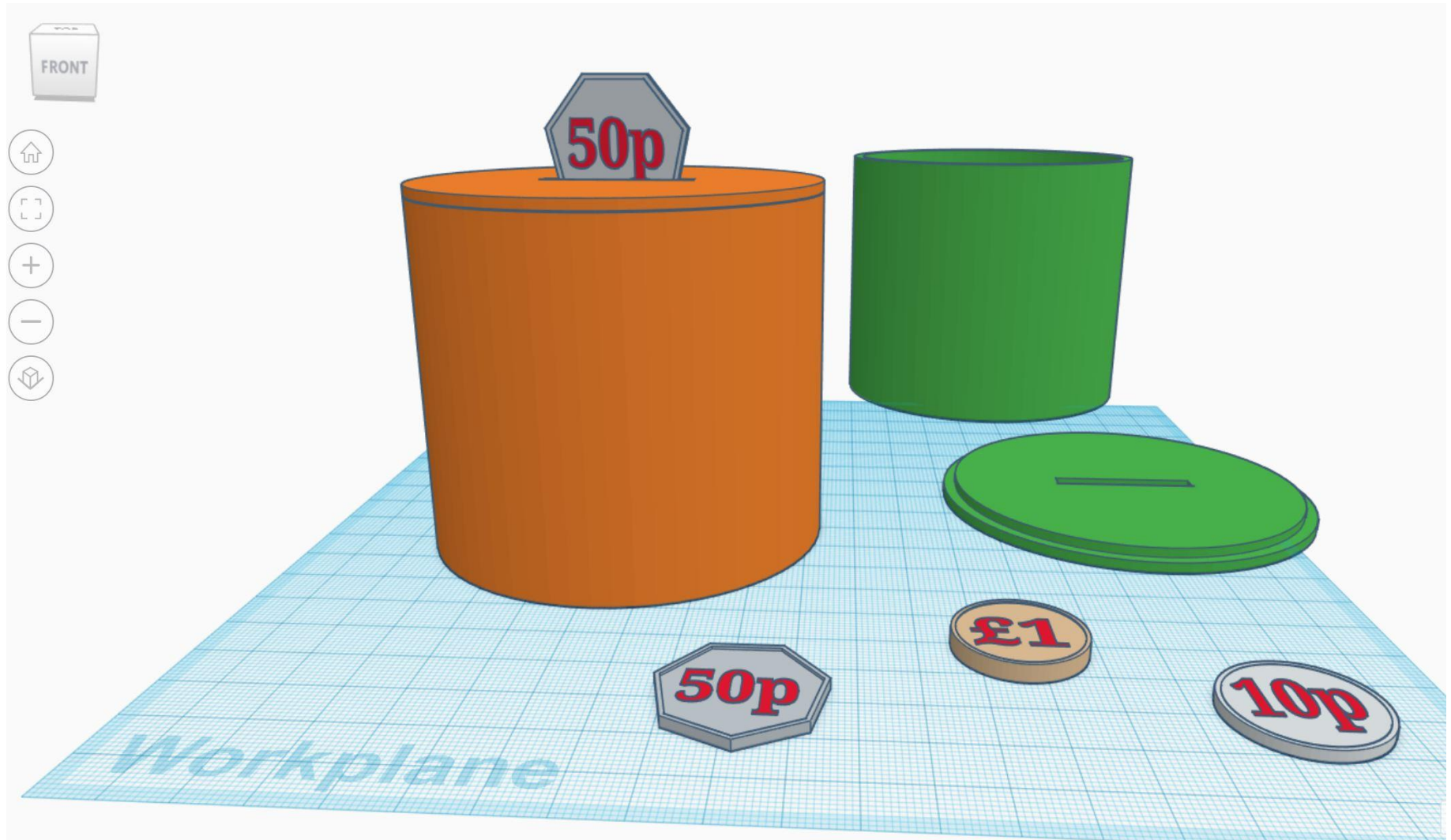
1. Introduce Tinkercad and try it out – use the [Mouse control diagram](#), [Basic instructions](#) and [Practising basic Tinkercad functions](#) documents from our outreach website, [click here](#).
2. Introduce the money pot design task – [use slide 3](#).
3. Discuss need to take measurements to ensure the pot works. Print copies of the money pot measurement sheet (slide 5) and complete sizes for the money hole – either measure some real coins or pupils can find the measurement on the [Royal Mint website](#). If you think the children might benefit, use [slide 4](#) for them to practice cm to mm. During WMG outreach workshops, we find a lot of children lack confidence in using mm, hence this worksheet has been included.
4. Pupils use Tinkercad to draw the money pot – guided by either the [video tutorial](#) or [written tutorial](#). * *see note below*.
5. Optional use of the links to scaled coin Tinkercad models to test the money hole size is correct – teacher needs to download coin models in advance - see the instructions on [slide 9](#) . There could also be other related money tasks, e.g. an imaginary trip to the shop with a £5 note, you buy something costing say £1.87, you must put the coins for your change in the money pot.
6. **Extension task to create your own moneypot design:** A further task would be for pupils draw their own money pot design on paper and annotate their drawing with the key measurements using the guidance on the measurement sheet ([slide 5](#)). To give them some ideas of other design possibilities you could use [slide 6](#).
7. In addition there are brief instructions for making 2 additional money pot design ideas ([slides 7](#) and [8](#)).

* Video tutorials have been used extensively with school pupils during our outreach work. We play the video tutorial to the whole class as part of the workshop delivery. Some pupils like to use the written tutorial alongside the video. You can use the videos online, or download them – to do this, start the video and as it is playing, right click on the centre of the screen and select **Save video as....**

If you have a class set of headphones, pupils can watch the video tutorial individually and get the benefit of discovering how best to use it to help them learn. Once they have watched it, they can minimise it on their screen, and return to it later to check certain points.



Draw a money pot in Tinkercad



How do you convert from centimetres to millimetres?

Computer aided design software such as Tinkercad uses mm and not cm. You need to be able to use your ruler to take measurements in mm.

Look at these measurements on your ruler and fill in the gaps on this diagram

$3.5\text{cm} = \underline{\quad} \text{mm}$

$3.2\text{cm} = \underline{\quad} \text{mm}$

$6.3\text{cm} = \underline{\quad} \text{mm}$

$9.4\text{cm} = \underline{\quad} \text{mm}$

$11.6\text{cm} = \underline{\quad} \text{mm}$

$2\text{cm} = \underline{\quad} \text{mm}$

$4.6\text{cm} = \underline{\quad} \text{mm}$

$7.7\text{cm} = \underline{\quad} \text{mm}$

$10\text{cm} = \underline{\quad} \text{mm}$

$12.2\text{cm} = \underline{\quad} \text{mm}$

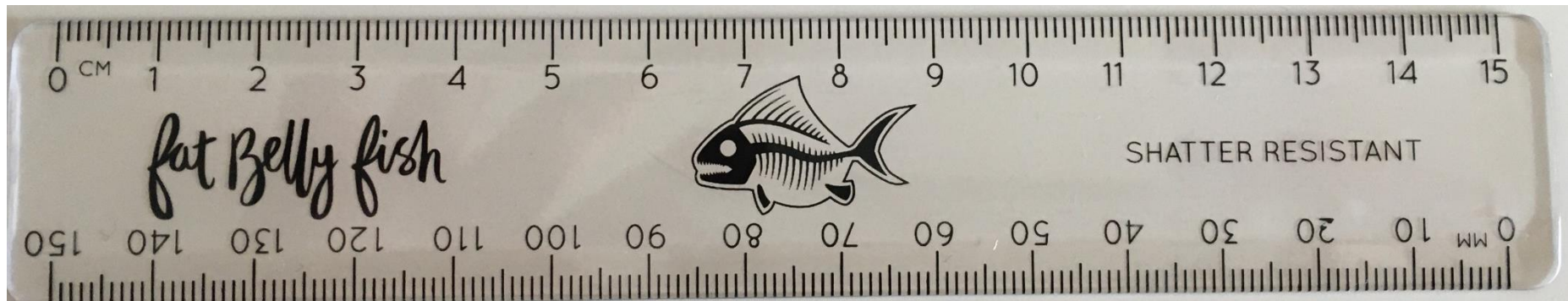
$1\text{cm} = \underline{\quad} \text{mm}$

$5.9\text{cm} = \underline{\quad} \text{mm}$

$8.1\text{cm} = \underline{\quad} \text{mm}$

$10.1\text{cm} = \underline{\quad} \text{mm}$

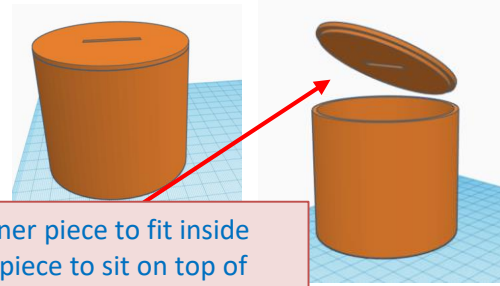
$14.9\text{cm} = \underline{\quad} \text{mm}$



Money Pot Measurement Sheet

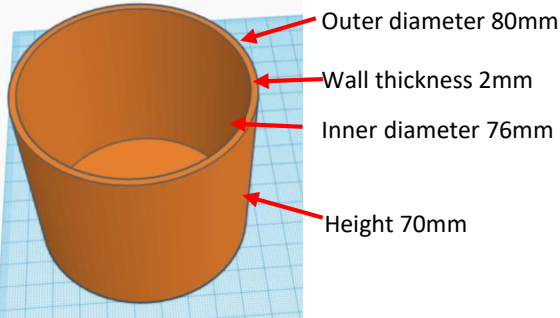
Before starting your Tinkercad drawing, decide on the measurements for your Money Pot

See the example below of the measurements of the pot made in the Money Pot tutorial.
Decide on the measurements for your money pot and write them in boxes below.

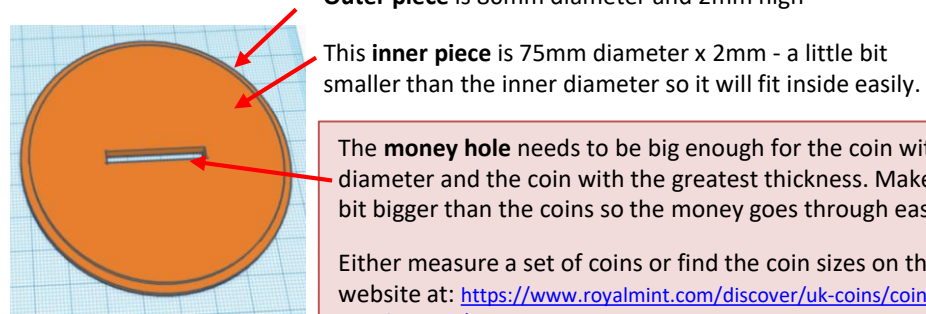


The pot top has an inner piece to fit inside the pot and an outer piece to sit on top of the pot.

Measurements for the pot made in the tutorial



Pot top made in the tutorial

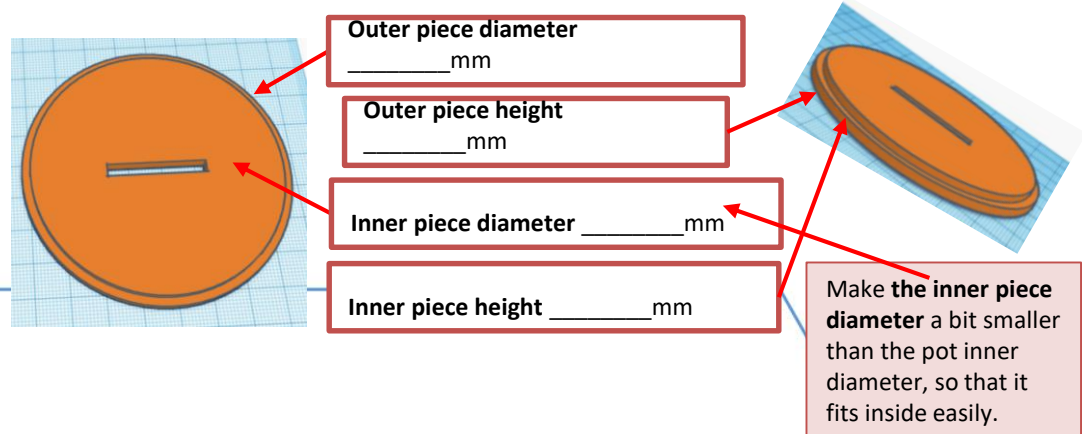
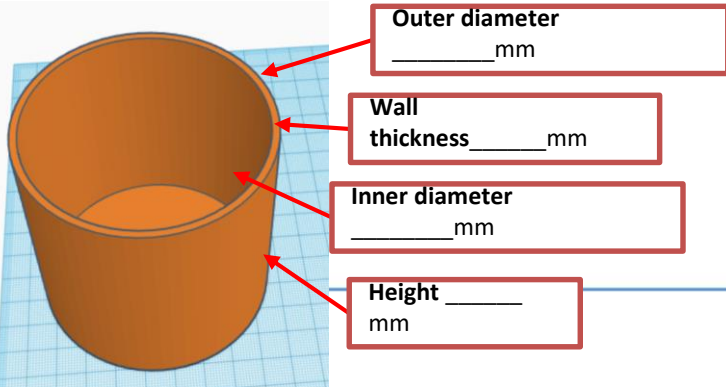


The **money hole** needs to be big enough for the coin with the biggest diameter and the coin with the greatest thickness. Make sure you make it a bit bigger than the coins so the money goes through easily.

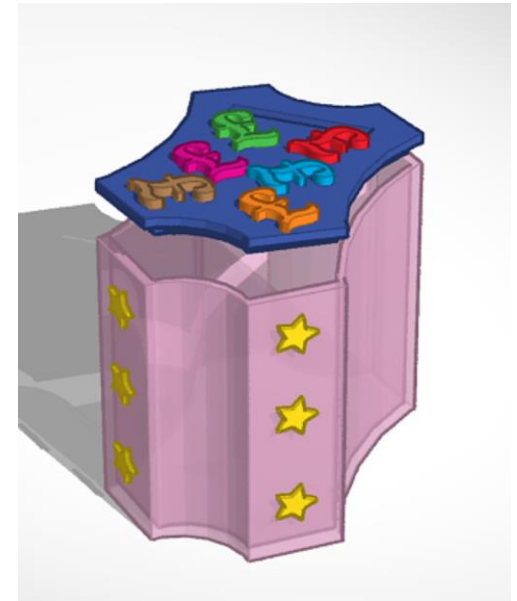
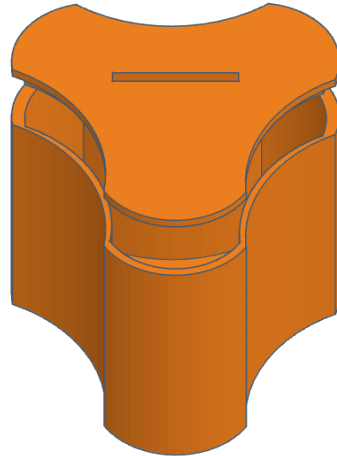
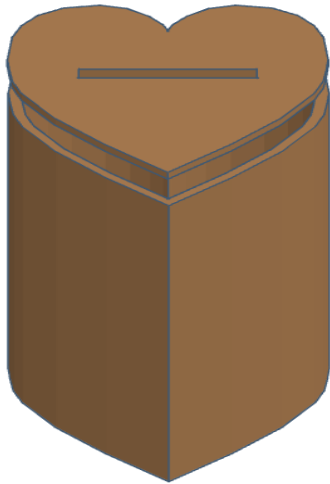
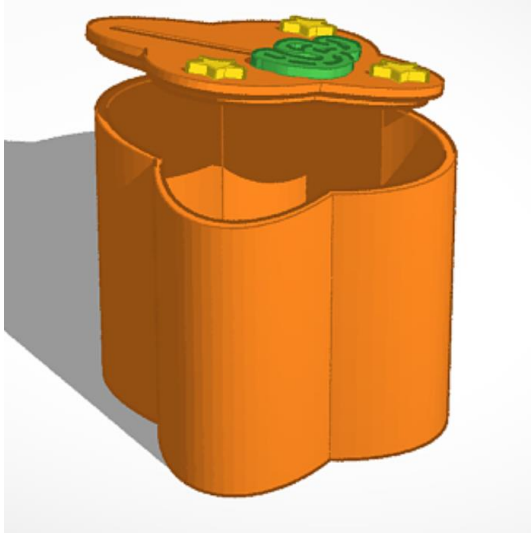
Either measure a set of coins or find the coin sizes on the Royal Mint website at: <https://www.royalmint.com/discover/uk-coins/coin-design-and-specifications/>

Write the **money hole size** here : **Width** _____ mm **Length** _____ mm

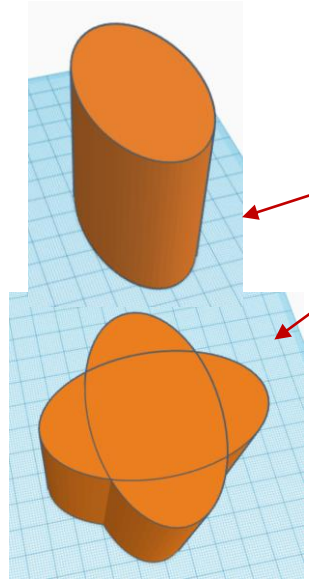
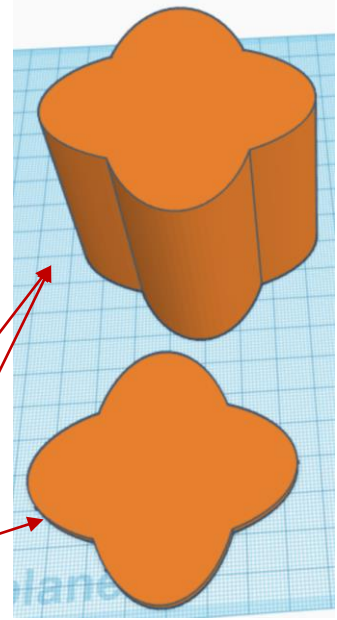
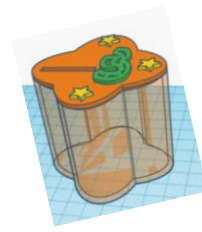
Your pot measurements



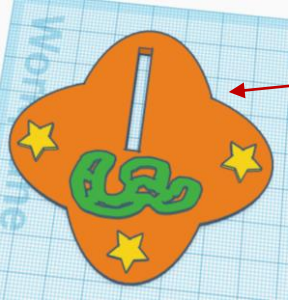
Create your own money pot design



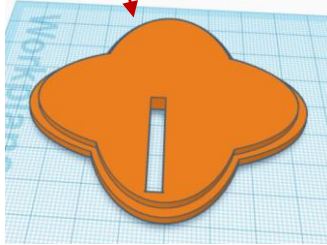
Overview of how to make pot design 1



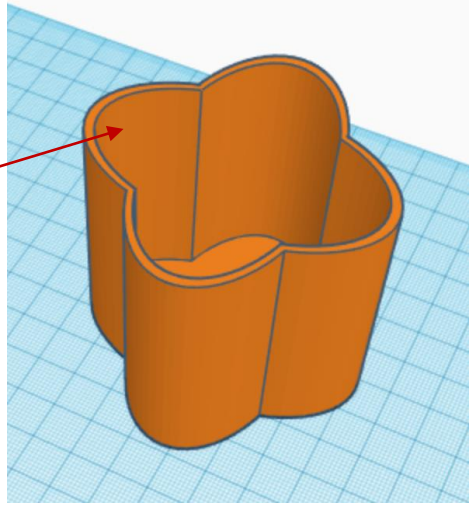
- 1) Begin with a cylinder shape and resize it to an oval shape.
- 2) Duplicate the oval and spin the copy round 90° to form this shape.
- 3) Group the 2 ovals to form this shape.
- 4) Make a copy of this shape and reduce the height of copy to 2mm. You will use this later to make the top.



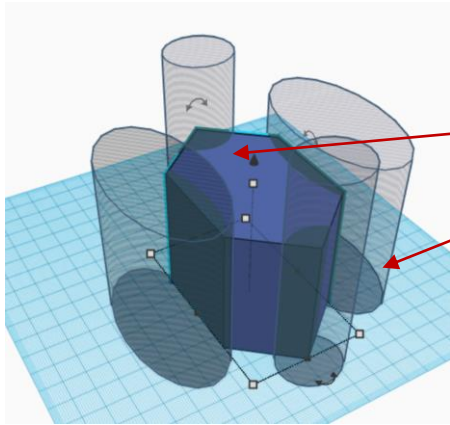
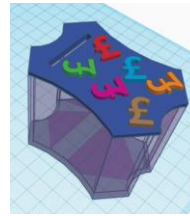
- 6) Use the copy shape you made earlier to form the pot top.
- 7) Decorate the lid to your own design. This uses the Star shape and the Scribble tool.



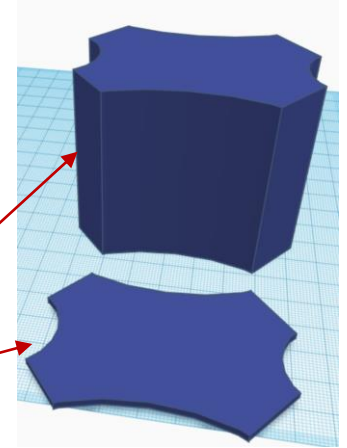
- 5) Duplicate the shape, change the copy to a hole shape, resize it, centre it, then Group to cut and shell out the pot.



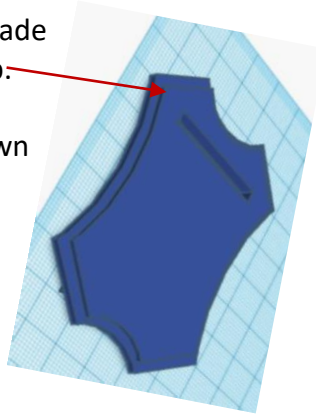
Overview of how to make pot design 2.



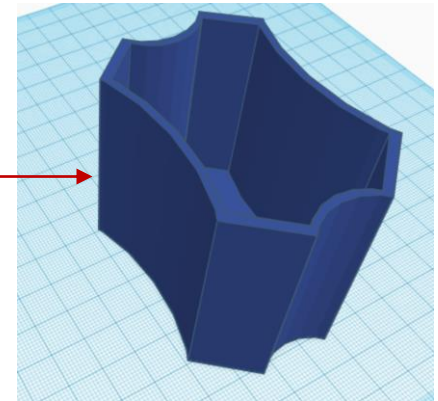
- 1) Begin with a Polygon shape – change number of sides to 6.
- 2) Various Cylinder hole shapes are resized and placed to cut away from the polygon to form this shape.
- 3) Make a copy of this shape and reduce height of copy to 2mm. You will use this later to make the top.



- 5) Use the copy shape you made earlier to form the pot top.
- 6) Decorate the lid to your own design. This uses the Text tool.



- 4) Duplicate the shape, change the copy to a hole shape, resize it, centre it, then Group to cut and shell out the pot.



Using Tinkercad coin models with money pot designs

Here are links to Tinkercad scaled models of coins which you can copy and make available in your Tinkercad parts collection for your pupils to use with their Tinkercad money pot designs.

See the [Using Tinkercad coin models video](#) for instructions on how to access and use the coin models

£2 <https://www.tinkercad.com/things/dWu9U7WHteO-2-coin>

£1 <https://www.tinkercad.com/things/66ZdlIWi2n8-1-coin>

50p <https://www.tinkercad.com/things/1n4pr1CuTG8-50p-coin>

20p <https://www.tinkercad.com/things/IANsBLQetvP-20p-coin>

10p <https://www.tinkercad.com/things/3DowisstB7l-10p-coin>

5p <https://www.tinkercad.com/things/01kmnGoeV2u-5p-coin>

2p <https://www.tinkercad.com/things/i5ISMRkjq0l-2p-coin>

1p <https://www.tinkercad.com/things/hfPBonx7PO8-1p-coin>

