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| **Setting up godot (new project** | |
| **Step** | **Operation** |
| 1 | Download from godotengine.org. |
| 2 | Execute and don’t explore example projects. |
| 3 | Create project, create folder (or choose empty folder)  When making mobile games choose mobile as renderer else use forward+. |
| 4 | Opens a 3d project, to set too 2d dev  go to editor, manager editor features, create profile (call eg 2d) than un check 3d and uncheck ( optionally also disable asset library). |

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| **Godot keywords** | |
| **Keyword** | **Explanation** |
| Scene | Is any collection of nodes that is saved to a file and work together. (can be an entire environment or individual characters, props, abilities, items), there can be a scene inside another scene. A scene is also called a parent node. |
| nodes | Each node represents a distinct piece of functionality. |

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| **Basic Scene controls** | |
| **How** | **Operation** |
| Middle mouse button | Pan the area. |
| space + left mouse button | Pan the area. |
| Scroll wheel | Zoom in and out. |
| F | Center the origin in the window or center selected node. |

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| **Ui** | |
| **UI** | **Use** |
| Main toolbar | Change settings, and stuff like that. |
| 2d / script | Switch between preview view and script view. |
| Right up tool bar | The run tops used to test and run the game. |
| Scene panel | Where game objects are stored . |
| Import panel | Shows how resources are imported. |
| File system | Where everything is stored. |
| Inspector panel | Used to edition and modifying properties of nodes. |
| Node panel | Contains more specific data about a node. |
| History | History of all actions taken. |
| Bottom toolbar | contains the debugger, audio editor, animation editor and shader editor. |
| **Changing the layout** | |
| By pressing the 3 dots you change the layout however you like. | |

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| **Creating a basic player character** | |
| **Steps** | **Operation** |
| 1 | In the scene panel select other nodes and then under node2d, PhysicsBody2d select CharacterBody2d |
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| **Nodes 2D Part 1** | |
| **Node** | **Use** |
| Node2D | Basis of all 2d nodes, Keeps track of rotation, position, skil. |
| Camera2D | Specifies the point from which the scene is viewed. Contains parameters of rotation and position, includes drag and smoothing. |
| Sprite2D | Used to render 2d textures to the screen. Can be part of a larger atlas. |
| AnimatedSprite2D | Used to render 2d textures to the screen. Can be part of larger atlas. Contains a tool for setting up Sprite sheet animations. |
| ColisionObject2D | Can not be used standalone, but serves as a base class of objects that have collisions both collision layer and if it is enabled. |
| PhysicsBody2D | Cant be used standalone, base class for all 2D objects that are affected by physics. |
| CollisionPoygon2D | Is a child of the Physicsbody |
| CollisionShape2D | Is a child of the Physicsbody, can choose your shape. |
| StaticBody2D | Physicsbody that cannot be moved but can affect other, can be used for walls floors and ceilings. Not affected by gravity or other physicsbody. |
| Animatable body2D | Physicsbody that can be moved but can affect other, can be used for walls floors and ceilings. Not affected by gravity or other physicsbodys. If you move in code or animation other physicsbody will be pushed appropriately. |
| RigidBody2D | Physicsbody affected by other physicsbody and gravity, used for all items that can be moved and not directly controlled by the player |
| CharacterBody2D | Specialized physicsbody that is meant to be controlled by the player. |
| joint2D | Cannot be used standalone but is base class for all 2d physics joints. Which are nodes that connect two physics bodies together |
| DampedSpringJoint2D | Connects two physicsbodys together in a spring like maner. |
| Groovejoin2D | Connect two physicsbodys together like a piston (can only retract and extend in one movement axis |
| Pinjoint2D | Can be used to pin two physics body together on a single point an freely rotate in any direction. |
| Area2D | Access two thinks a detection field that checks whether collection objects leave or enter it, an area of space with its own physics and audio settings (in which you change things like gravity wind audio channels). |
| AudioListener2D | By default camera will be the point that listens too 2D audio but if you want to hear your scene from a different location you can use this node. |
| AudioStreamPlayer2D | Is the 2d Audio source, which can play audio from a certain point in space. |
| CPUParticles2D | Is a particle system running on the cpu. |
| GPUParticles2D | Is a particle system running on the gpu. |
| TileMap | used to build 2dTilemaps, has a build-in tool for painting tile maps and setting tile sets, supports physics layers and navigation layers. |

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| **Nodes 2D Part 2** | |
| **Node** | **Use** |
| CanvasModulate | Needed to set up shadows in the scene, it darkens it so that 2d light can light it up. |
| Light2D | cannot be used standalone but is the base class for al l2d lights, ha settings for color energy and blend. |
| PointLight2D | Is used to light up a scene from one specific point, needs a texture. This texture lights up and cast shadows from its center. |
| DirectionalLight2D | is sued to light up entire scene at once, is used as the sun and the moon. Shine from one angle |
| LightOccluder2D | is the shape to cast a shadow in the scene. |
| Line2D | Allows you to draw a line. |
| Marker2D | Debugging node can be used to keep track of invisible nodes or node in space. |
| MeshInstance2D | Used to render a 3d model in 2d. |
| MultiMeshInstance2d | Used to render a lot of meshes efficiently |
| NavigationRegion2D | Set up path finding in 2D, navigation regions have to be set up manually. |
| NavigationLink2D |
| NavigationObstacle2D |
| ParallaxLayer | Are used to set up parallax backgrounds in a 2d scene (background like sky faraway mountains ect). |
| ParallaxBackround |
| Path2D | Are used to set up a 2d path or curve and then bind another node to this path using the path follow2d node. |
| PathFollow2D | Used to have a node follow the set up path. |
| Polygon2D | Allows to create a polygon. |
| RayCast2D | Can be used to check collisions in a straight line. (To check if a gun hit something) |
| ShapeCast2D | Same as rayCast2D but checks it in a line using a shape instead of just line. |
| RemoteTransform2D | Can set up another nodes transform to its own. So it can become the parent. |
| Skeleton2D | Are used to set up 2d skeletons and skeleton animations. |
| PhysicalBone2D |
| Bone2D |
| VisibleOnScrenNotifier2D | Is used if a visual is onscreen or not. Send a signal to code when it is onscreen. |
| VisibleOnScreenEnabler2D | Is used if a visual is onscreen or not. Enables itself when its onscreen. |
| CanvasGroup | Can be used to merge all children in a single draw call, for example for a translucent bottle and its contents. |
| BackBufferCopy | Used to capture part or whole screen to be used in shaders. |

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| **Nodes 3D Part 1** | |
| **Node** | **Use** |
| Node3D | Basic 3d node all other 3d nodes inherit from this class, includes position, rotation, skill and visibility. |
| Marker3D | Same as nod3D but shows axis can be used to keep track of invisible nodes. |
| VisualInstance3D | Not used standalone, but is used for all visible nodes to inherent from. keeps track of its layer and its bounding box. |
| GeometryInstance3D | Not used standalone and is the basis of all geometry based nodes aka models it keeps track of lighting, shadow and LOD settings, and material. |
| MeshInstance3D | Takes mesh data and instantiates that mesh, hold the model and all its materials. |
| MultiMeshInstance3D | Same as meshinstance3D but groups them and allows to randomly populate one mesh with another mesh. Eg grass on a green surface. |
| Label3D | Used for displaying text in 3dD. |
| Decal | Used to project a texture on a geometry (e.g. to create bullet holes in walls) |
| Sprite3D | Used to render2d sprites in 3D. |
| AnimatedSprite3D | Used to render2d sprites in 3D. |
| WorldEnvironment | Allows to change global lighting level of entire scene, volumetric fog and global illumination. |
| FogVolume | when volumetric fog is enabled allows you to add fog to scene in specific area. |
| GPUParticls3D | Particle system of 3d. |
| GPUparticlesAttractor3D | Used to manipulate particles to push or pull particiles. |
| GPUParticlesCollision3D | Used to manipulate particles, to give it something to collide with. |
| Light3D | Cannot be used to standalone is the base of lights in 3D |
| OmniLight3D | Most basic light shines from 1 point in all directions. |
| SpotLigh3D | Specific angle in which it lights something up |
| DirectionalLight3D | Light up the scene from 1 angle, used as the sun and the moon. |
| CSGshape3D | Constructive solid geometry shapes, used to create new shapes. |
| SoftBody3D | inherits from geometry node used for cloth. |
| CollisionObject3D | Cannot be used standalone but is the base of al 3D notes that collide. |
| PhysicsBody3D | Cannot be used standalone used to block certain movement or rotation of the physics body. |
| CollisionPolygon3D | physics body needs one of it to collide when any other object. |
| CollisionShape3D |
| StaticBody3D | Is a physicsbody that stays in one place used for walls and floors, cannot be moved. |
| AnimatableBody3D | Is a physicsbody cannot be affected by gravity but can push other physicsbodys. |
| RigidBody3D | All not controlled by player objects that need to adhere to gravity. (Boxes, arrow) and collide with other physics body |
| CharacterBody3D | Can be controlled by the player. |
| Area3D | Acts as a detection field, when a object enter is or leaves it, or create an area with its own physics settings. |

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| **Nodes 3D Part 2** | |
| **Node** | **Use** |
| Camera3D | Shows what is visible from its location and shows on its nearest view point by default is the game window but can also be a separate one like a minimap. |
| VehicleBody3D | Nodes implement to simulate a car. |
| VehicleWheel3D |
| Joint3D | Cannot be used on its own, but is base class to join multiple phisics bodies. |
| HingeJoint3D | Restricts the rotation of join bodies in a hinge like manner. |
| ConteTwistJoint3D | Can be used to join 2objects allows for rotation of the join in a cone shape. |
| SliderJoint3D | Restricts the moved to a single axis like a piston. |
| PinJont3D | allowed to pin 2 objects together on a single point. |
| Generic6DOFJoint3D | Allows 6 degrees of freedom, for complex joins |
| Skeleton3D | Provides an interface animate skeletons (cannot create within godot). |
| Bone attachment 3D | Allows you to add objects to a bone (say a helmet ect) |
| RootMotionView | Editor only debug note it shows a grid as ground reference. |
| VoxelGi | Heavy light map. Doesn’t bake it |
| LightmapProbe | Does bakes light and shadows in scene. |
| LightmapGi |
| ReflectionProbe | Used to capture a reflection map. Low performance cost. |
| ImporterMeshInstance3D | unknown. |
| visibleonScreenNotifier3D | Gives a notification in code when a object is in view. |
| VisibleOnScreenEnabler3D | Enable an object when it is in view. |
| GridMap | A 3d Tile set including vertical tiles. |
| AudioListener3D | By default sound is captured from the camera but can be done from this node. |
| AudioStreamPlayer3D | plays 3d audio. Is the audio source. |
| NavigationRegion3d/ Navigationob stacle3D/ Navigatio nLink3D/Navigation Agend3d | set up a nav mesh for path finding, the navigation agent can than traverse the map. |
| OccluderInstance3D | used to improve performance by hiding objects that are invisible too the camera. (should be used on static objects only and best not in open areas) |
| Path3D | Cn be used to create 3d paths and curves and combine a node to it which will take this path. |
| PathFollow3D |
| Raycast3D | Shouts out a ray and report if it hit something. |
| ShapeCast3D | shoots out a shape instead of ray. |
| SpringArm3D | Same as raycast3D but also move objects (blitzcranksarm) during the check. |
| RemotetTransform3D | Copies another node to make the other node its child. |
| XROrigin3D/XRAnchor3D XRController3D/ XRnode3D | Used for VR and XR games. |

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| **Nodes UI Part 1** | |
| **Node** | **Use** |
| Container | The Base class of all different types of containers. |
| AspectRatioContainer | Sets an aspect ration so no matter what resolution, this container will keep its aspect ratio. |
| BoxContainer(VBoxContainer, HBoxContainer) | everything within these contains are aligned horizontally or vertically |
| CenterContainer | all children within this container will be perfectly in the center. |
| FlowContainer(VFlowContainer, HFlowContainer) | it positions children like text so from right to left and if they don’t fit one row they will jump a row lower. |
| GridContainer | displays elements in a grid, like inventories. You cant set amount of columns and elements are added from left to right. |
| SplitContainer(VSplitContainer, HSplitContainer) | allows to split the container with a handle in the middle that you can drag |
| MarginContainer | add custom spacing to elements. (editable in theme override) |
| PanelContainer | Base container but contains a background. For grouping things together visually |
| SCrollContainer | creates a container that can be scrolled (can only contain one other container so use a vbox or hbox inside) |
| TabContainer | will set a tab based system all containers within get their own tab and will get the name of the note. |
| Label | inside container: is the basic text display. |
| RichtTextLabel | inside container: same as label but allows bold, italic and underlined text. |
| ColorRect | inside container: a coloured rectangle (eg for a background) |
| TextureRect | inside container: same as colorRet but instead of a color displays an image. |
| VideoStreamPlayer | inside container: allows to view a video within the ui |
| HSperator, VSeparator | inside container: little lines |
| panel | inside container: background component of the panelContainer not recommended to use on its own. |
| NinePatchRect | inside container: allows to set up a responsive texture, keeping the corners intact and stetches the sides and center to match panel with and hight. |
| BaseButton, Button, TextureButton | input element: all the basic button, basebutton is just an button and texture button can be given its own texture. |
| linkButton | input element: basic button and styled as a link on webpage |
| CheckBox, CheckButton | input element: toggle buttons and retain state. |
| MenuButton | input element: opens a little menu when pressed. |
| Optionbutton | input element: Opens little drop-down selector. |

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| **Nodes UI Part 2** | |
| **Node** | **Use** |
| colorPickerButton | input element opens color picker menu to select a color. |
| LineEdit | input element: a single line text input (eg. Character name) |
| TextEdit, CodeEdit | input element: allow for multiple lines of text, code editor is just an ide inside godot |
| Rage | Basic node not used on its own. To display a ranger of a value or input a ranger. |
| ProgressBar, TextureProgressBar | Progress bar think loading bar or health bar. Can be an input element as well using a slider |
| SpinBox | input element: number input which you can scroll |
| HScrollBar,  VScrollBar | input element: just a scroll bar where you can add your own functionality too. |
| HSlider, VSlider | input element: used to select a value within a range, think scrollbar but the bar fills up. |
| ItemList | is a menu of a menu button but without having to click a button to open it. |
| MenuBar | used to create a row of drop down menu, need to use popupmenu nodes to work. |
| TabBar | top of the tabctonainer for if you want to create your own functionality behind it. |
| ReferenceRect | debugging node, used for positioning nodes within a space. |
| Tree | used for displaying hierarchy data. Like complicated quest lines. (think a folder with folders init. |
| GraphNode, GraphEdit | used to set up and render graphs. |
| TouchScreenButton | for if you wanna map actions touch screen button you can use this. |
| Control | base node for all ui nodes. has allot of properties  **clipcontents** if ui nodes that are outside of this node will be cut off like if a overflowing text will be cut of or overlap its margin.  **custom minimum size**: states the minimum size of the ui element.  **layout direction**: how the element within this elements are aligned.  **layoutmode**: if the location of the node is set with a xy value or by its **anchors**. (most of the time anchor mode, than its responsive)  **transform**: the size position rotation and scale of the element.  l**ocalization**: can be set if you want the text to be translated.  **tooltip**: set the text that pops up when you hover over an element.  **focus:** used for navigation with tab and arrow keys (choosing its neighbours) also needed for controller support.  **Mouse:** how mouse inputs are recognised, generally don’t change it. Here also the cursor shape is indicated.  **input**: here you can shortcuts for buttons like ctrl+z is undo.  **theme:** allow to create custom ui theme. You can change here styling **options,** but every element can override theme used for big ui systems. |

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| **Nodes Other Part 1** | |
| **Node** | **Use** |
| Viewport | https://www.youtube.com/watch?v=tO2gthp45MA&t=416s |
| SubViewport, SubViewportContainer |  |
| Window |  |
| AcceptDialog, ConfirmationDialog |  |
| FileDialog |  |
| Popup |  |
| PopupMenu |  |
| PopupPanel |  |
| CanvasItem |  |
| CanvasLayer |  |
| AudioStreamPlayer |  |
| AnimationPlayer |  |
| AnimationTree |  |
| HTTPRequest |  |
| MultiplayerSpanwer, MultiplayerSynchornizer |  |
| ResourcePreloader |  |
| ShaderGlobalsOverride |  |
| SkeletonIK3D |  |
| Timer |  |
| CPUParticles3D |  |
| PhysicalBone3D |  |
| SpriteBase3D |  |