TINKERCAD–SHAPE YOUR IDEAS

BRIDGE COURSE

GRADE-7

PRIMARY PREVIEW

- Understanding 2D and 3D Shapes
- Introduction to Tinkercad
- Starting Tinkercad
- Components of the Tinkercad 3D Design Window
- Working with Shapes
- Saving your Design
- Sharing your Design

In school and daily life, you often need to make models, solve problems or share ideas. Drawing by hand can take a lot of time. Software like AutoCAD, Blender, SketchUp, SolidWorks and others help with designing. In this chapter, you will learn about Tinkercad, a fun and easy computer-aided design tool that lets you create 3D models and show how things work on your computer.

UNDERSTANDING 2D AND 3D SHAPES

In daily life, you must have seen many two-dimensional and three-dimensional shapes. Understanding the basic difference between them is important, especially when you are going to learn about three-dimensional modelling and design.

WHAT ARE TWO-DIMENSIONAL SHAPES?

Two-dimensional shapes have length and breadth, but no depth or height. They can be drawn on a flat surface and have an area and perimeter. These shapes are visible only on a screen or paper.

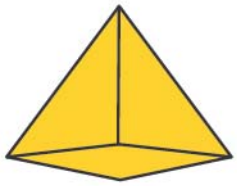
Some examples of two-dimensional shapes are:

Circle Rectangle Square

WHAT ARE THREE-DIMENSIONAL SHAPES?

A three-dimensional shape has three dimensions: length, width and height. These shapes take up space and can be held in real life. These shapes can be viewed from different angles.

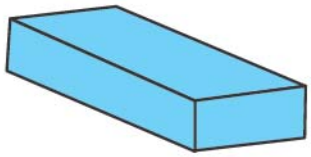
Some examples of three-dimensional shapes are:



Square-based pyramid

Triangular prism

Cone



Cuboid

INTRODUCTION TO TINKERCAD

Tinkercad is an easy-to-use and simple 3D design and modelling software. It runs on a web browser. It was created by former Google engineer **Kai Backman** and his friend **Mikko Mononen** in **2011**. It allows building 3D models and makes designing easy and simple.

FEATURES OF TINKERCAD

Some of the key features of Tinkercad are:

- **User-friendly Interface:** Easy for beginners with drag-and-drop 3D model creation.
- **3D modelling and printing:** Create 3D models and export them for printing.
- **Shape combination:** Combine simple shapes to form complex geometries.
- **Collaboration:** Share projects and collaborate with others for joint design work.

APPLICATIONS OF TINKERCAD

Some of the key applications of Tinkercad are:

- **3D printing:** Design models for 3D printing with ease.
- **Educational tool:** Used in schools for teaching 3D design, engineering and electronics.
- **Product prototyping:** Helps engineers create quick prototypes and visualise designs.
- **Engineering education:** Helps students learn design, measurement and mechanics.

FACT File

Tinkercad was acquired by Autodesk in **May 2013**.

RAPID RECALL

Tick (✓) if you know this.

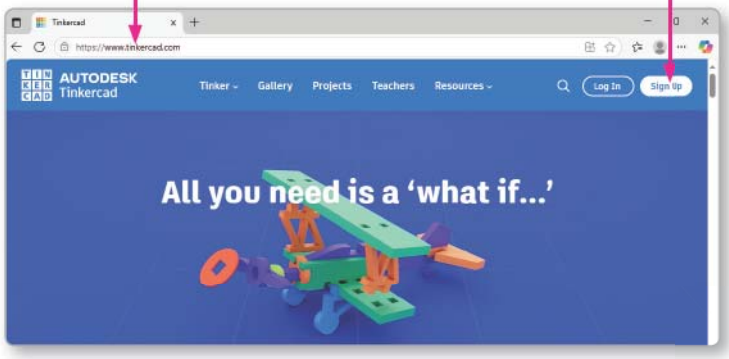
1. Two-dimensional shapes have length and breadth, but no depth or height.
2. Tinkercad is an easy-to-use and simple 3D design and modelling software.

STARTING TINKERCAD

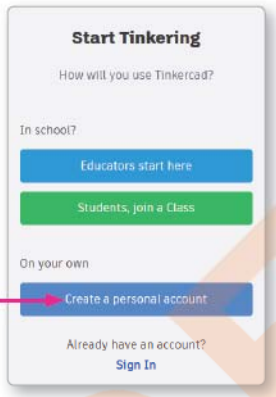
To use Tinkercad, you need to create an account on the Tinkercad website. You can join as a student, educator or create a personal account. To start Tinkercad, follow the given steps:

1 Open your web browser and go to https://www.tinkercad.com

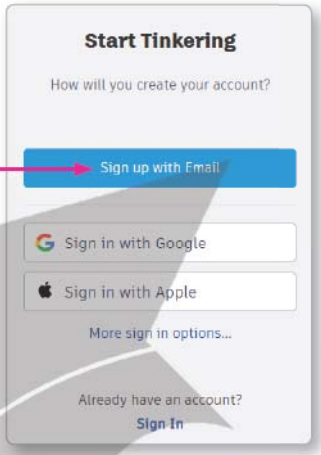
2 Click on the **Sign Up** button.



3 Click on the **Create a personal account** button.



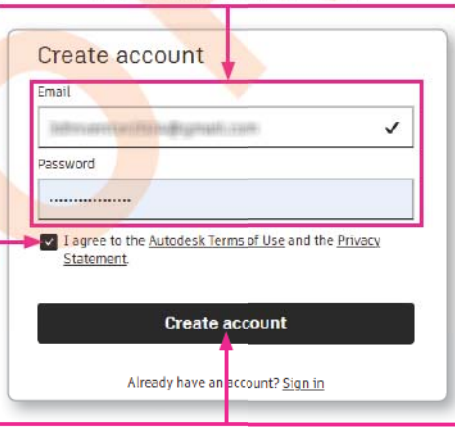
4 Click on the **Sign up with Email** button.



5 Enter the desired information from the drop lists.

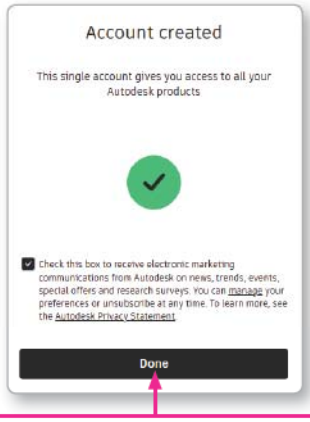
6 Click on the **Next** button.

7 Enter your email id and password in the desired text box.



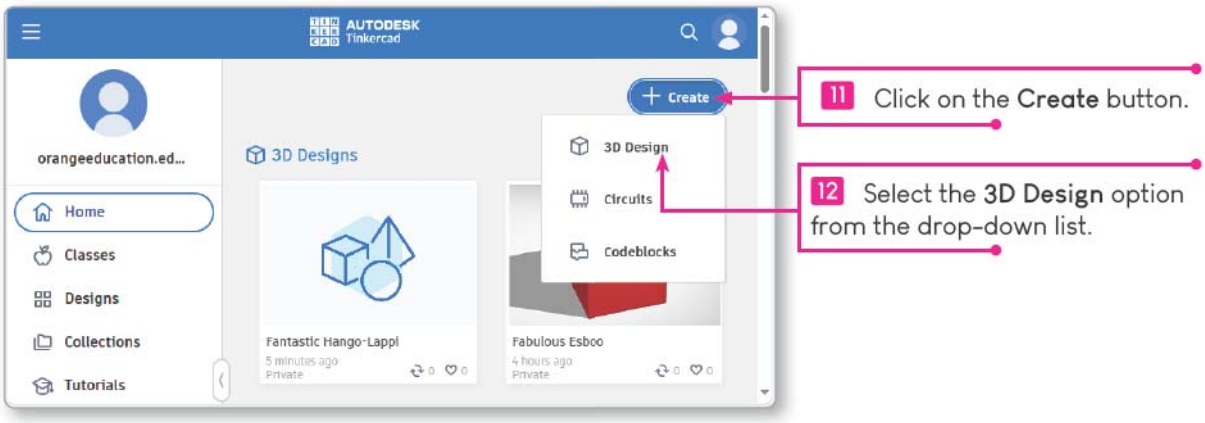
8 Click on the checkbox.

9 Click on the **Create account** button.



10 Click on the **Done** button.

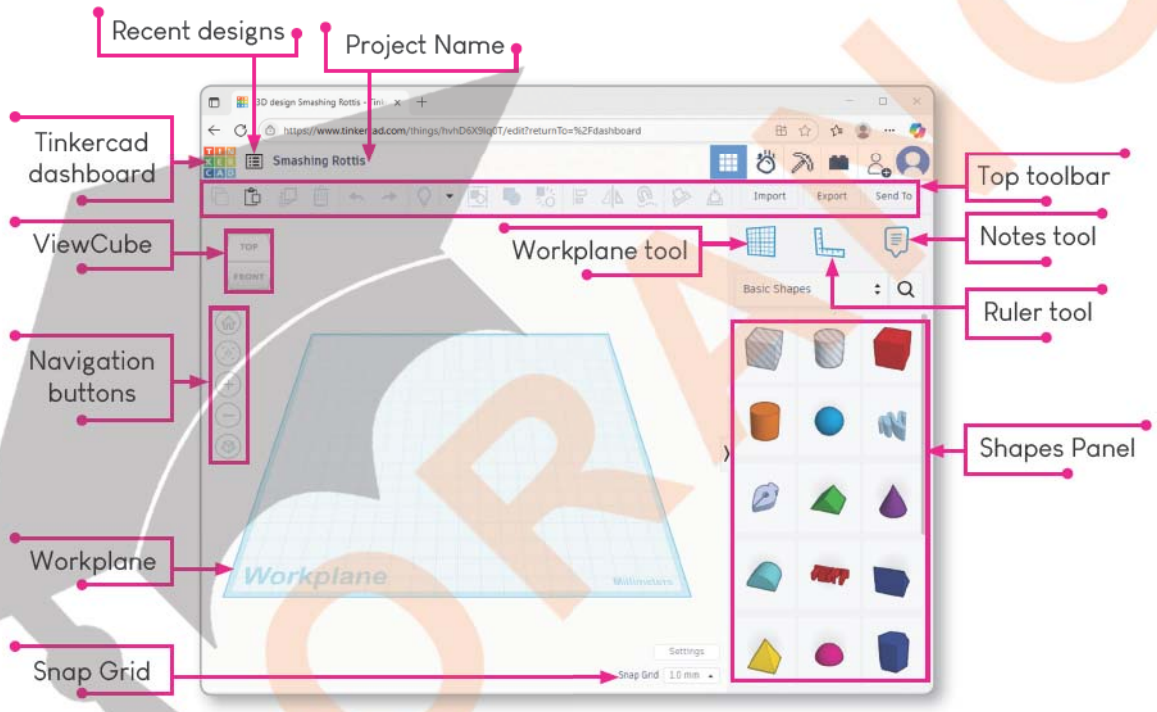
This will take you to the home screen where you can start using Tinkercad.



It will open the 3D design workspace, where you can start creating and manipulating 3D models using the available tools.

COMPONENTS OF THE TINKERCAD 3D DESIGN WINDOW

The main components of the Tinkercad 3D design window are:



- **Tinkercad dashboard:** This Tinkercad logo takes you back to the dashboard.
- **Recent designs:** You can click this button to view the list of designs you have recently opened.
- **Project Name:** It displays the title of the current project. Tinkercad assigns a random name to your project, but you can rename it.
- **Top Toolbar:** This includes tools like Mirror, Paste, Copy, Undo, Align, Import, Duplicate, Delete, Redo, Visibility, Ungroup and Export, helping users manage and modify their designs easily.

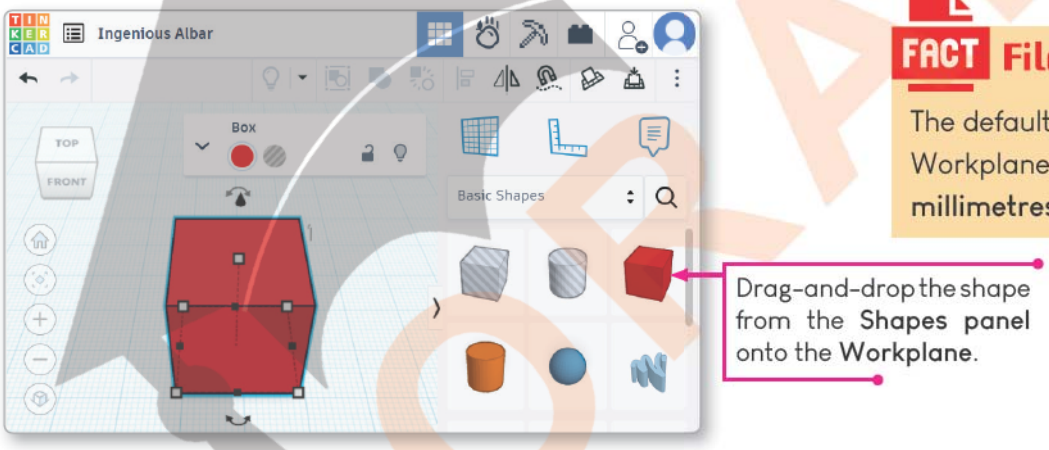
- **ViewCube:** It helps you change the view angle of your design by clicking different faces of the cube to switch between TOP, FRONT, LEFT, RIGHT, BACK and BOTTOM views.
- **Workplane:** The flat surface where you place and manipulate 3D objects for your designs.
- **Navigation Buttons:** These tools allow you to reset the view, fit objects on the screen, zoom in/out and switch between flat and perspective views for easy navigation.
- **Snap Grid:** It allows you to adjust the movement intervals of objects on the Workplane. You can also turn off the Snap Grid for free movement.
- **Shapes Panel:** It displays basic 3D shapes and objects that you can drag and drop onto the workplane to build your design.
- **Workplane Tool:** It allows you to create and move the workplane, which is the surface where you place objects in 3D space.
- **Ruler Tool:** It allows you to measure distances and align objects accurately in your design.
- **Notes Tool:** It enables you to add notes or labels.

WORKING WITH SHAPES

Shapes are the building blocks of designs. You can choose from basic 3D shapes like cubes, spheres and cylinders, then manipulate them on the workplane to create complex models.

ADDING SHAPES

You can add any shape from the Shapes panel and customise it to fit your project needs.



FACT File

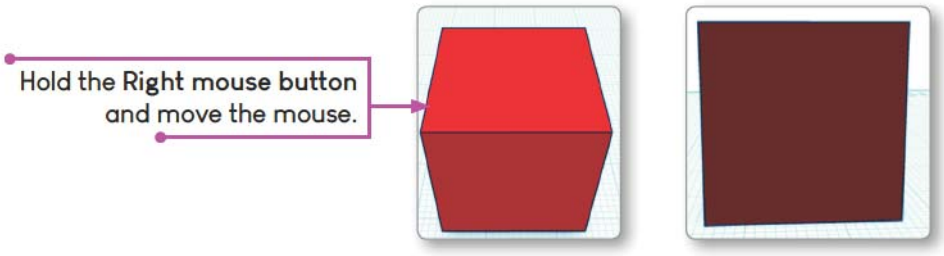
The default size of the Tinkercad Workplane is **200 x 200 x 200 millimetres.**

Once you release the shape on the Workplane, it will appear in your design.

NAVIGATING WORKSPACE

Tinkercad's Viewport is crucial for smooth design and accurate modelling. Tinkercad offers four primary navigation techniques:

- **Orbit:** You can orbit around objects to view them from different angles.

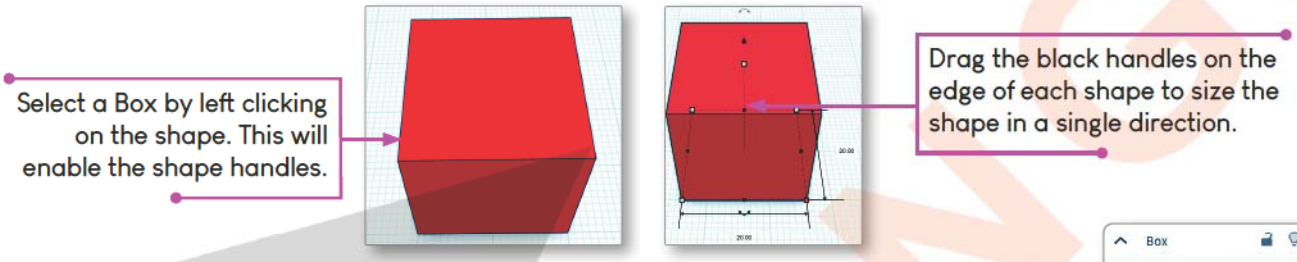


You can also hold **Ctrl + Left mouse** and move the mouse to orbit around the object.

- **Fit selection into view:** Press F to automatically adjust the view to fit the selected object.
- **Pan:** Move the view horizontally or vertically without rotating. Use the **Middle mouse button** or **Shift + Right mouse.**
- **Zoom:** Adjust the view to focus on specific details or the entire design. You can use +, – or scroll using the **mouse wheel.**

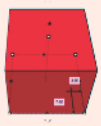
RESIZE, ROTATE AND MOVE SHAPES

To resize the shape, follow the given steps:



The Shape properties panel, also known as the **Inspector panel**, is a tool in Tinkercad that allows you to view and modify the properties of the selected shape or object in your project. This panel provides a range of options for customising the length, width, height, steps and more.

Similarly, you can resize and rotate using the following:

Action	Image	Description
Resize shape (Using white handles)		You can drag the white handles on the corners to resize in two directions at once.
Rotate shape		You can use the curved arrows to rotate each shape.
Move shape		Click on the shape and drag the mouse to move the selected shape in the required direction.

HINTS & HACKS

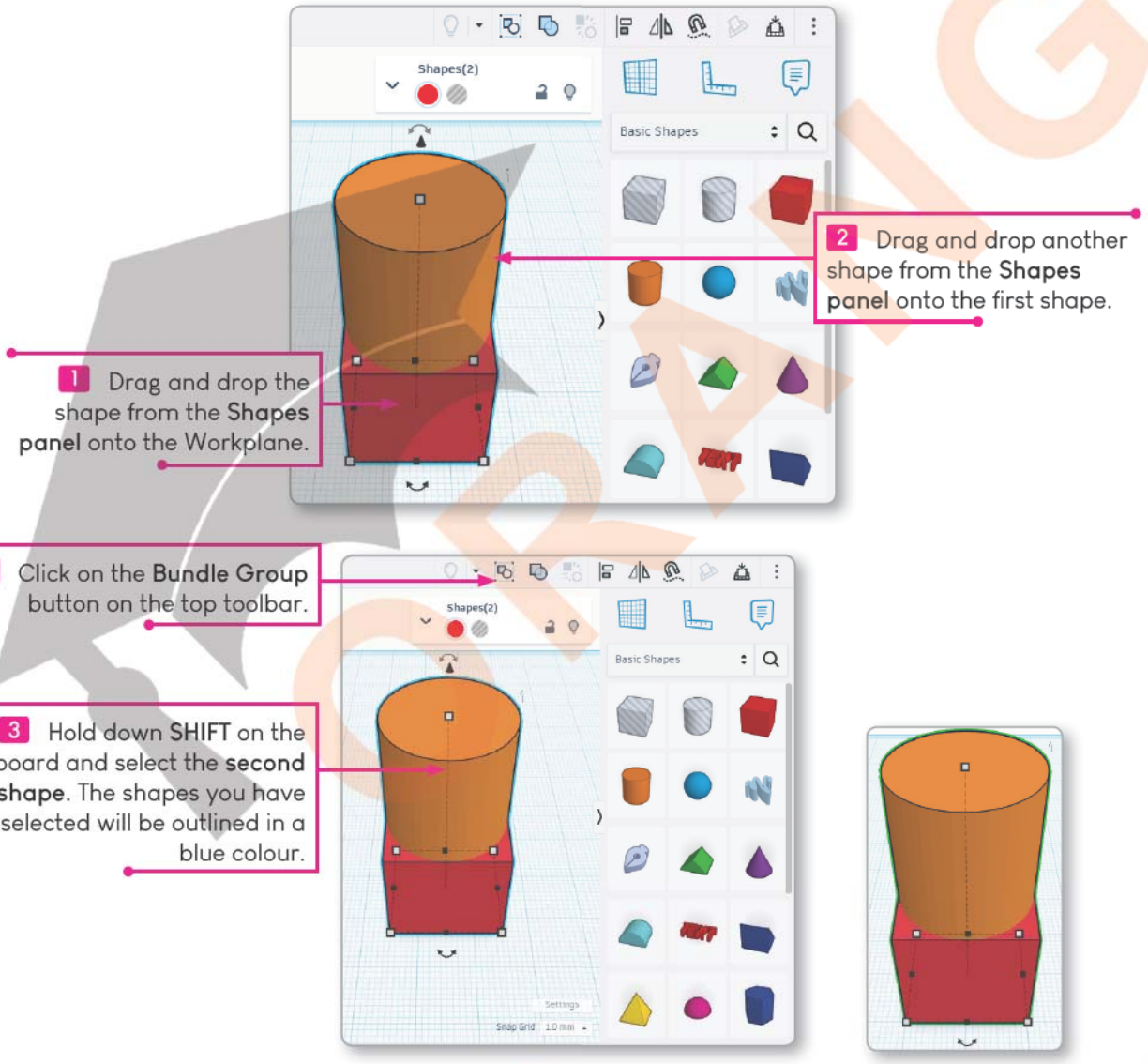
You can enter exact values for rotation, resizing or moving a shape in the text boxes when you select it in Tinkercad.

GROUPING AND UNGROUPING SHAPES

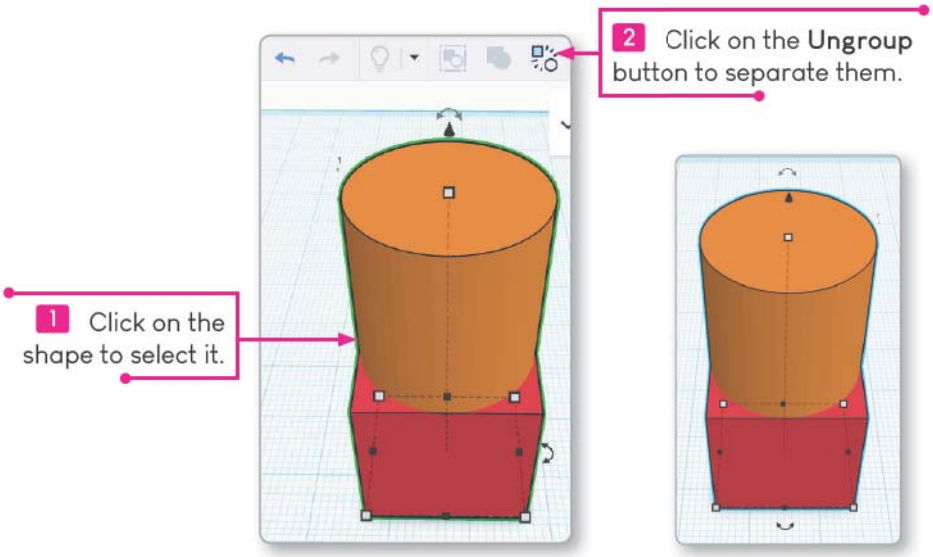
You can group shapes to move, resize or modify them as one and ungroup to adjust each shape separately. There are two types of grouping in Tinkercad:

- **Bundle Group:** It keeps the shapes separate but selectable as one, preserving their original colour and shape.
- **Union Group:** It merges solids and holes into one combined shape, taking the colour of the first selected shape.

To group shapes, follow the given steps:



To ungroup shapes, follow the given steps:



SHORT SIGN

To combine selected objects (Union Group):
Ctrl + G

ALIGNING SHAPES

Aligning shapes refers to arranging multiple shapes in a specific order or position relative to one another, ensuring they are evenly spaced or centered.

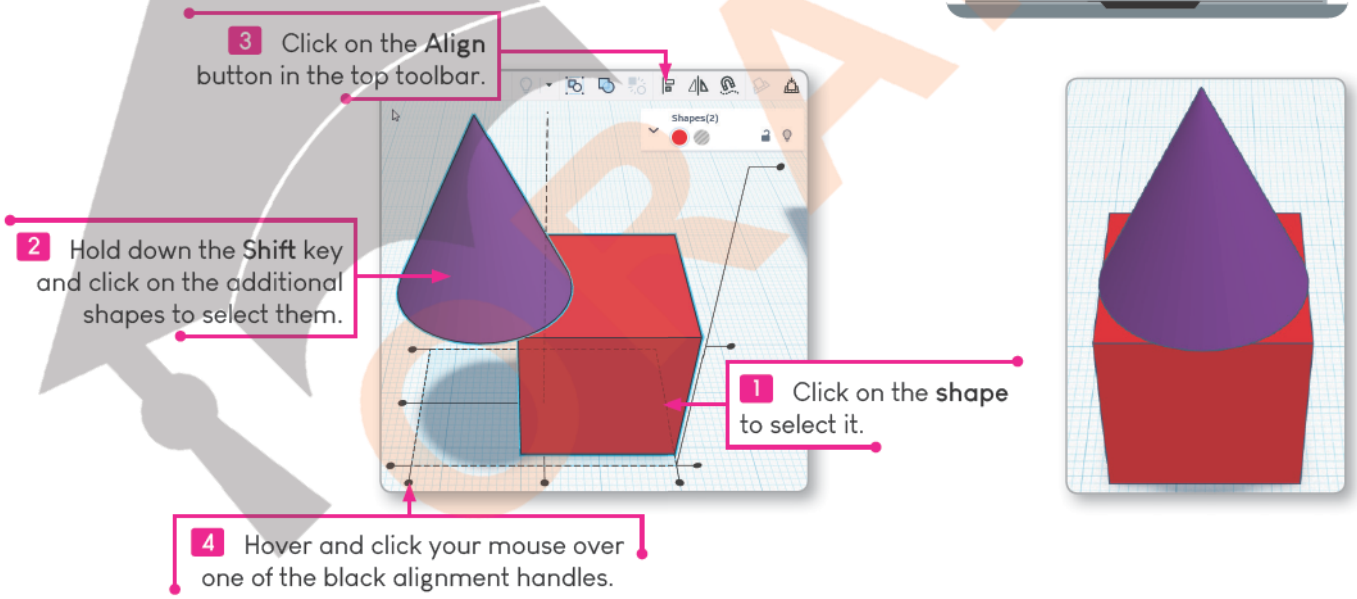
Tinkercad allows the following alignments:

- For **vertical alignment**, choose the **left**, **centre** or **right** dot.
- For **horizontal alignment**, choose the **top**, **middle** or **bottom** dot.

SHORT SIGN

To align shapes:
L

To align shapes, follow the given steps:

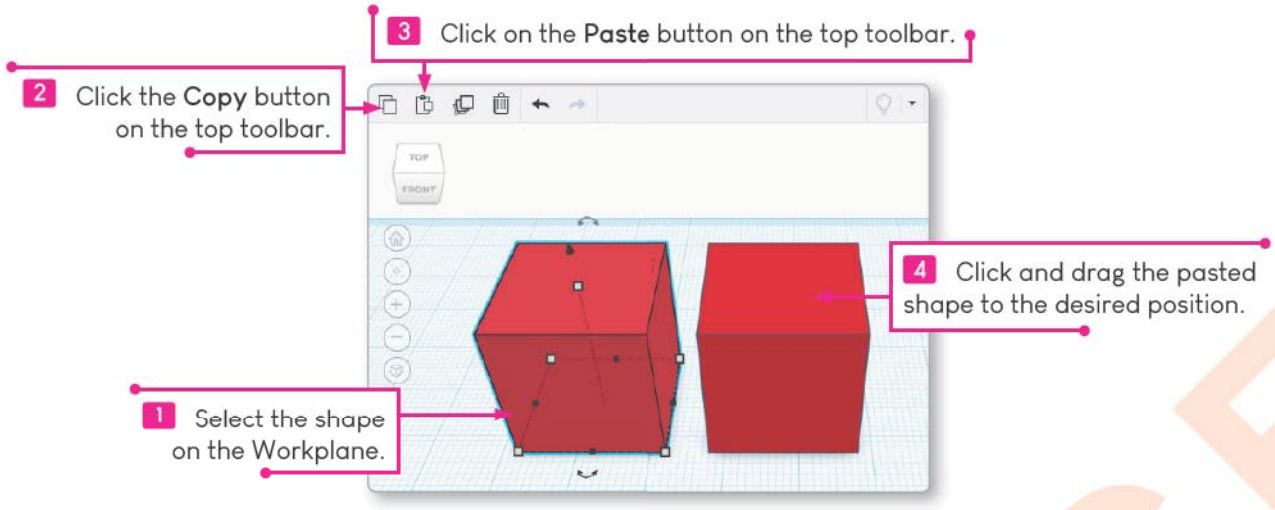


The shapes will automatically align according to the selected axes. Click anywhere on the workspace to deselect the shapes.

COPYING SHAPES

Copying is the process of creating a duplicate of a selected shape.

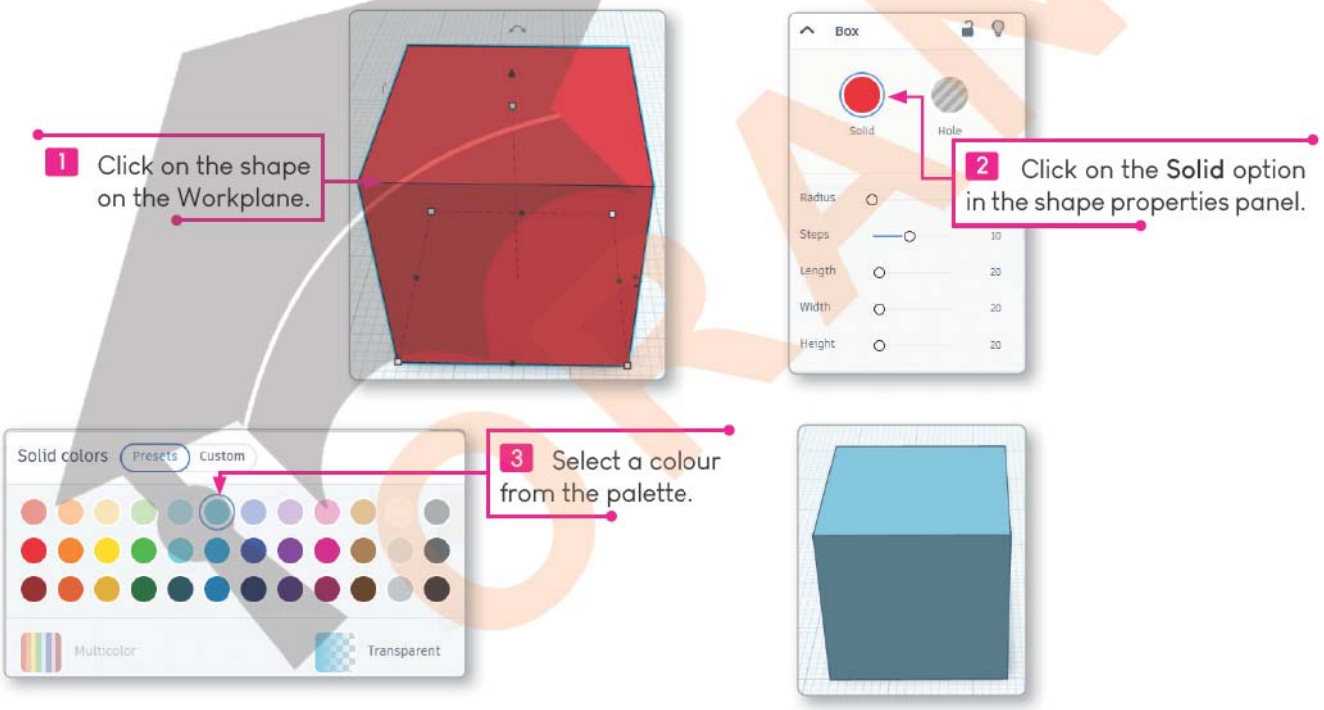
To copy a shape, follow the given steps:



A duplicate of the selected shape will be created. You can generate multiple copies of the shape in your design.

CHANGING THE COLOURS

To customise a shape colour, follow the given steps:

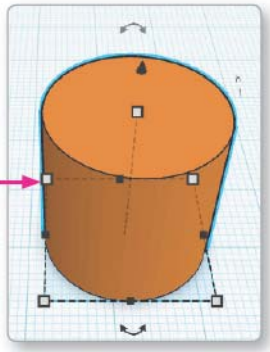


The selected shape will change to its newly selected colour.

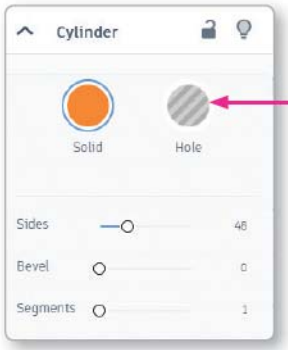
CREATING HOLLOW SHAPES

Tinkercad allows users to subtract shapes and create holes using the Hole feature.

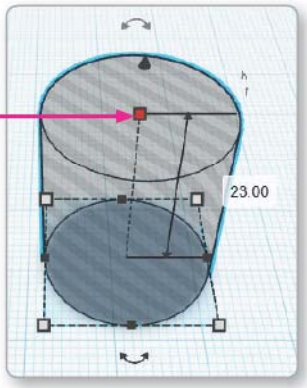
To remove a section from a solid shape, follow the given steps:



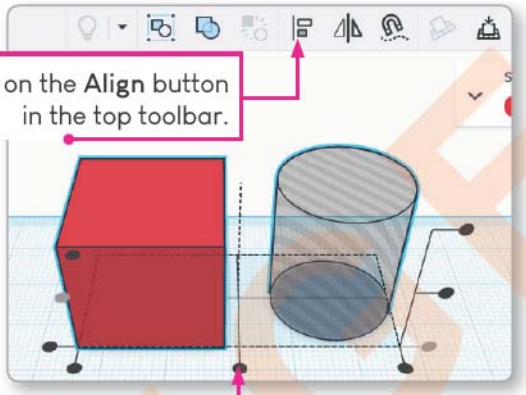
1 Select the shape you want to make hollow.



2 Click on the **Hole** option in the shape properties panel.



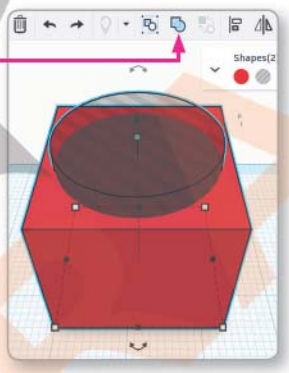
3 Resize the hole shape to fit inside the solid shape.

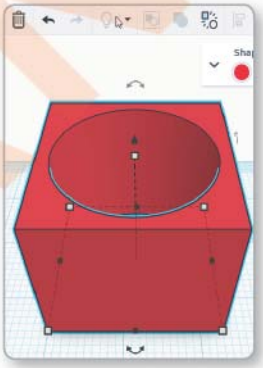


4 Click on the **Align** button in the top toolbar.

5 Click on the **middle dot** to centre align them horizontally.

6 Click on the **Union Group** button on the top toolbar.





Once grouped, the hole shape will be cut out from the shape it is grouped with.

MAKING PATTERNS

To make a pattern, follow the given steps:

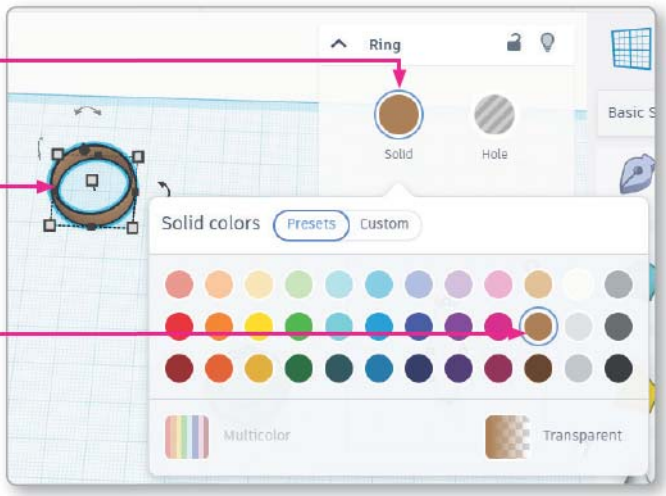
1 Drag and drop the **Ring** shape from the **Shapes Panel** onto the Workplane.

2 Drag and drop the **Diamond** shape from the **Shapes Panel** onto the Workplane.

4 Click on the **Solid** option in the **shape properties** panel.

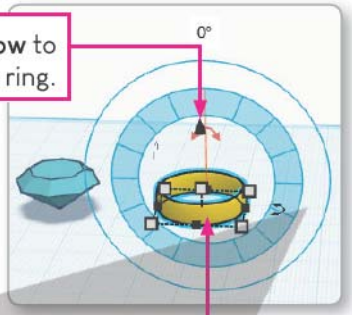
3 Select the **Ring** shape on the Workplane.

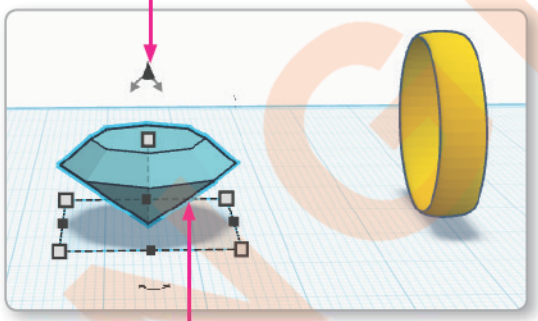
5 Select a desired colour.



9 Click and drag the **black arrow handle** to move up the Diamond shape.

7 Use the **curved arrow** to rotate the ring.

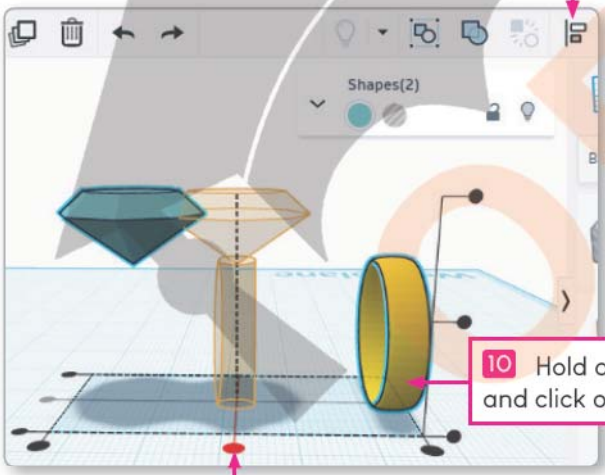




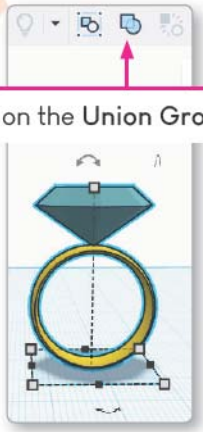
6 Select the **Ring** shape on the Workplane.

8 Select the **Diamond** shape.

11 Click on the **Align** button in the top toolbar.



13 Click on the **Union Group** button.



10 Hold down the **Shift** key and click on the **Ring** shape.

12 Hover and click on the black alignment handle.

The design will look like the image given above.

EXPERIENTIAL LEARNING

21st Century Skills #Technology Literacy #Creativity

Examine your toys at home and think about which primary 2D and 3D shapes they are made up of. Then, try to create them in Tinkercad.

RAPID RECALL

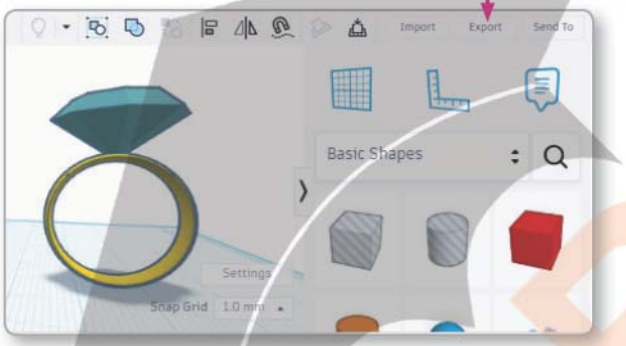
Tick (✓) if you know this.

1. You can add any shape from the Shapes panel and customise it to fit your project needs.
2. Copying is the process of creating a duplicate of a selected shape.

SAVING YOUR DESIGN

Tinkercad automatically saves your work while you create a project. However, if you need to create a backup or share your design, you can use the Export button. To export your design, follow the given steps:

1 Click on the **Export** button on the top toolbar.



2 Choose a file format for export.

HINTS & HACKS

You can save it as an STL file to 3D print it.

Your design will be downloaded in your selected file format, which you can use and share. Tinkercad allows you to import and export your work in the following formats:

- .STL stands for Stereolithography
- .OBJ stands for Object File Format
- .SVG stands for Scalable Vector Graphics

Ask AI AGENT

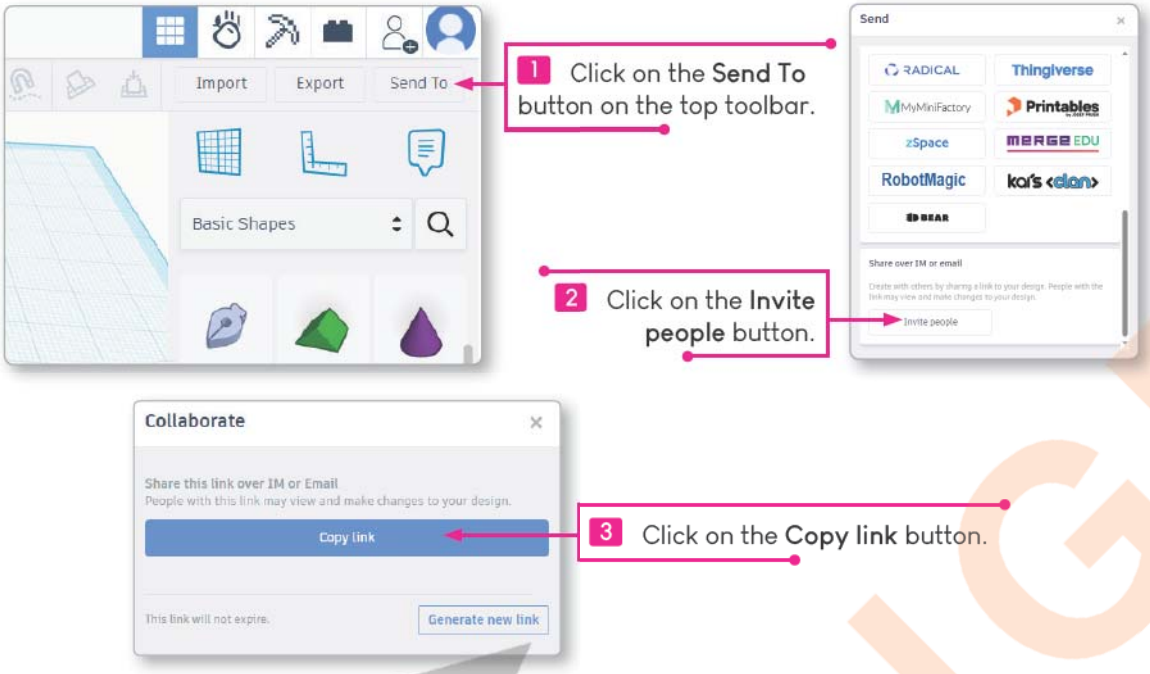
Create a 3D model of a keychain in Tinkercad.

+ | Study

SHARING YOUR DESIGN

Tinkercad allows you to share your design with your friends and other users.

To share your design with others, follow the given steps:



Now you can email or share the copied link with your friend.

TECH TERMS

- **Prototype:** The first rough model of a product, which is later tested and refined.
- **Export:** The process of saving a file in a specific format for use in other applications.
- **Orbit:** To rotate or move around an object to view it from different angles.

REWIND RUN

- Two-dimensional shapes have length and breadth, but no depth or height.
- A three-dimensional shape has three dimensions: length, width and height.
- Tinkercad is an easy-to-use and simple 3D design and modelling software.
- To use Tinkercad, you need to create an account on the Tinkercad website.
- You can add any shape from the Shapes panel and customise it to fit your project needs.
- Tinkercad automatically saves your work while you create a project.
- Tinkercad allows you to share your design with your friends and other users.