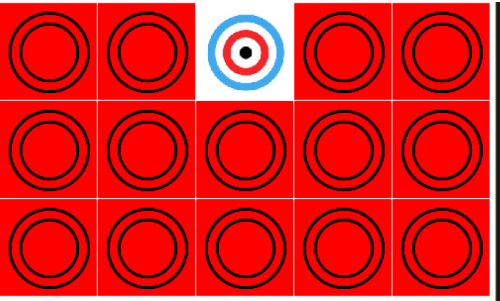
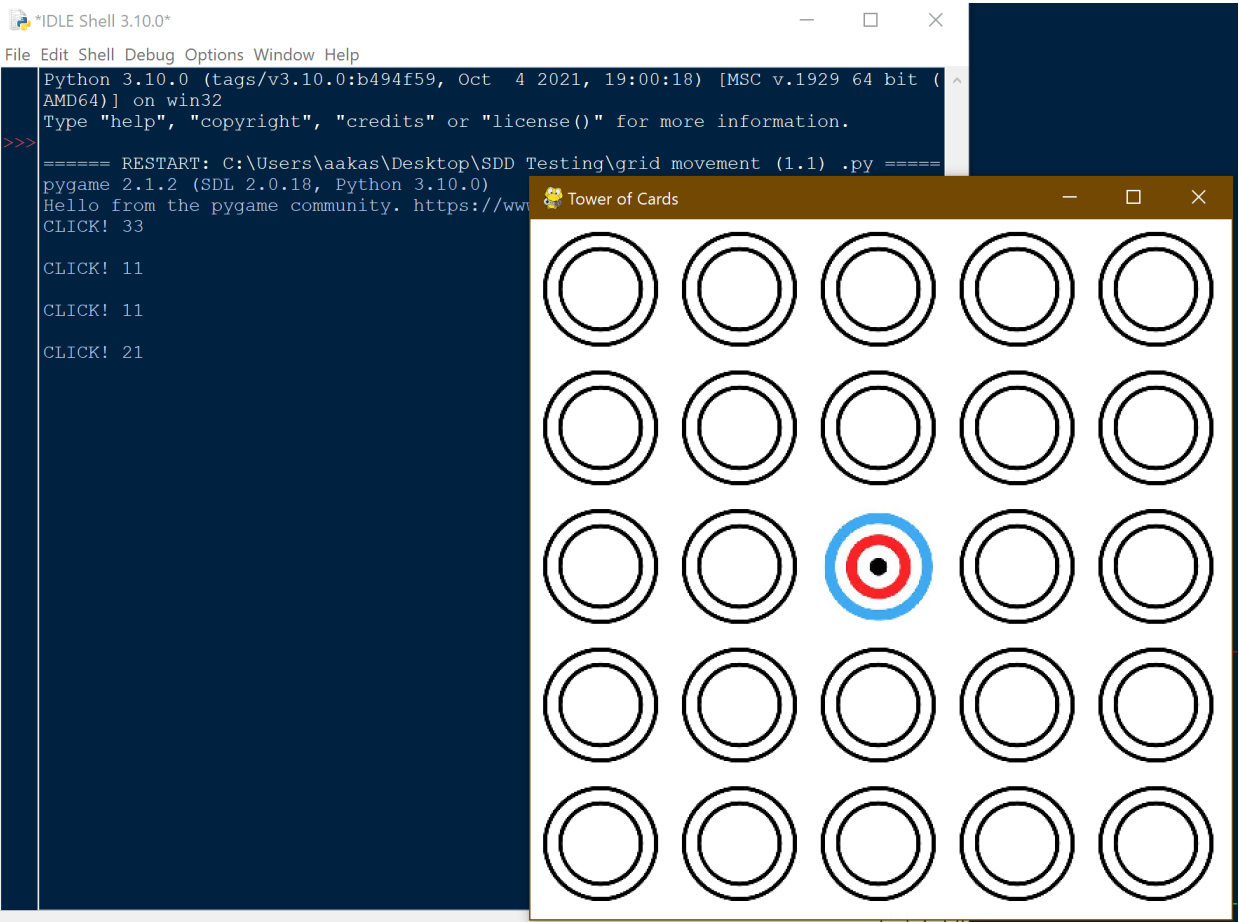
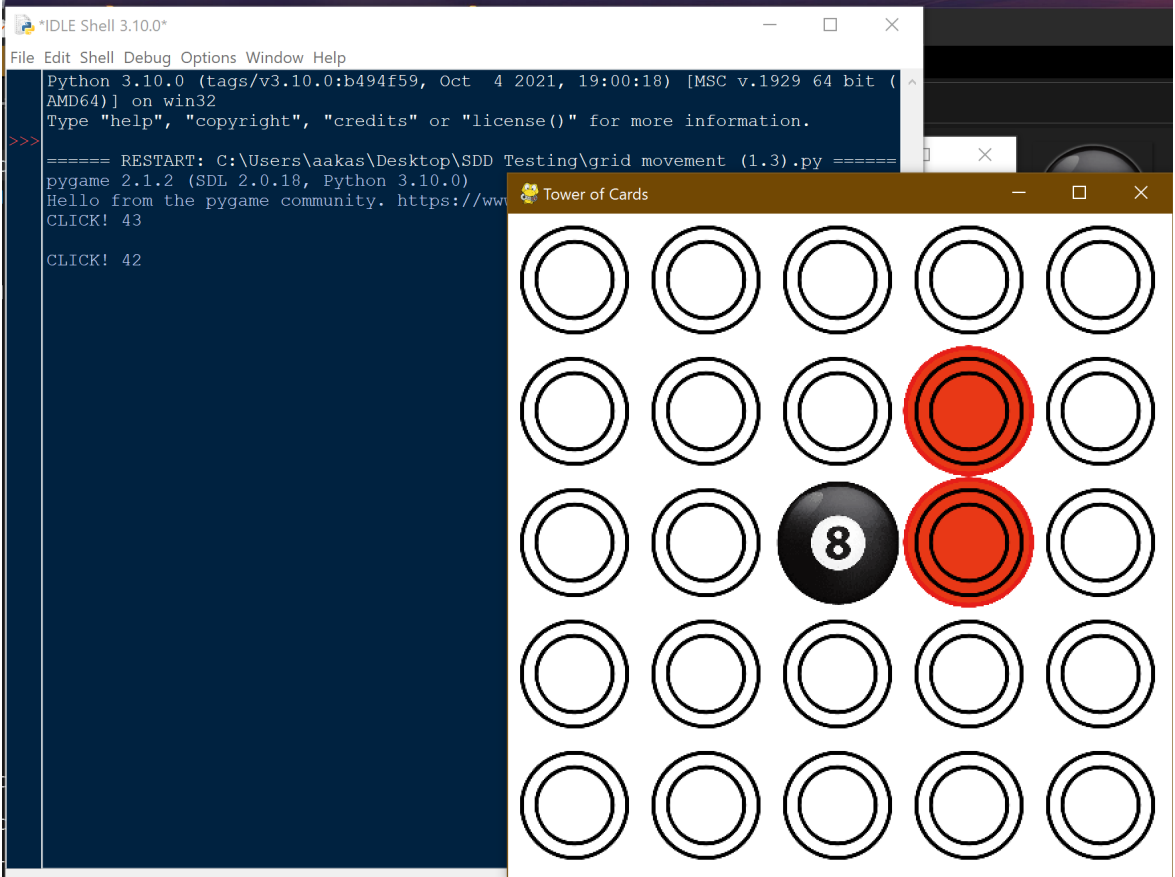
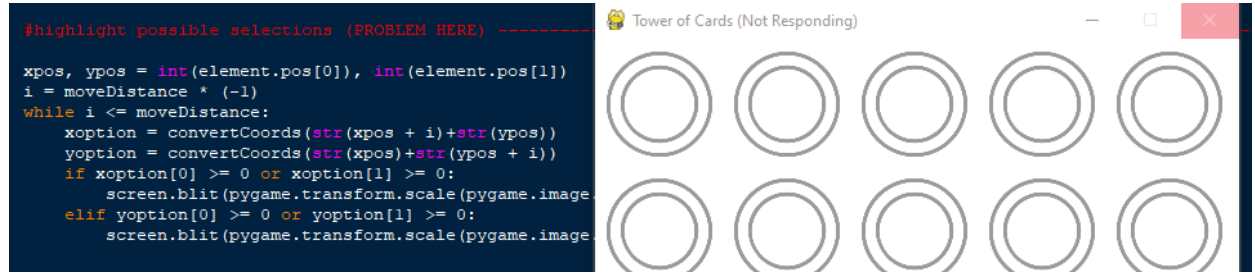
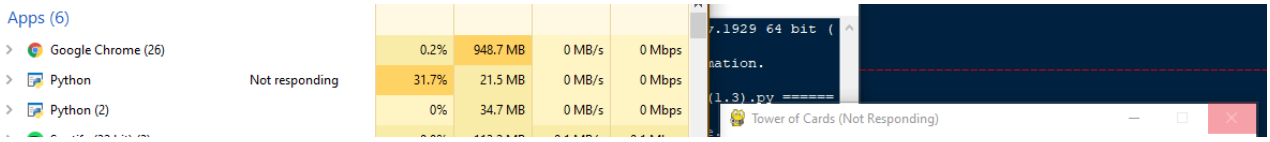


Within the logbook:

- A list of work completed is to be identified such as:
 - Completed the main menu function
 - Includes a login input and checks against a list of users
 - Added in some colours to the main menu function
 - Imported colorama library
- Challenges or achievements:
 - **Achievement:** Issues with user input have been solved by checking if it is alphabetical.
 - **Challenge:** Using the colorama library of code and attaching it to all documents to be submitted to work properly
- References and links that are vital to the development of the project
 - Geeks For Geeks - Dictionaries - <https://www.geeksforgeeks.org/python-dictionary/>
 - Images can be included to demonstrate the work completed or highlight issues

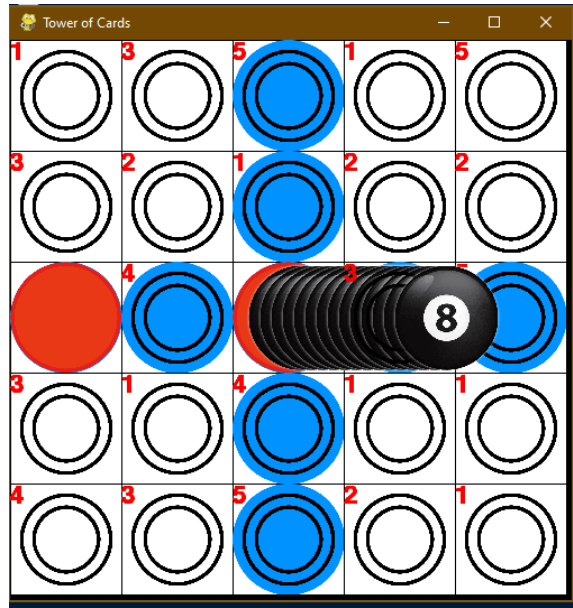
Date	Work Completed	References / Links
02/01/22	<ul style="list-style-type: none">• Looked through pygame tutorials (Which are referred to, multiple times throughout the development of this project)	Pygame links: https://coderslegacy.com/python/python-pygame-tutorial/ https://www.pygame.org/docs/ref/pygame.html
06/01/22	<ul style="list-style-type: none">• Experimented with placing objects in a grid• Researched classes Achievements <ul style="list-style-type: none">• Created a prototype resizable 5x5 grid	Python classes: https://www.learnpython.org/en/Classes_and_Objects https://www.geeksforgeeks.org/python-classes-and-objects/
01/02/22	<ul style="list-style-type: none">• Adjusted grid assignment method in the prototype• Created draft of gantt chart Challenges <ul style="list-style-type: none">• Problem with variable assignments• Problem with the list that stored the grid squares	
02/02/22	<ul style="list-style-type: none">• Removed some unnecessary variables• Fixed variable issues• Started work on detecting when grid squares are clicked by mouse input	
03/02/22	<ul style="list-style-type: none">• Worked on mouse selection	Detecting mouse input:

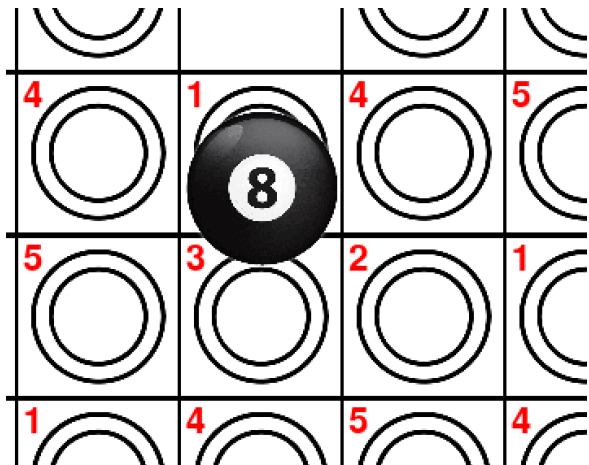
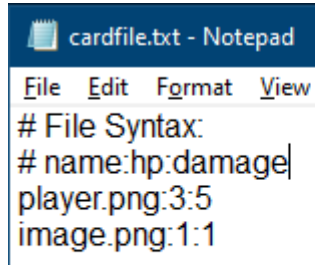
		<pre>mouse = pygame.mouse.get_pos() for event in pygame.event.get(): if event.type == QUIT: pygame.quit() sys.exit() elif event.type == pygame.MOUSEBUTTONDOWN:</pre>
04/02/22	<ul style="list-style-type: none">Tested mouse selection by drawing boxesFixed box selection Challenges <ul style="list-style-type: none">Multiple boxes being selected when one is clicked Achievements <ul style="list-style-type: none">When each grid is clicked, its coordinates are returned	<p>Testing with rectangles:</p> <pre>pygame.draw.rect(screen, (255, 0, 0), (square[0], square[2], xinterval-1, yinterval-1)) if square[0] < mouse[0] < square[1] and square[2] < mouse[1] < square[3]: if click == True: print(f'CLICK! {item.pos}') #FLAG----- print() square in grid: #assign image files depending on square.card.cardName match square.squareElement.cardName: case 'image': square.squareElement.display = image case 'target': square.squareElement.display = target case _: print('----- no image file uh oh -----') screen.blit(square.squareElement.display, convertCoords(square.pos))</pre>  <p>Grid Selection:</p> 

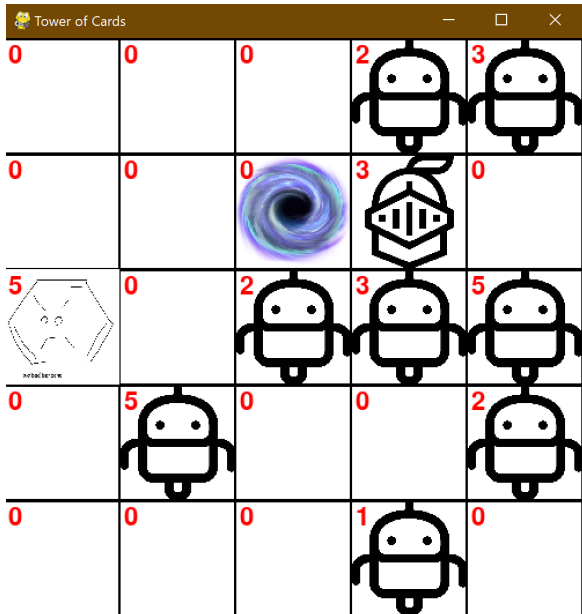

09/02/22	<ul style="list-style-type: none">Worked on visual confirmation of selection (highlighting clicked grid squares)	
10/02/22	<ul style="list-style-type: none">Worked on selecting squaresPrevented users from selecting the same square twice. <p>Achievements</p> <ul style="list-style-type: none">Code allows the user to select two grid squares, and highlights them both on click. On third click, both objects are deselected.	<p>Two objects selected:</p> 
11/02/22	<ul style="list-style-type: none">Worked on validating movement selectionAdded a temporary limit of only allowing the user to move two spaces at a timeAdjusted selection function so that the first click is always the user character (in this case, the 8 ball image)Highlighted possible selections after movement <p>Challenge</p> <ul style="list-style-type: none">Code for highlighting valid movement causes program to ‘not respond’ : 	<p>Not responding:</p> 
13/02/22	<ul style="list-style-type: none">Simplified some variables and listsResearched causes for the ‘not responding’ message<ul style="list-style-type: none">Most likely due to high CPU usage	<p>Investigating possible cause:</p> <p>https://www.makeuseof.com/tag/7-common-reasons-why-your-system-is-irresponsive-how-to-solve-them/</p> 
15/02/22	<ul style="list-style-type: none">Worked on grid selection <p>Achievements</p>	<p>http://www.marinamele.com/7-tips-to-time-python-scripts-and-control-memory-and-cpu-usage</p> <p>Current Grid:</p>


	<ul style="list-style-type: none">• Fixed issue by simplifying a section of code and moving it to the game loop• Created a visual grid around the objects• Finished grid object selection	
16/02/22	<ul style="list-style-type: none">• Worked on object movement and movement animation	
17/02/22	<ul style="list-style-type: none">• Looked through notes and test programs to figure out how to display text in pygame• Implemented a 'hp' system, where the player can only move onto a square that has lower or equal hp to them. (this 'hp' system is a temporary measure to ensure that the player cannot move onto other enemies when they are implemented)• Worked on a movement animation <p>Achievements</p> <ul style="list-style-type: none">• Player character (8 ball) can now move around the grid, according to hp and moveDistance limits <p>Challenges</p> <ul style="list-style-type: none">• Implemented a movement animation, but there are some bugs<ul style="list-style-type: none">◦ Left movement: multiple copies of the 8 ball appear◦ Right movement: same as above, but the copies appear towards the left◦ Movement up and down: 8 ball teleports to correct location after a delay	<p>Grid movement and 'hp':</p>


Failed animation:

		
22/02/22	<ul style="list-style-type: none"> Cleaned up code by removing unnecessary variables and repetitions and using more functions Worked on fixing move animation 	
2/03/22	<ul style="list-style-type: none"> Researched enumerate() function Cleaned up code and reorganised functions 	<p>Testing enumerate:</p> <pre>list = [chr(x) for x in range(65, 91)] for num, item in enumerate(list): print(num, item)</pre> <p>https://www.geeksforgeeks.org/enumerate-in-python/</p>
9/03/22	<ul style="list-style-type: none"> Started second version of move animation <p>Challenges</p> <ul style="list-style-type: none"> Multiple bugs as the object doesn't stop moving, leaves a trail of copies and does not work with different sized screens 	
10/03/22	<ul style="list-style-type: none"> Finished move animation Started work on card randomisation <p>Achievements</p> <ul style="list-style-type: none"> Entire program successfully optimised using a new structure Move animation works as required. 	Moving Player Icon:

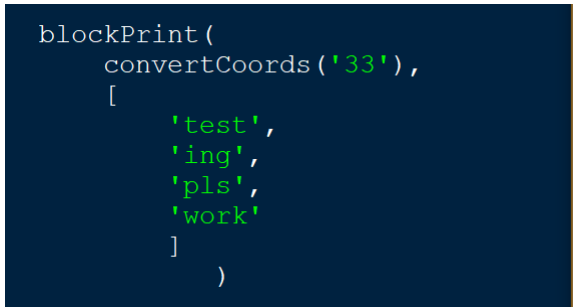
		
11/03/22	<ul style="list-style-type: none"> Started work on random card picker Reworked function that displays images to screen to allow the function to work with any image file supplied 	
13/03/22	<ul style="list-style-type: none"> Created a txt file to store card stats Fixed some errors regarding use of exec() function 	<p>Research on exec() function: https://stackoverflow.com/questions/23168282/setting-variables-with-exec-inside-a-function</p> <p>Txt file:</p> 
14/03/22	<ul style="list-style-type: none"> Worked on random card drawing <p>Achievements</p> <ul style="list-style-type: none"> Finished card randomiser and selector <p>Challenges</p> <ul style="list-style-type: none"> Though the program works as intended, response time between user input and screen output is very slow 	<p>Randomly generated grid:</p>

		
16/03/22	<ul style="list-style-type: none"> Accidentally fixed response time issue, when experimenting with code. This was probably due to combining some 'if' statements together. However the same problem may arise again when more code is added to the game loop. (Refer back to link on right if that happens) 	Optimising Code: https://www.loginradius.com/blog/async/speed-up-python-code/
21/03 - 04/04	<ul style="list-style-type: none"> Half Yearly Exams No progress on project apart from finding a good online image editor 	Image Editor: https://pinetools.com/pixelate-effect-image
07/04/22	<ul style="list-style-type: none"> Improved aesthetics of gantt chart and made it look neater 	
08/04/22	<ul style="list-style-type: none"> Created a list of different types of biomes and enemies across levels 1 to 100 Searched for backgrounds 	
12/04/22	<ul style="list-style-type: none"> Used image editor to pixelate backgrounds and edit them to suit the project 	Biome 4 Background: 
13/04/22	<ul style="list-style-type: none"> Created player sprite and other miscellaneous images (attack/health icon, portal icon) 	
14/04/22	<ul style="list-style-type: none"> Created all enemy sprites and boss sprite 	

	<ul style="list-style-type: none"> Organised current assets into folder 	
19/04/22	<ul style="list-style-type: none"> Created audio assets <ul style="list-style-type: none"> Background music for game SFX (Move, click, enter portal etc.) <p>Achievements</p> <ul style="list-style-type: none"> Finished making all assets 	
20/04/22	<ul style="list-style-type: none"> Made data flow diagrams: <ul style="list-style-type: none"> Level 1 Level 2: ('Game' process from level 1) 	
21/04 - 22/04	<ul style="list-style-type: none"> Remade some sprites and added new ones Edited data flow diagrams 	
26/04/22	<ul style="list-style-type: none"> Compiled Part A files and submitted <p>Achievements</p> <ul style="list-style-type: none"> <u>Part A Submitted</u> 	
28/04/22	<ul style="list-style-type: none"> Started work on implementing "combat" <ul style="list-style-type: none"> (ranged combat is allowed so the player can attack if the enemy is within movement range) If the square health is above zero, player will not move and deal damage to enemy instead. If square health is zero, player will move onto square. 	
3/05/22	<ul style="list-style-type: none"> Worked on combat system <ul style="list-style-type: none"> Split moving and attacking into two different functions <p>Challenges</p> <ul style="list-style-type: none"> Highlight that indicates which tiles the player can move onto has randomly disappeared. Game loop breaks on second tile selection 	
5/05/22	<ul style="list-style-type: none"> Fixed bug Worked on combat system Added two functions for animations when player attacks an enemy and reaches end portal. Animation has not been implemented yet. Implemented new assets, but still as placeholders <p>Achievements</p> <ul style="list-style-type: none"> Finished combat system 	<p>Game Screenshot:</p> 

		(Player can move onto portal and some enemies have less health)
8/05/22	<ul style="list-style-type: none"> Added a fireball sprite for the attack animation (sprite is rotated depending on attack direction) Found a bug that caused player to move off screen when clicking an invalid square option and fixed it. <p>Achievements</p> <ul style="list-style-type: none"> Finished attack and portal animations 	<p>Rotating Images:</p> <p>https://www.geeksforgeeks.org/how-to-rotate-and-scale-images-using-pygame/#:~:text=To%20rotate%20the%20image%20we,rotation%20is%20to%20be%20done.</p>
9/05/22	<ul style="list-style-type: none"> Improved portal animations Worked on card stat icons (hp, damage, speed, defence) Changed resizing so that game window will always be a square <p>Challenges</p> <ul style="list-style-type: none"> Logic error with displaying card stats 	<p>Error:</p> 
10/05/22	<ul style="list-style-type: none"> Fixed error from above Removed unnecessary instances of different x and y variables (since the window is always a square both axis should be the same) Centred display on screen Researched lambda functions 	<p>Lambda Function: https://realpython.com/python-lambda/</p>
16/05/22	<ul style="list-style-type: none"> Worked on implementing levels Created level files Created placeholders for player death, manual quit, end game etc Created a main menu Attempted to move some functions to another file to improve code readability <ul style="list-style-type: none"> However this causes a series of problems with the code, so I organised functions within the original file instead <p>Achievements</p> <ul style="list-style-type: none"> Fully implemented level system and different worlds across levels 	
17/05/22	<ul style="list-style-type: none"> Started work on enemy to player interaction <ul style="list-style-type: none"> Each enemy now creates a path of L/R/U/D steps (each step moves one space on the grid) to reach the player 	<p>Error:</p>

	<ul style="list-style-type: none"> ○ Enemies also detect whether the player is within their individual move range ● Playtested game <ul style="list-style-type: none"> ○ Game is too easy as player can just move past enemies to reach the portal every time ○ Increase enemy stats to make them more dangerous. The user will be forced to kill enemies to get coins (which will be implemented later) to upgrade their stats so they can survive enemies as the levels progress ○ Also increase the number of enemies per floor, to make them more difficult to avoid. ● Made animate() function less dependent on global variables so it can be used for any moving object and added 'block' animation ● Adjusted enemy movement, so that a character with more than 1 speed value, will not move the maximum amount of spaces they can, if it takes them further away from the player. <ul style="list-style-type: none"> ○ EG: <ul style="list-style-type: none"> ■ enemy has 3 speed, enemy is moving left ■ the player is 2 tiles left and one tile up, ■ Enemy will move only two tiles up instead of their maximum of 3 ○ (before adjustment, the 'move loop' repeated the same number of times as the enemy's 'speed' stat, forcing them to always move max spaces. <p>Challenges</p> <ul style="list-style-type: none"> ● Error with killing enemies AFTER the first action (another move or attack) has been performed <ul style="list-style-type: none"> ○ Problem resolved by renaming a variable that had the same name as the 'card' class 	 <p>The image shows a Python IDE window on the left with a traceback error. The error message is: "TypeError: 'gridsquare' object is not callable". The traceback points to line 225 in a file named "enemies.py". On the right, there is a game window titled "Tower of Cards" showing a top-down view of a game grid with various enemy characters and a player character.</p>
18/05/22	<ul style="list-style-type: none"> ● Created coin variable and place for it to be displayed ● Also created shop and pause icons <ul style="list-style-type: none"> ○ Icons obstruct the game grid so they need to be moved ● Researched transparent rects as a possible solution to make the grid visible underneath coin counter <ul style="list-style-type: none"> ○ This solution is a little messy but it works <ul style="list-style-type: none"> ■ NOTE: this soln was not implemented 	<p>Transparent rectangles:</p> <p>https://stackoverflow.com/questions/6339057/draw-a-transparent-rectangles-and-polygons-in-pygame</p>
19/05/22	<ul style="list-style-type: none"> ● Adjusted the grid size to add an extra 6th column on the right <ul style="list-style-type: none"> ○ This column will not be used for the game, instead it will hold the coin counter, shop and pause buttons and any other stats ○ Moved coin counter, shop and pause buttons to extra column ○ Made column transparent to improve aesthetics ● Enemies now have a move animation and do not just teleport to their locations <p>Challenges</p> <ul style="list-style-type: none"> ● Grid is cut off when the screen's horizontal length is longer than vertical length 	
20/05/22	<ul style="list-style-type: none"> ● Created shop menu <ul style="list-style-type: none"> ○ NOTE: Player stats only update on every new level. This is NOT a bug, better to leave it in as a feature 	

	<ul style="list-style-type: none"> Implemented placeholder death and victory screens <ul style="list-style-type: none"> Victory screens are only for story mode not endless 	
23/05/22	<ul style="list-style-type: none"> Added animation toggle <ul style="list-style-type: none"> Animations can be disabled if they affect game performance Reworked level counting system Created a button asset for buttons on the main menu Implemented endless mode, selected from main menu <p>Challenge</p> <ul style="list-style-type: none"> power scaling implementation does not work well <ul style="list-style-type: none"> In later levels, enemies have absurdly high stats 	
24/05/22	<ul style="list-style-type: none"> Fixed power scaling mechanic (problem caused because the stat values were strings when multiplied not integers) Created block print function for easily printing lines Added keyboard shortcuts for shop and pause menu Created a system which checks the length of number being displayed on each card's stat icon and adjusts positioning to centre it Combined opacity code into a separate function Implemented bulk upgrade function, but had to readjust dimensions to keep numbers centred and avoid them from going off screen or on top of other images <p>Challenge</p> <ul style="list-style-type: none"> Player has to click too many times to upgrade 	<p>Blockprint:</p>  <pre> blockPrint(convertCoords('33'), ['test', 'ing', 'pls', 'work']) </pre> <p>test ing pls work</p> <p>Keypress: https://www.pygame.org/docs/ref/key.html</p>
25/05/22	<ul style="list-style-type: none"> Fixed shop display, by repositioning the buttons Reworked game sidebar, <ul style="list-style-type: none"> Swapped pause and world info so that the world info is on top Implemented a neater form of text display <ul style="list-style-type: none"> The code that centres text and blockprint function Added world transitions <ul style="list-style-type: none"> When a world changes, it fades to black and shows a title screen for the next world On user click, it fades to the new background <p>Challenge</p> <ul style="list-style-type: none"> World transition plays twice sometimes and not at all other times Sometimes it plays, and then the level changes afterwards 	<p>Centre: https://stackoverflow.com/questions/23982907/how-to-center-text-in-pygame</p>
26/05/22	<ul style="list-style-type: none"> Removed transition function and integrated them into the game loop Implemented a new function for writing text <ul style="list-style-type: none"> This function centres text according to its length Integrated the previously written code into a function - write() 	

27/05/22	<ul style="list-style-type: none"> - Implemented the side text information panel <ul style="list-style-type: none"> - On right click, information about the clicked card will appear on the side panel - Changed system to only detect left click on normal checks <ul style="list-style-type: none"> - For button clicks in main menu and gameplay etc. - If an attack is completely blocked, player now loses shield <ul style="list-style-type: none"> - Currently the shield lost is the powerscale variable - This also happens for enemies 	
28/05/22	<ul style="list-style-type: none"> - Created new visual assets <ul style="list-style-type: none"> - 7 new player characters and player items 	
30/05/22	<ul style="list-style-type: none"> - Created character selection menu, and implemented unique projectiles 	
31/05/22	<ul style="list-style-type: none"> - Implemented hero abilities <ul style="list-style-type: none"> - Ability uses can be bought in the shop - Each character can only use their own ability - Abilities <ul style="list-style-type: none"> - Buff: Multiply player stats by 1.5 until level end - Shield: When enemies attack, 50% is deducted from their health - Cloak: Skip enemy attack phase once - Mage: Shield of enemies is multiplied by 0.5 before total damage is calculated - Priest: On death, if an item use exists, consume one use and return to full health and shield - Necromancer: any enemy that is killed, gives 75% of their health to player - Dark Knight: After ability is activated, move to any square if it is empty - Assigned a variable or list to store ability name and number of uses - Only hero mechanics have been added, players cannot use them. 	
1/06/22	<ul style="list-style-type: none"> - Enabled the player to actually use hero abilities and upgrade them in the shop - Created scoreboard <ul style="list-style-type: none"> - Created function to display - Made a placeholder scoreboard file - Created code that updates scoreboard file whenever a player dies on endless - Created Game guide <p>Achievements</p> <ul style="list-style-type: none"> - Finished adding and implementing all aspects of the different characters <ul style="list-style-type: none"> - Added abilities - Added character selection 	Sorting lists (for leaderboard): https://www.programiz.com/python-programming/methods/list/sort Sounds: https://pythonprogramming.net/adding-sounds-music-pygame/
2/06/22	<ul style="list-style-type: none"> - Balanced stat upgrade costs and enemy coin drops - Created and implemented unique projectiles 	

	<ul style="list-style-type: none">- Tested code and fixed small bugs- Wrote Testing the Solution Doc- Finished Logbook- Added extra comments to code <p>Achievements</p> <ul style="list-style-type: none">- Finished game code completely- Compiled files- Submitted Major Project	
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