

PERSPECTIVE AND GAME PLAY

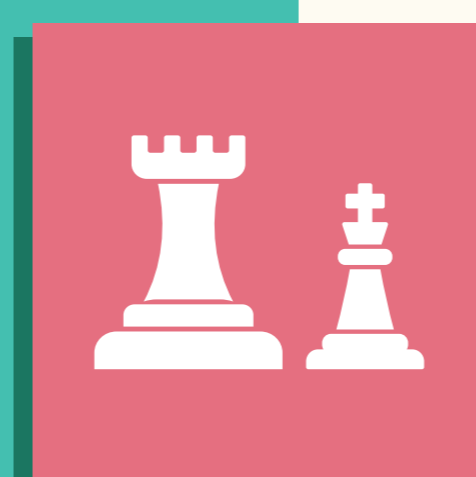
Games have two different types of perspectives:

- ▶ **Game play**
How you interact with the game
- ▶ **Visual appearance**
What you can see on the screen



1D game play

Games where you move along a single dimension, like one line of Snakes and Ladders, or Ludo. Another example is Flappy Bird, that looks 2D, but plays with only a single input "flapping" or not.



2D game play

You are only allowed to move around in x and y. Games like these include Chess, Tower Defence, Match3 (Bejewelled), Super Mario, and Slidescroller games.



3D game play

You see a 3D world (x, y, z) on a 2D screen (x, y) in games like Subnautica, or Flight Simulator. Many racing car games drive around a track with 3D visuals, but have 2D game play.

Perspective projections

In art and computer graphics, we use **perspective projection** to make objects in a drawing look like they're positioned in 3D, even though the surface is flat. By making further away objects look smaller, we create the illusion of depth and space.

Through perspective projection, computers turn the 3D world into a 2D view on screen. Using mathematics, you can calculate the sizes and locations of an object in the new 2D image.

Want to learn more?

Study **Computer Graphic and Games** and learn how to create the algorithms that make computer graphics and games better to view and interact with.

It opens the doors to a wide range of career options such as software developer, software engineer, UI (user interaction) designer, game designer, and many more.



Think it. Plan it. Build it.

Te Wāhanga Ahunui Pūkaha
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Test this yourself

Closing one eye and using a whiteboard marker, draw on a window the outline of an object you see outside.

You can calculate the object's height (Y_w) by knowing your distance to the window (Z_s) and you to the object (Z_w).

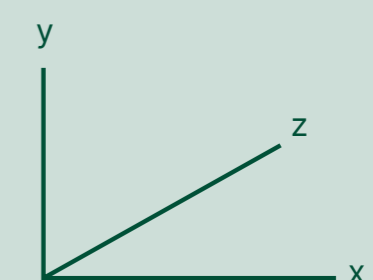
You can also alternate closing your eyes to see the difference in what each eye sees. That is how VR games create 3D, by showing different 2D images to each eye.

What is the height in the world (y_w)?*

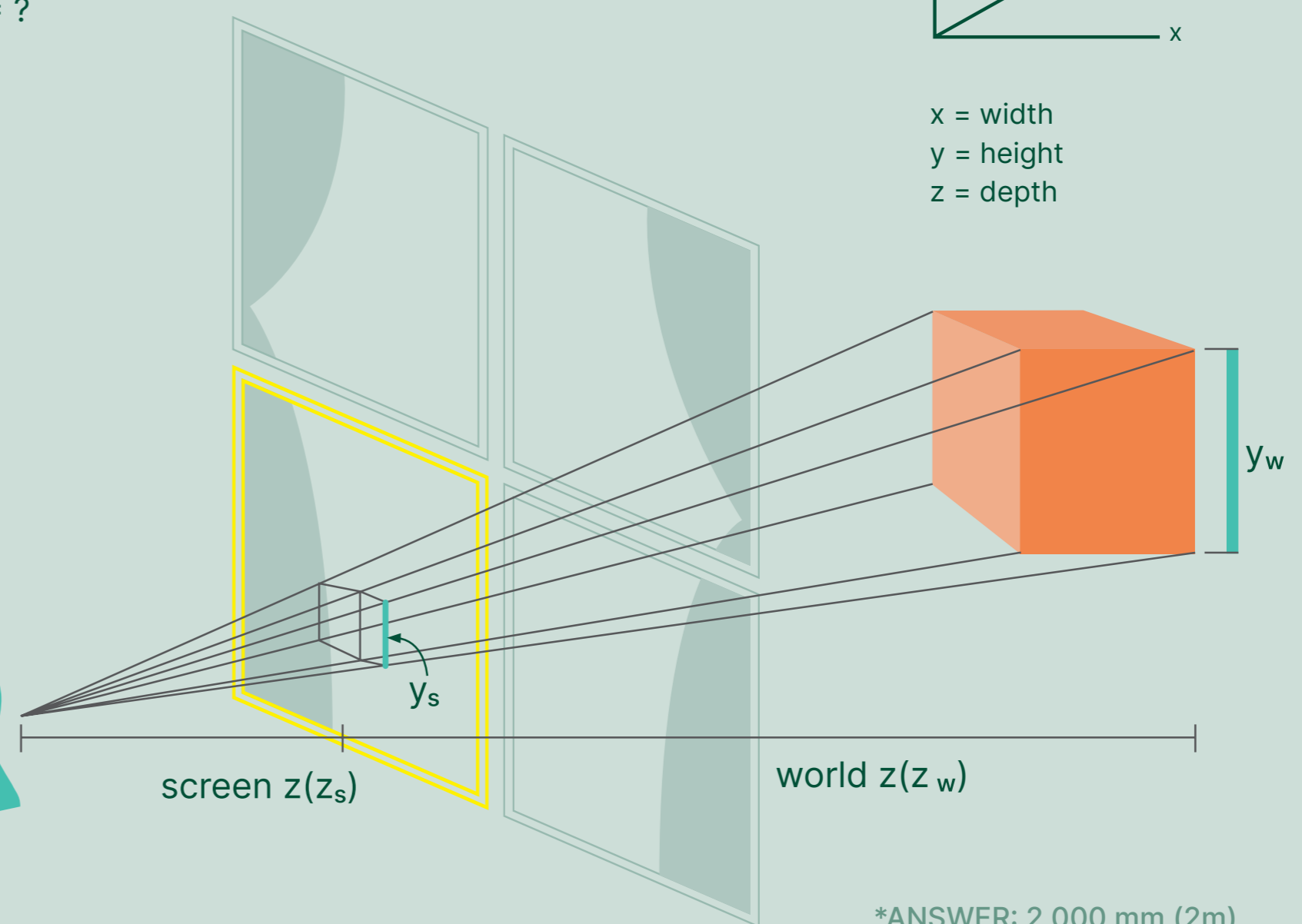
$Z_s = 350\text{mm}$
 $y_s = 70\text{mm}$
 $Z_w = 10000\text{mm}$
 $y_w = ?$

$w = \text{world}$ $s = \text{screen}$ World
 $(x, y, z) \rightarrow \text{screen } (x, y)$

$x_s = (x_w/z_w)z_s$ $y_s = (y_w/z_w)z_s$



$x = \text{width}$
 $y = \text{height}$
 $z = \text{depth}$



*ANSWER: 2,000 mm (2m)