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Class X

Handouts on basics of 3d

What is 3-D ?

- 3D means three-dimensional, i.e. something, that has width, height and depth (length). Our physical environment is three-dimensional and we move around in 3D every day. Humans are able to perceive the spatial relationship between objects just by looking at them because we have 3D perception, also known as depth perception. As we look around, the retina in each eye forms a two-dimensional image of our surroundings and our brain processes these two images into a 3D visual experience.

Views

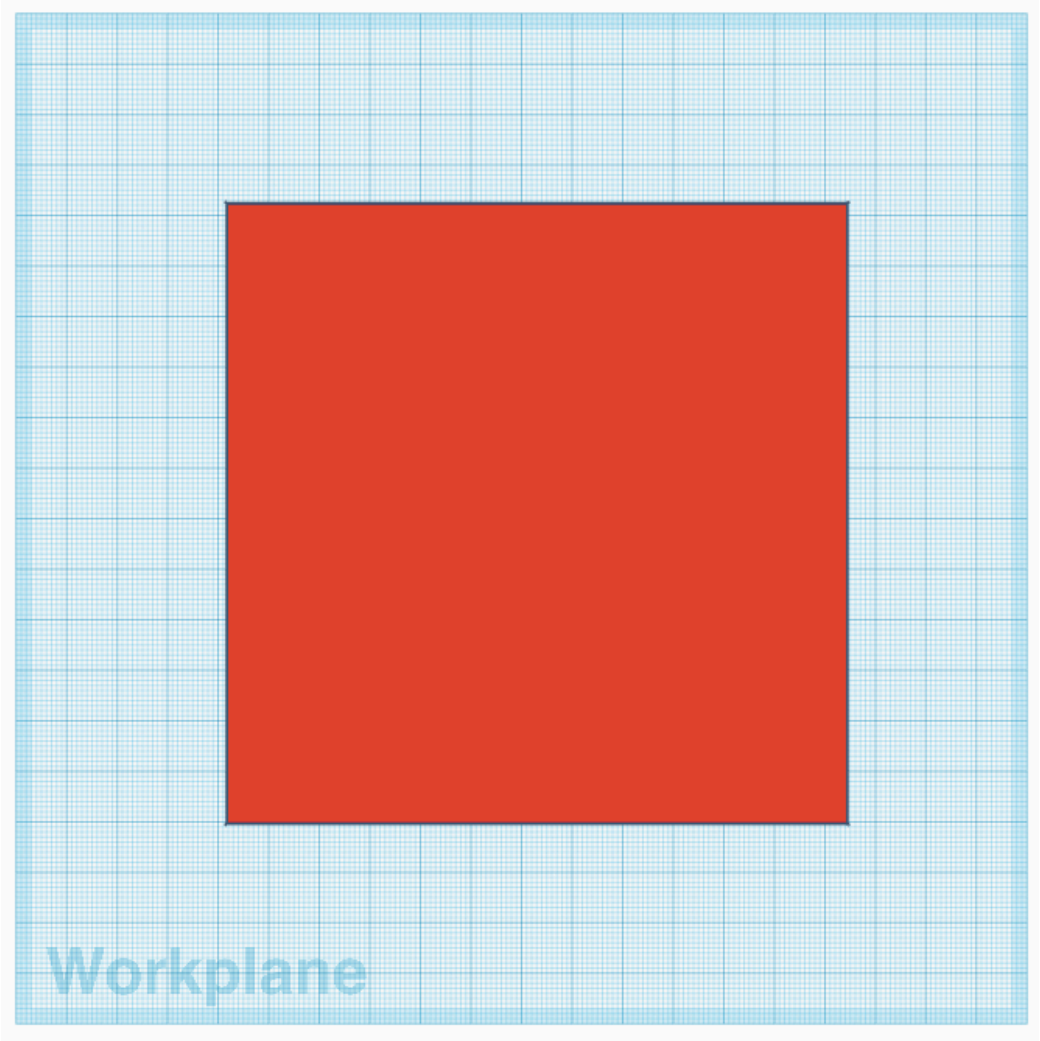
- Orthogonal vs Perspective

"Orthogonal" is a term used to describe two vectors that are perpendicular (at 90 degrees) to each other

Perspective Views: most closely resemble human vision.

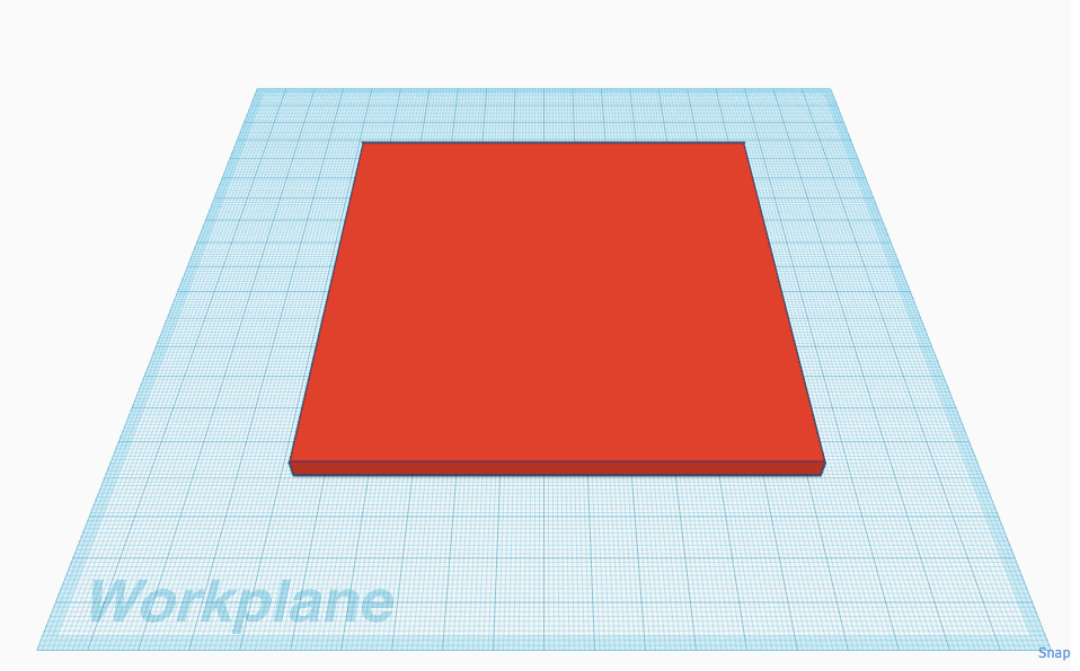
We will see this difference through two visual examples.

Orthogonal



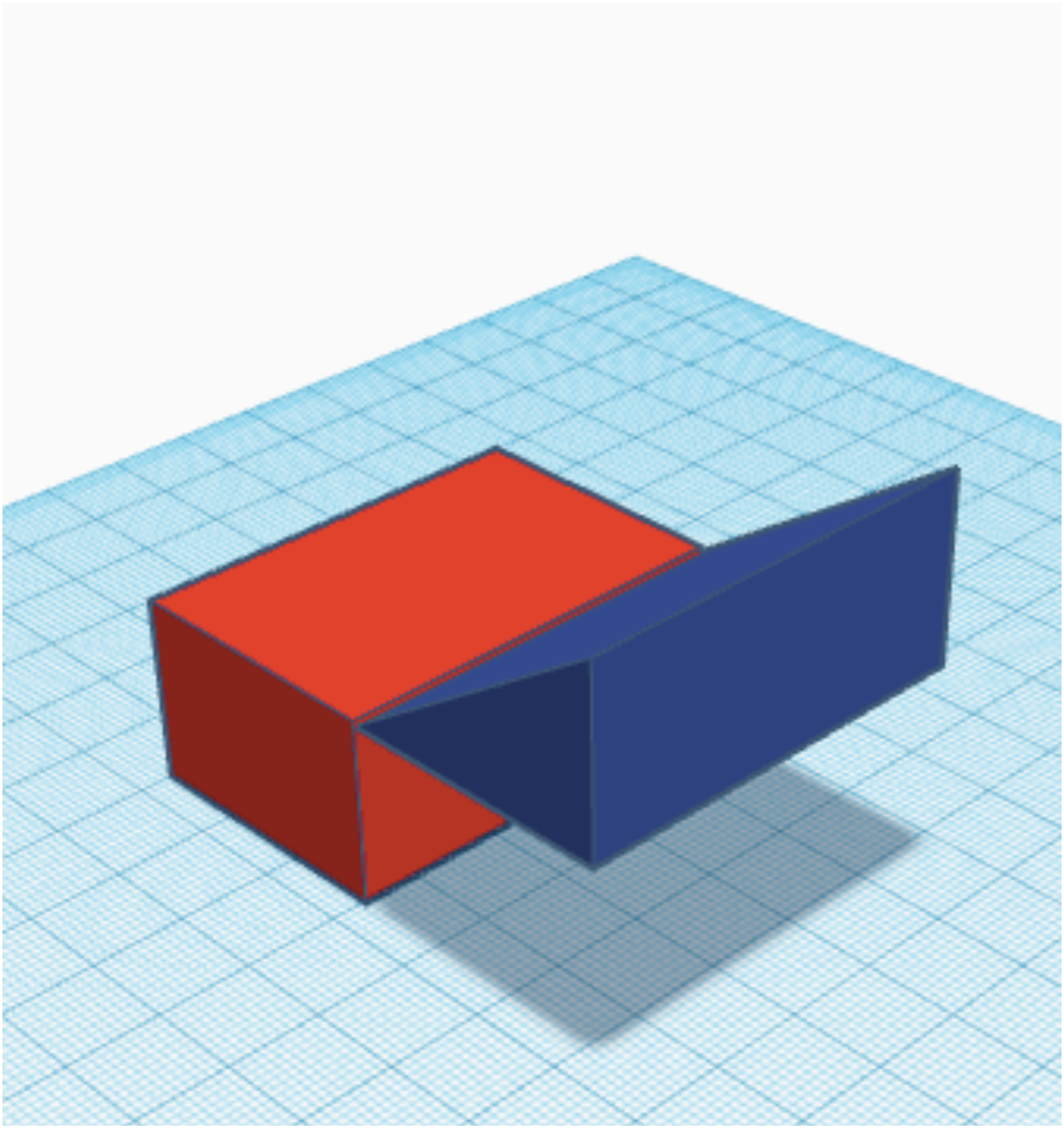
This is how the actual shape is. See the lines on the sides. They do not seem to converse even after being dragged to an infinite distance.

Perspective

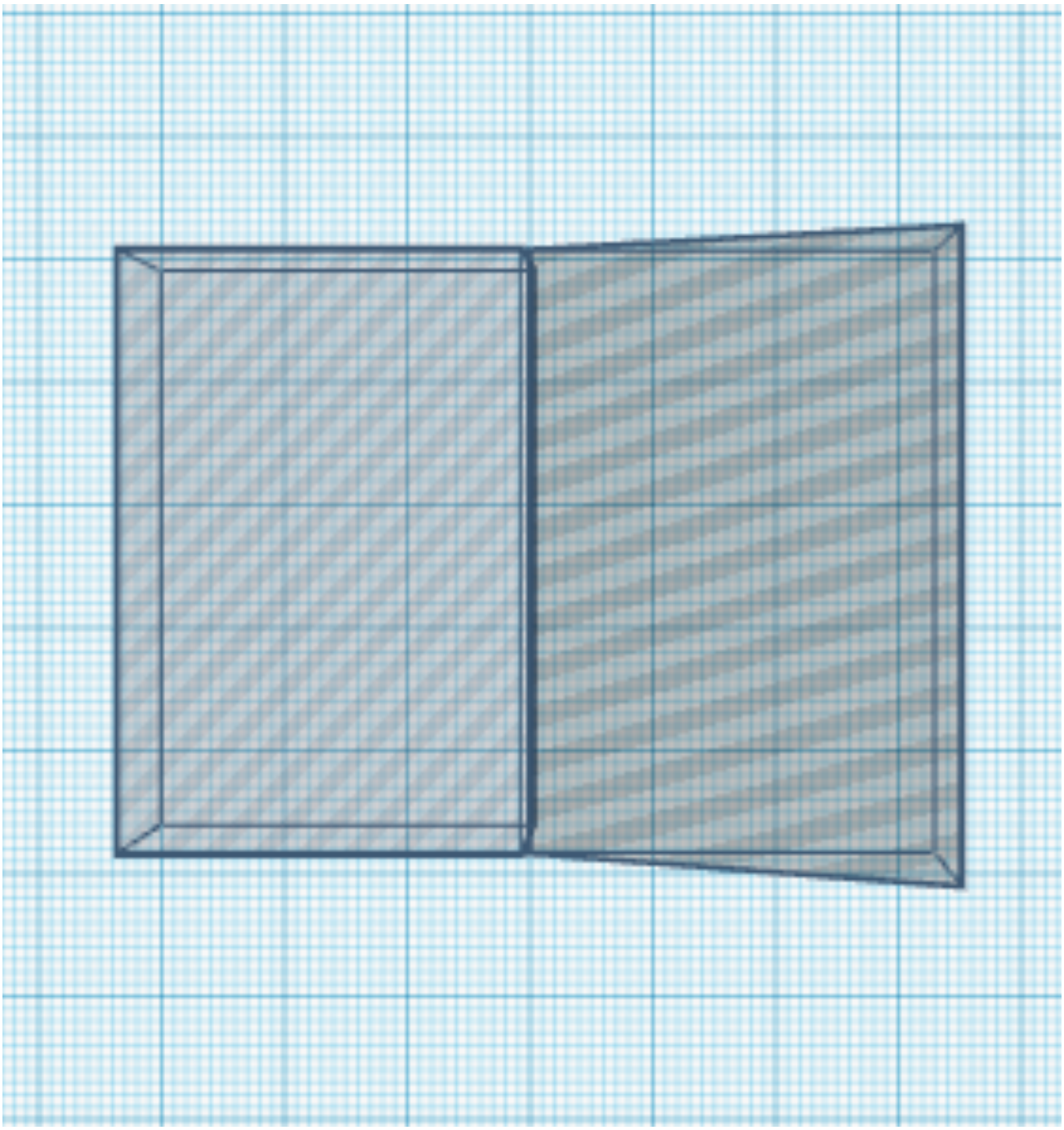


See how these lines looks like they’ll converse after a certain length.

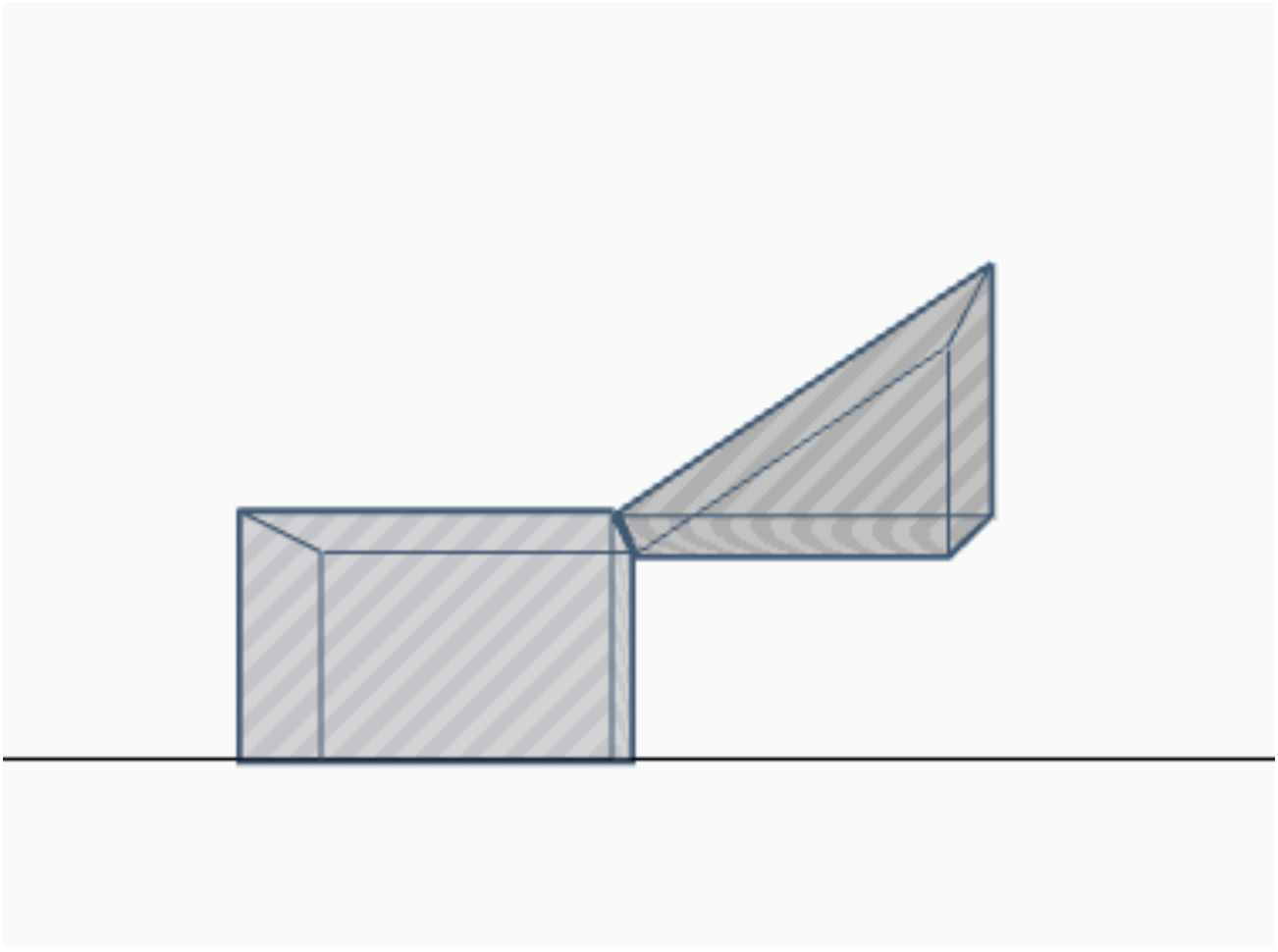
Rendered Image



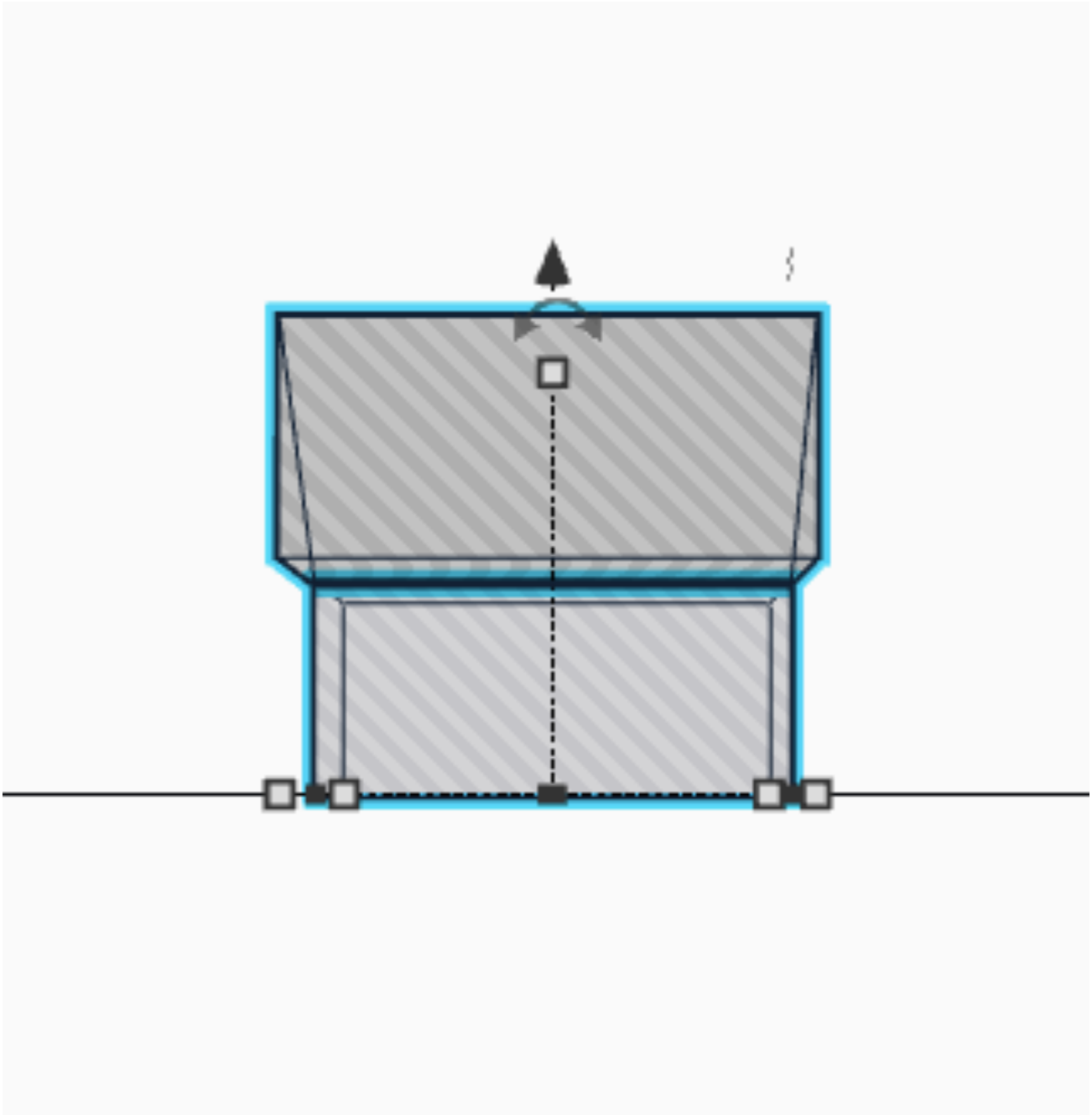
Top View



Left/Right View



Front View



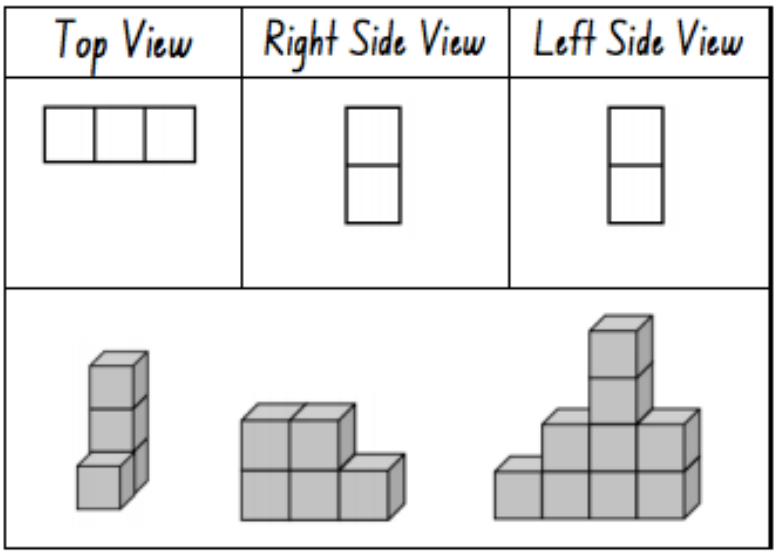
Practice Time

- You can use this really cool workbook to practice on your own.

Click Here to access the workbook

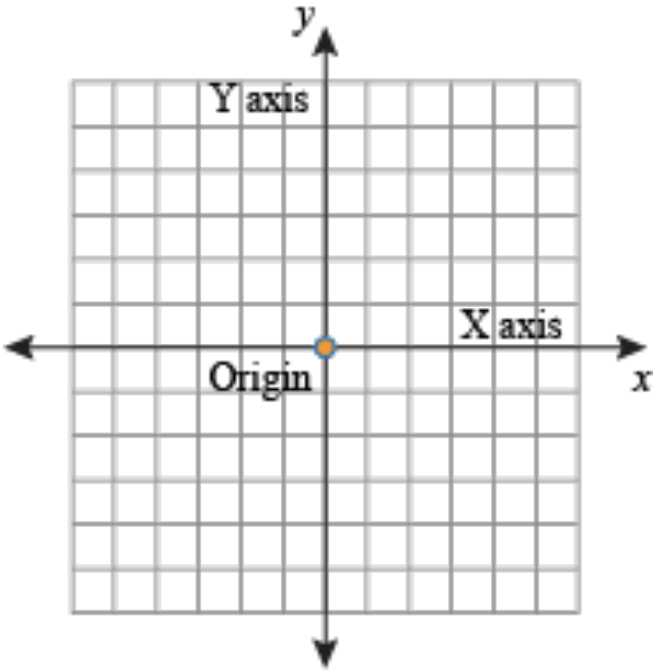
In case link is unclickable:
http://mathsmentality.com.au/images/Front_Left_Right_Top_views_of_3D_objects.pdf

Here's the sneak peak ->



3D Coordinate System

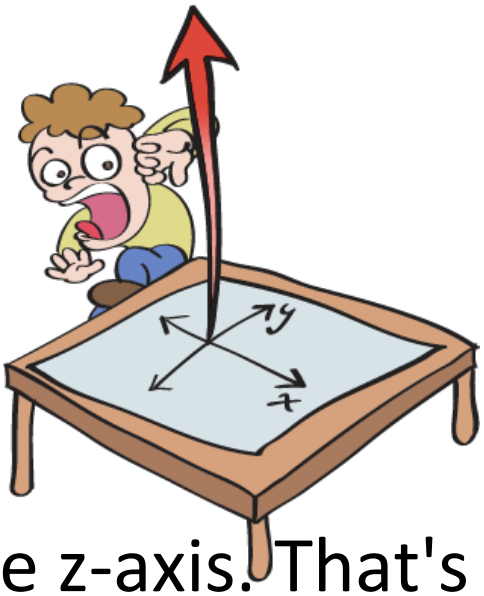
- A 3D system has access to another axis. Just like in 2D we have x and y.
- How we can envision the 3d System. Not very hard.
- This is how a typical 2d system looks.



- That's where all the 2D shapes like triangles and circles and quadrilaterals live.

Moving from 2d to 3d

- If we look up, we can imagine another axis coming up and out of the page through the origin and perpendicular to the other axes.

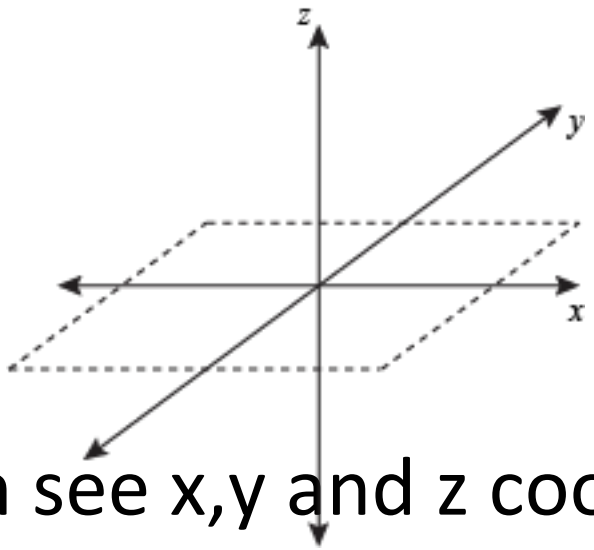


- That's the z-axis. That's 3D space. That's what solids live in. And that's what the real world is: a 3D coordinate system.

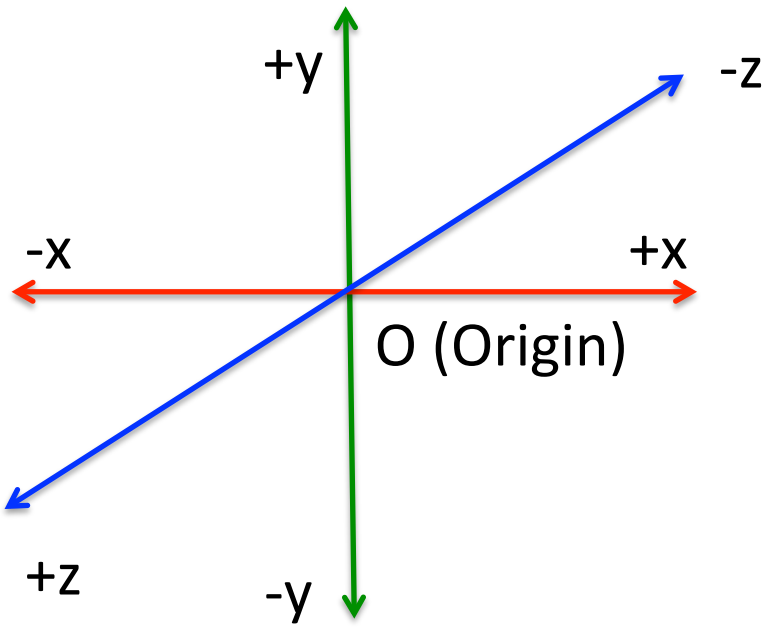
Continued…

3 axis of 3d

- Now observe this drawing.



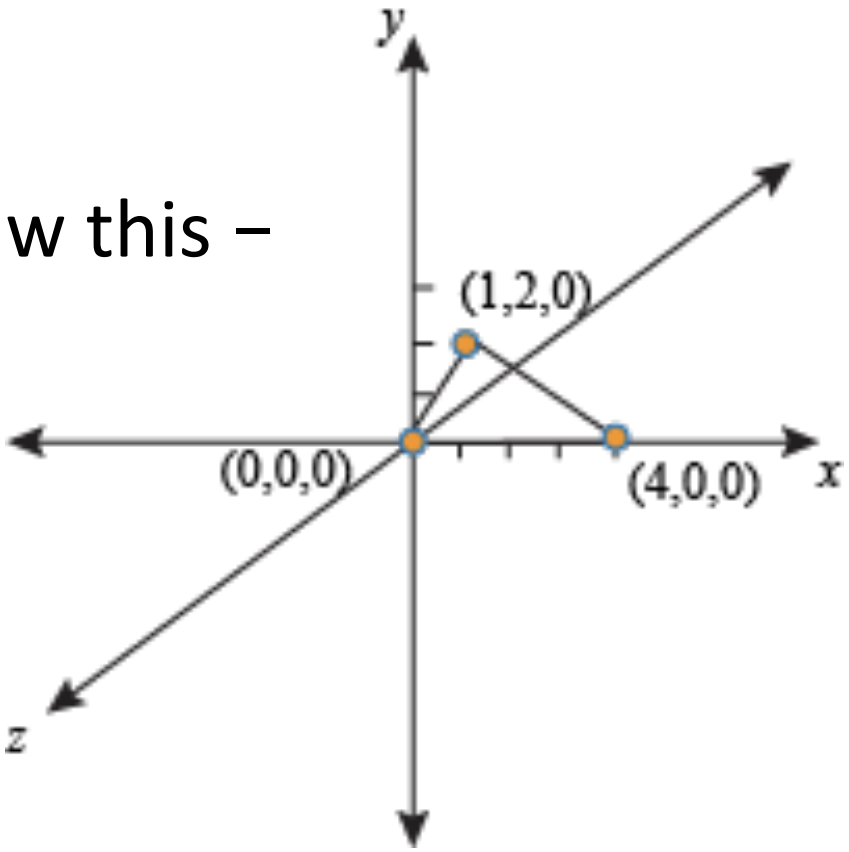
- You can see x,y and z coordinates. These can also be interchanged.
- Like swapping z and y.



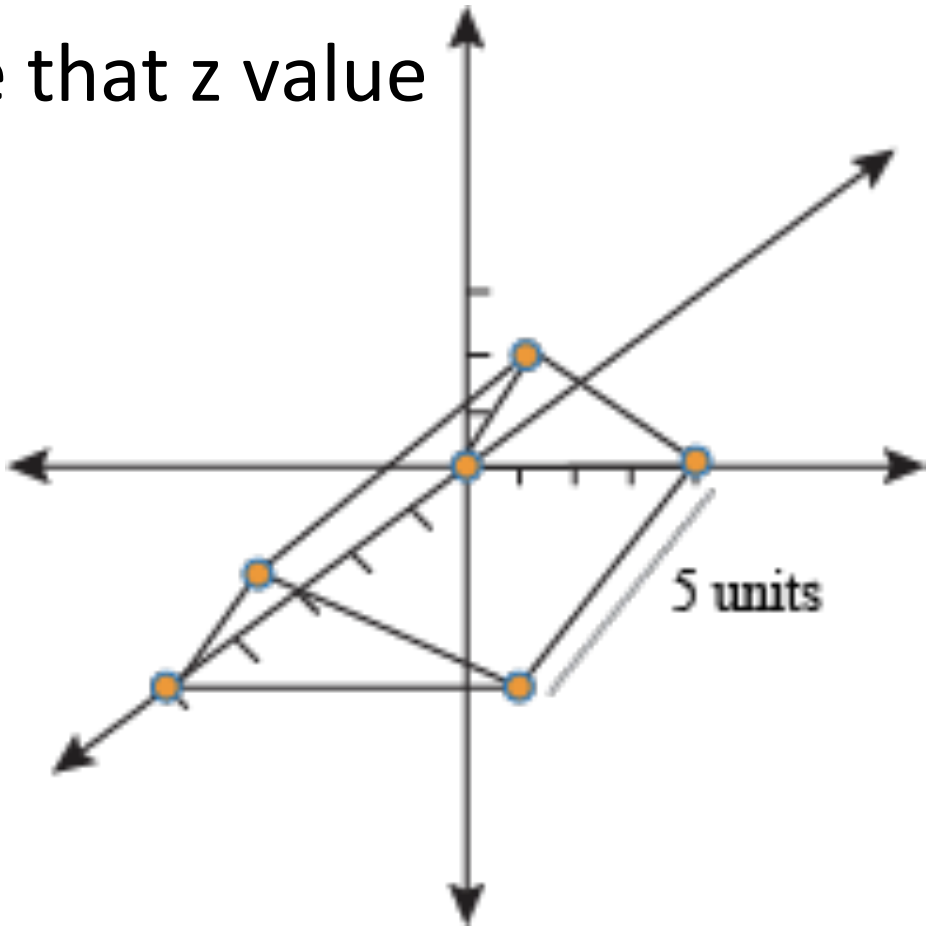
Doing some maths

- let's say we want to draw a triangular prism with a base that has vertices at (0, 0, 0), (1, 2, 0), and (4, 0, 0) and a height of 5 units.

- We draw this –



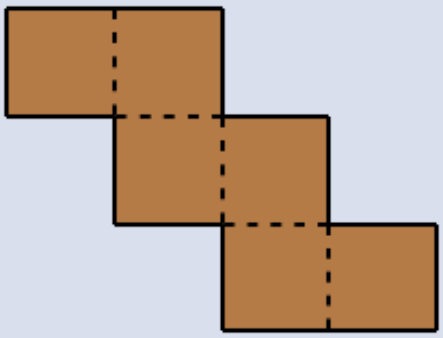
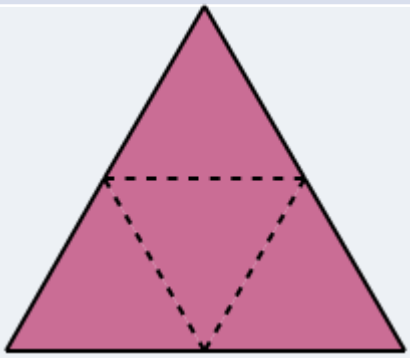
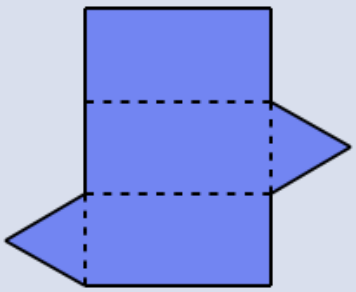
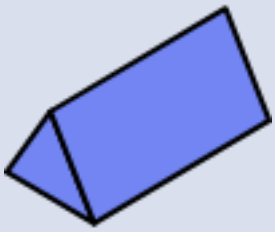
- To make it 3D, we have to add the 5 units of width. Since it's not specified, we can choose where we want to take the height.
- Here’s how it looks ->
- See that z value



2D Nets

- 2d Nets are printable version of any 3d shape (not any but many).
- What's the catch ?
- 2D nets are like origami art. Fold them correctly and you might end up with a cool 3d shape.
- Let's have a look at some basic 2d Nets and equivalent 3d Shape in the next section.

2d Nets (Case Study)

2d Net	3d Shape
	
	
	

These are some basic nets. You can practice more shapes on your own.

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