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| **Lesson type:** | Bird House |
| **Learning objectives:** | Understanding coordinates  Making use of the While loop (undefined number of repetitions)  Introducing conditions (IF and Else)  Using random |
| **Tools** | Minecraft Education / Make code |
| **Activity** | Within a selected area the Agent is teleported to a random point and is programmed to find the treasure which in this case is a Redstone block. The agent will move forward until it reaches the perimeter wall. The agent will then automatically be teleported to a new random location and move forward. The process is repeated until the Agent finds the Redstone block |
| **Extension work** | Once completed students can experiment by changing how the Agent moves. And change what the Agent does once the Redstone is found. |
| **Further Extension** | Add different block types as obstacles in the selected area and reprogram the Agent to deal with these obstacles. |

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| **Create a new world: Blocks of Grass** | |
| Build a Cobble Stone wall  10 blocks by 10 blocks area of grass. So you will need 44 blocks of Cobble Stone    Then randomly replace one of the **grass blocks** with a **Redstone** block | Machine generated alternative text: -23B |

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| Now we need to find the coordinates of 2 diagonal corners within the perimeter wall. I used corners **A** and **B** as seen in the diagram.    Move your player (**not while flying**) and stand on the block labelled A. Make a note of the coordinates. Then do the same while standing on block labelled B.    Here are my coordinates     |  |  | | --- | --- | | A: | Machine generated alternative text: | | B: | Machine generated alternative text: | | Machine generated alternative text: -23B  pest |

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| **Let’s find a Random Location** | |
| Let's create a new chat command to start the treasure hunt.  From the PLAYER toolbox Add a new on chat command and rename the command to **treasure** | on chat conmand  treasure |
| First thing is to teleport the agent to a random position within the  10 x 10 block area we have selected.  For **my** coordinates this means:    **X coordinate**= anywhere between **-156 and -147**  **Y coordinate**= **4**  **Z coordinate=** anywhere between -**294 and -285**    **You will need to use your coordinates**    From the AGENT toolbox drag the agent teleport to code block to the chat command | on chat conmand  treasure  agent teleport to  facing  West (negative X)    on chat conmand  treasure  agent teleport to  facing  West (negative X)  world |

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| Next from the POSITIONS toolbox drag the world coordinates  οοορτ  and place them on top of the coordinates of the agent teleport code | on chat conmand  treasure  agent teleport to  facing  West (negative X)  borld    on chat conmand  treasure  000  agent teleport to wrld  facing  West (negative X) |
| Next, we need to set the **X** coordinate to choose from a random number based on our coordinates.  From the search bar at the top of the **toolboxes** type **random** to find the pick random code. | random  Q SEARCH  BASIC  otoo  pick randcm  pick random position |
| Drag this out and place it in the **X** position for the teleport coordinates | on chat conmand  treasure  agent teleport to  oo  facing  pick random  West (negative X) |

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| Then enter the two **X** coordinates.  **x=** anywhere between **-156 and -147**  on chat conmand  treasure  agent teleport to  Id  pick  random  -156  -147  facing  West (negative X) • | |
| Now repeat for the **Z** coordinates  **z**= anywhere between -**294 and -285**    For **Y** coordinate enter the number **4**    on chat conmand  treasure  agent teleport to wrld  pick  random  -156  -147  pick  r andan  -294  -285  facing  West (negative X) • | |
| **Test your Program** | It is a good idea to test your program every time you complete a section so test your program. Press the key **t** and type **treasure**  Your agent should appear in a random position within the 10 x 10 perimeter  Try it again and see that it is truly random |

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| **Let’s program the agent** | |
| Next is to create a loop that will keep looping as long as the **Agent** is **NOT** standing on a **Red Stone Block**    From the LOOPS tool box drag out a while code block and place it under the agent teleport block | on chat conmand  treasure  agent teleport to  while true  Id  pick r |
| From the LOGIC toolbox pull out a not code and replace the **true** statement in the **While** block    We do this as we want the program to keep looping as long as the Agent has not found the Red Stone | |  |  | | --- | --- | | on chat conmand  treasure  agent teleport to  while true  Id  pick random | on chat conmand  treasure  agent teleport to wrld  pick r  while  not | |

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| Now for the condition the While loop will keep checking.  **As long as Agent is NOT above a Redstone**    From the AGENT toolbox pull out an agent detect code block    Drag this block to the **not** property block  Be careful not to replace the **not**. Make sure the inner shape of the **not** is highlighted before you drop the block  Machine generated alternative text: | on chat conmand  treasure  agent teleport to  Id  while  not  pick random  agent detect  -156  block  -147  forward |
| Next replace property **block** with **redstone** and **forward** with **down**    Now, whatever we place in the **do** section within the **while** loop will be repeated until the Agent detects a **redstone** under it | on chat co—and  ' treasure '  agent teleport to  Id pick random  -156  down  -147  while  do  not  agent detect redstone |

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| If we simply tell the agent to move forward until it finds a redstone it will soon face a block and will not be able to move. Our next code will involve using an **If Else** logic check    **If**  Agent detects a block in front of it then it will be teleported to a random point within the 10 x 10 block  **Else**  Agent to move forward by 1 block | agen+ move  oleåec  b IOC  01  Yes  Agen4  +0 re-n  Pos; |
| Form the LOGIC toolbox pull out an If Else code block and place it in the **while** block | while  if  else  not  agent detect  redstone  down  true then  e |

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| From the AGENT toolbox pull out an agent detect code block  And replace the true statement in the IF block    The default properties **block** and **forward** are correct so leave them as is | while  if  else  not  true  agent detect  hen  redstone  agent detect  down  block  forward    while  if  else  not  agent detect redstone  down  agent detect block •  forward  then  e |
| So, what should happen if the Agent detects a block in front of it? We want to teleport the Agent to a random point in the 10 X 10 area.    We have already done this right at the beginning of our program so we can duplicate this block  **Right click** on the Teleport block and select **duplicate**  Ri click  on chat conmand  treasure  1k;s  agent teleport  pick  Duplicate  while not ag  random  stone  -156  down  -147  pick  r andan  -294  -285  facing  West (negative X) • | |

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| This will produce a copy of the block. Place the new block in the **if** loop  on chat cc—and  treasure  o too  agent teleport to  pi Ck rand'"  *ile not agent detect redstme  pi Ck randæ  facing West (negative X)  if  agent detect block forward  then  agent teleport to  else  Id pick ran  pick randcm  facing kSt (negative x) •  placed here |
| If the Agent does not detect a block in front of it then we want it to move forward.  From the AGENT toolbox pull out an agent move forward code block and place it under the **else** section  Machine generated alternative text: if  agent detect  block  forward  agent teleport to  world pick random  byo  then  -156  e  -147  pick  random  - 294  facing  -285  West (negative X) •  else  agent mve  forward |

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| Finally, what do we want the Agent to do if it finds the **redstone?**  For my program I am simply making my agent move up by 1 block. You can make it more interesting by making it do a victory dance.    From the AGENT toolbox pull out an agent move forward code block and change the **forward** to **up**  Place this block after the **while** loop  Machine generated alternative text: on chat conmand  treasure  agent teleport to  Id pick random  -156  down  -147  then  pick randun  -294  -285  facing  West (negative X) •  while  if  not  agent detect redstone  agent detect block •  forward  agent teleport to  Id pick random  byo  -156  e  -147  pick  random  - 294  -285  facing  West (negative X) •  else  agent mve  agent mve  up  forward  byo |
| **Test your Program** |