# Asset Purchase and License

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| Source and Description | License | Proof of purchase |
| [Zombie Top-Down Shooter Game Kit by Free Game Assets (GUI, Sprite, Tilesets)](https://free-game-assets.itch.io/zombie-top-down-shooter-game-kit) | [File Licenses - CraftPix.net](https://craftpix.net/file-licenses/) |  |
| [Zombie Massacre Sound Effects Starter Pack by TerrorByteGames](https://terrorbytegames.itch.io/zombie-massacre-sound-effects-starter-pack) |  | Free |
| [Snake's SECOND Authentic Gun Sounds Pack by SnakeF8](https://f8studios.itch.io/snakes-second-authentic-gun-sounds-pack) | CC0 | Free |
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**Entity Testing**

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| Initialization & Configuration | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 5th July | Entity instantiates correctly | Expected | Entity(game\_view, 1.0) | No crash; properties like speed, friction, etc. set | Worked correctly | No fix needed |
| 5th July | Load character config from JSON | Expected | Valid character\_config path | Config is loaded and stored in cache | Loaded successfully | No fix needed |
| 6th July | Load config with invalid path | Invalid | "bad\_path.json" | Warning printed, no crash | Error message shown, no crash | No fix needed |
| 6th July | Missing animation in config | Boundary | Config missing animation section | Should fallback or report gracefully | Warned and skipped | No fix needed |
| 5th July | Entity instantiates correctly | Expected | Entity(game\_view, 1.0) | No crash; properties like speed, friction, etc. set | Worked correctly | No fix needed |

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| State Management | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 9th July | Changing from IDLE to WALKING | Expected | velocity = (5, 0) | State changes to WALKING | State changed correctly | No fix needed |
| 10th July | Switching back to IDLE | Expected | velocity = (0, 0) | State becomes IDLE | State changed to IDLE | No fix needed |
| 10th July | Changing to same state | Boundary | change\_state(IDLE) again | No change, returns False | Handled correctly | No fix needed |
| 11th July | Entity dies and sets state to DYING | Expected | die() | State = DYING, animation changes | Switched to DYING | No fix needed |
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| Movement & Physics | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 11th July | Movement applies normalized velocity | Expected | move(Vec2(3, 4)) | Velocity = unit vector scaled by speed | Velocity set correctly | No fix needed |
| 12th July | Friction using delta\_time formula | Expected | friction = 0.12 | Velocity decays using (1 - friction) \*\* dt | Smooth decay confirmed | No fix needed |
| 12th July | Velocity clamped to speed | Boundary | Large change\_x / change\_y | Velocity doesn't exceed speed | Capped at max speed | No fix needed |
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| Facing Direction (Look At) | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 3th July | Facing updates to target | Expected | Target = (100, 200) | facing\_direction = angle to point | Angle updated | No fix needed |
| 13th July | Facing straight up | Expected | Target above entity | Angle near 0/180 | Correct angle | No fix needed |
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| Health Management | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 14th July | Taking damage reduces health | Expected | take\_damage(10) | Health drops by 10 | Dropped correctly | No fix needed |
| 14th July | Taking fatal damage | Expected | take\_damage(max\_health) | Entity dies | State = DYING, health = 0 | No fix needed |
| 15th July | Health bar updates fullness | Expected | Damage → 50% health | Health bar fullness = 0.5 | Fullness updated correctly | No fix needed |
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| Asset Loading | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 15th July | Load animations from config | Expected | Valid config + preset | Animations loaded, cached in loaded\_animations | Animations appeared | No fix needed |
| 16th July | Load invalid animation path | Invalid | Bad frame path | Logs error, uses fallback texture | Used red fallback | No fix needed |
| 16th July | Static cache prevents reloading | Expected | Load same config again | Config pulled from cache, not reloaded | Cache hit confirmed | No fix needed |
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| Sound Handling | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 17th July | Load sound from path | Expected | Valid sound.wav | Sound added to loaded\_sounds cache | Played correctly | No fix needed |
| 18th July | Attempt to play missing sound | Invalid | sound\_name = "not\_found.wav" | Logs warning, no crash | Printed error message | No fix needed |
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**Player Testing**

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| Initialization & Configuration | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 5th July | Player initialization with default params | Expected | Player(game\_view) | No crash; default properties set | Worked correctly | No fix |
| 5th July | Player initialization with custom params | Expected | Various overrides incl. scale, speed, sound\_set | All custom properties applied | Worked correctly | No fix |
| 7th July | game\_view linkage | Expected | Access to wall\_list, bar\_list | Properties available | Linked successfully | No fix |
| 6th July | Valid character preset/config | Expected | player\_preset="Man" | Animations loaded and cached | Loaded successfully | No fix |
| 8th July | Invalid character config path | Invalid | config\_file="non\_existent\_config.json" | Warning logged, fallback used | Error logged, used defaults | Improved error logging |
| 10th July | Missing animations in preset | Boundary | player\_preset="MissingAnimMan" | Warning logged, fallback used | Used fallback texture | Added fallback |
| 5th July | Initial health setting | Expected | On init | current\_health == max\_health | 100 == 100 | No fix |
| 7th July | Initial weapon | Expected | On init | current\_weapon == WeaponType.GUN | Confirmed | No fix |
| 8th July | Health bar setup | Expected | On init | fullness == 1.0, linked to bar\_list | Confirmed | No fix |
| 10th July | Shoot cooldown timer | Expected | On init | shoot\_cooldown\_timer == 0 | Confirmed | No fix |

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| Weapon Management | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 9th July | Switch to BAT | Expected | set\_weapon(BAT) | Weapon set; animation switches to Walk\_Bat | Success | No fix |
| 11th July | Switch to RIFLE | Expected | set\_weapon(RIFLE) | Animation changes to Walk\_Rifle | Success | No fix |
| 13th July | Switch to current weapon | Boundary | set\_weapon(GUN) (already equipped) | No change | Handled correctly | No fix |
| 14th July | Idle anim for KNIFE | Expected | set\_weapon(KNIFE) | Idle\_Knife or Walk\_Knife used | Walk\_Knife used | Improved fallback logic |
| 15th July | Walk anim for FLAMETHROWER | Expected | set\_weapon(FLAMETHROWER) | Walk\_Flamethrower used | Success | No fix |
| 16th July | Gun ATTACKING animation | Expected | attack() | Gun\_Shot plays once | Worked as expected | No fix |
| 17th July | Bat ATTACKING animation | Expected | attack() with BAT | Bat animation plays once | Worked as expected | No fix |
| 18th July | Missing attack anim fallback | Boundary | attack() with unknown weapon | Generic attack animation or warning | Warning + fallback used | Improved fallback handling |

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| Combat & Attack Mechanics | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 12th July | attack() dispatches shoot() | Expected | Weapon = GUN | shoot() called | Confirmed | No fix |
| 13th July | attack() dispatches melee | Expected | Weapon = KNIFE | attack\_with\_weapon() called | Confirmed | No fix |
| 14th July | attack() in DYING state | Boundary | Player is DYING | No attack occurs | Correct behavior | No fix |
| 15th July | Bullet creation | Expected | shoot() | Bullet added to bullet\_list | Confirmed | No fix |
| 16th July | Cooldown enforcement | Expected | Call before cooldown expires | No bullet or sound | Cooldown enforced | No fix |
| 17th July | Cooldown reset | Expected | Call shoot() | shoot\_cooldown\_timer reset to 0 | Confirmed | No fix |
| 18th July | Gun sound plays | Expected | Call shoot() | "gun\_shot" sound plays | Confirmed | No fix |
| 19th July | Enemy detected in melee | Expected | Enemy near player | Enemy in hit list | Confirmed | No fix |
| 20th July | Damage applied in melee | Expected | Enemy in range | take\_damage() called | Damage applied | No fix |
| 21st July | ATTACKING state set | Expected | Call attack\_with\_weapon() | State briefly switches to ATTACKING | Confirmed | No fix |

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| State & Animation Transitions | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 10th July | IDLE → WALKING | Expected | Set velocity | State becomes WALKING; Walk\_ anim plays | Walk\_Gun animation played | No fix |
| 12th July | WALKING → IDLE | Expected | Velocity = 0 | State becomes IDLE; Idle\_ anim plays | Walk\_Gun used (Idle\_ missing) | Prioritized Walk\_ fallback |
| 16th July | IDLE → ATTACKING | Expected | Call attack() | State = ATTACKING, Gun\_Shot plays | Confirmed | No fix |
| 22nd July | Any → DYING | Expected | Call die() | State = DYING, Death anim plays | Confirmed | No fix |
| 23rd July | Redundant change\_state() | Boundary | Already in IDLE | No state change | Handled correctly | No fix |
| 17th July | Gun\_Shot animation restarts | Expected | Repeated shoot() calls | Animation restarts | Worked as expected | No fix |
| 19th July | Walk\_ animation loops | Expected | Long WALKING state | Animation loops | Loop confirmed | No fix |
| 24th July | Death animation finishes once | Expected | DYING state entered | Animation plays once and stops | Played to end, held last frame | No fix |

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| Health & Death Management | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 15th July | Damage reduces health | Expected | take\_damage(20) | Health drops by 20 | Confirmed | No fix |
| 18th July | Health bar syncs with health | Expected | take\_damage(50) | Health bar at 0.5 | Confirmed | No fix |
| 25th July | Fatal damage triggers reset | Expected | reset\_on\_death = True | Health/position reset | Player reset | No fix |
| 26th July | Fatal damage → DYING | Expected | reset\_on\_death = False | State = DYING, health = 0 | Confirmed | No fix |
| 27th July | Multiple die() calls | Boundary | Call die() twice | Only first call has effect | Confirmed | No fix |

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| Input & Interaction | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 11th July | mouse\_position updates | Expected | Move mouse to (500, 300) | Position stored correctly | Confirmed | No fix |
| 13th July | look\_at() faces up | Expected | Mouse above player | Angle ≈ 90° | Rotated correctly | No fix |
| 15th July | look\_at() faces right | Expected | Mouse to the right | Angle ≈ 0° | Rotated correctly | No fix |
| 17th July | look\_at() faces diagonal | Expected | Mouse at 45° offset | Angle ≈ 45° | Rotated correctly | No fix |

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| Physics & Movement | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 9th July | PhysicsEngineSimple initialization | Expected | Player instantiation | self.physics\_engine is instance of PhysicsEngineSimple and linked | Physics engine initialized correctly | No fix needed |
| 10th July | PhysicsEngineSimple with None as wall\_list | Invalid | PhysicsEngineSimple(self, None) | Engine initializes without crash; no collisions | Engine initialized, player passed through walls | Added check for None wall\_list in engine constructor |
| 11th July | Movement in X-direction | Expected | change\_x = 5, delta\_time = 1.0 | Player moves 5 units horizontally | Player moved 5 units right | No fix needed |
| 12th July | Movement in Y-direction | Expected | change\_y = -3, delta\_time = 1.0 | Player moves 3 units vertically down | Player moved 3 units down | No fix needed |
| 13th July | Diagonal movement | Expected | change\_x = 4, change\_y = 4, delta\_time = 1.0 | Diagonal movement; speed normalized | Player moved diagonally at correct speed | No fix needed |
| 14th July | Collision with walls prevents movement | Expected | Player moves into wall | Player stops at wall boundary | Player stopped at wall | No fix needed |
| 15th July | Non-numeric change\_x | Invalid | change\_x = "abc" | Error logged, player doesn't move | TypeError logged, no movement | Added type validation for change\_x/y |
| 16th July | Friction application at rest | Expected | velocity = (0, 0), friction = 0.1 | Velocity remains unchanged | Velocity remained (0, 0) | No fix needed |
| 17th July | Friction while moving | Expected | velocity = (10, 0), friction = 0.1, delta\_time = 0.1 | Velocity decays slightly | Velocity decayed as expected | No fix needed |
| 18th July | High friction value | Boundary | friction = 0.9 | Velocity decays rapidly | Velocity stopped quickly | No fix needed |
| 19th July | Zero friction value | Boundary | friction = 0.0 | No velocity decay | Velocity maintained | No fix needed |
| 20th July | Negative friction | Invalid | friction = -0.5 | Friction ignored or clamped | Treated as 0, no error | Added friction input validation in \_\_init\_\_ |
| 21st July | Collision with multiple walls | Expected | Move into a corner | Player cannot pass through corner | Player stopped at corner | No fix needed |
| 22nd July | Collision with moving wall | Expected | Simulated moving wall | Player reacts properly | Player pushed or stopped accordingly | Assumes wall\_list can have dynamic sprites |
| 23rd July | External force pushes player | Expected | Apply external change\_x/y | Player moves in response | Player moved as pushed | No fix needed |
| 24th July | Velocity clamping | Expected | Exceed PLAYER\_MOVEMENT\_SPEED | Speed is capped | Speed clamped properly | No fix needed |
| 25th July | Engine update with None values | Invalid | self.physics\_engine.player = None | No crash, fails silently or warns | AttributeError, game continued | Added try-except around engine update |
| 26th July | Update method runs physics engine | Expected | player.update(delta\_time) | physics\_engine.update() runs | Physics updated | No fix needed |
| 27th July | Varying delta\_time | Expected | delta\_time = 0.01 and 0.1 | Consistent movement at both time steps | Movement consistent | No fix needed |
| 28th July | Negative delta\_time | Invalid | delta\_time = -0.1 | Handled gracefully, no movement | No crash, warning logged | Added check for negative delta\_time |
| 29th July | Spawn position | Expected | Player instantiation | Player appears at spawn position | Player spawned correctly | No fix needed |
| 29th July | Movement after reset | Expected | reset(), then movement | Player starts from spawn with reset state | Player moved normally after reset | No fix needed |
| 29th July | Collision with non-wall sprites | Expected | Touch enemies or pickups | No collision response, only logical interaction | Passed through as expected | No fix needed |
| 29th July | Movement while in DYING state | Boundary | state = DYING, then input | No movement allowed | Player remained still | No fix needed |
| 29th July | Friction causes stop | Expected | Move → release input | Player slows to halt via friction | Player decelerated | No fix needed |
| 29th July | Rapid direction changes | Expected | Quick change in change\_x/y | Player instantly turns and moves accordingly | Immediate direction change observed | No fix needed |
| 12th July | Movement in Y-direction | Expected | change\_y = -3, delta\_time = 1.0 | Player moves 3 units vertically down | Player moved 3 units down | No fix needed |
| 13th July | Diagonal movement | Expected | change\_x = 4, change\_y = 4, delta\_time = 1.0 | Diagonal movement; speed normalized | Player moved diagonally at correct speed | No fix needed |

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| Sound Integration | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 6th July | Valid sound set loaded | Expected | "gun\_shot.wav" | Sound loaded | Confirmed | No fix |
| 19th July | Missing sound file | Invalid | Non-existent .wav path | Warning logged | Confirmed | Improved logging |
| 21st July | Sound plays on shoot | Expected | Player calls shoot() | "gun\_shot" plays | Confirmed | No fix |

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| Reset Functionality | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 28th July | Health reset | Expected | Call reset() | current\_health == max\_health | Confirmed | No fix |
| 28th July | State reset to IDLE | Expected | From DYING state | state == IDLE | Confirmed | No fix |
| 29th July | Weapon reset to GUN | Expected | Weapon changed to BAT | Resets to GUN | Confirmed | No fix |
| 29th July | Velocity zeroed | Expected | While moving | velocity == 0.0 | Confirmed | No fix |
| 29th July | Position reset | Expected | From different position | Back to spawn\_position | Confirmed | No fix |
| 29th July | Health bar reset | Expected | After damage | fullness == 1.0 | Confirmed | No fix |

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| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
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**Zombie Testing**

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| Initialization & Configuration | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 5th July | Zombie instantiation with default parameters | Expected | Zombie(game\_view) | No crash; default properties (speed, friction, ranges) set correctly | Worked correctly | No fix needed |
| 5th July | Zombie instantiation with custom parameters | Expected | Zombie(game\_view, zombie\_type="Fat\_zombie", scale=1.2, friction=0.3, speed=50, player\_ref=player\_instance) | All custom properties are applied correctly | Worked correctly | No fix needed |
| 6th July | player\_ref linkage | Expected | Accessing self.player.position | player\_ref object is correctly assigned and its properties are accessible | player\_ref linked successfully | No fix needed |
| 7th July | Initial state is IDLE | Expected | After Zombie instantiation | self.state is EntityState.IDLE | State was IDLE | No fix needed |
| 8th July | Initial random\_move\_timer value | Expected | After Zombie instantiation | random\_move\_timer is a random float within ZOMBIE\_RANDOM\_MOVE\_INTERVAL | Timer set to a random value | No fix needed |
| 9th July | Initial random\_move\_point value | Expected | After Zombie instantiation | random\_move\_point is Vec2(0, 0) | Point was Vec2(0, 0) | No fix needed |
| 10th July | Health bar initialization and fullness | Expected | After Zombie instantiation | health\_bar exists, linked to game\_view.bar\_list, and fullness is 1.0 | Health bar visible, fullness at 1.0 | No fix needed |
| 11th July | Zombie added to game\_view.enemies list | Expected | After Zombie instantiation | self is present in game\_view.enemies | Zombie added to list | No fix needed |
| 12th July | Zombie added to game\_view.scene["Enemies"] list | Expected | After Zombie instantiation | self is present in game\_view.scene.get\_sprite\_list("Enemies") | Zombie added to scene list | No fix needed |
| 13th July | Invalid zombie\_type (non-existent preset) | Invalid | zombie\_type="Non\_existent\_zombie" | Warning logged; zombie uses a default/fallback animation | Warning logged, default zombie animation used | Added fallback to generic zombie if preset missing |
| 14th July | game\_view is None during initialization | Invalid | Zombie(None) | Initialization fails gracefully or logs error, no crash | AttributeError on game\_view.bar\_list, crashed | Added checks for game\_view being None before accessing its properties |

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| AI & Movement Behavior | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 15th July | Zombie detects player within detection\_range | Expected | Player at distance = detection\_range - 10 | Zombie changes state to WALKING and moves towards player | Zombie started chasing | No fix needed |
| 16th July | Zombie does not detect player outside range | Expected | Player at distance = detection\_range + 10 | Zombie remains in IDLE or WALKING (random move) state | Zombie continued random movement | No fix needed |
| 17th July | Zombie engages player | Expected | Player at distance = 200 | Zombie sets random\_move\_point to player’s position and calls goto\_point | Zombie moved directly towards player | No fix needed |
| 18th July | Zombie attacks within attack\_range | Expected | Player at distance = attack\_range - 5 | Zombie stops, calls attack(), and looks at player | Zombie stopped, attacked, faced player | No fix needed |
| 19th July | Zombie random moves when player out of range | Expected | Player within physics\_range - 100 | Zombie performs random movement, updates random\_move\_point | Zombie patrolled randomly | No fix needed |
| 20th July | random\_move\_timer triggers new random point | Expected | random\_move\_timer >= ZOMBIE\_RANDOM\_MOVE\_INTERVAL | random\_move\_point is updated, timer resets | New random point generated | No fix needed |
| 21st July | Zombie reaches random\_move\_point, generates new | Expected | diff.length() < 50 | random\_move\_point is updated | New random point generated | No fix needed |
| 22nd July | Pathfinding fails; fallback to random | Expected | engage\_player(True) but path is empty | walk\_random = True, initiates random movement | Zombie switched to random movement | No fix needed |
| 23rd July | animation\_allow\_overwrite blocks AI | Boundary | Set self.animation\_allow\_overwrite = False | Zombie doesn’t react to player | Zombie ignored player | No fix needed |
| 24th July | player\_ref is None | Invalid | Set self.player = None | hunt\_player handles gracefully, no crash | No crash, no player interaction | Added check for self.player is None |
| 25th July | Extremely large detection\_range | Boundary | self.detection\_range = 100000 | Zombie detects player from far away and chases | Zombie chased from across map | No fix needed |

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| Combat & Damage | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 18th July | attack() called within attack\_range | Expected | Player within range | attack() method is called | attack() executed | No fix needed |
| 20th July | attack() applies damage to player | Expected | Zombie attacks | Player’s health reduces by self.damage (10) | Player health reduced by 10 | No fix needed |
| 22nd July | Attacking player while they are DYING | Boundary | Player state = DYING | Attack plays but health doesn’t change (already 0) | No effect on health | No fix needed |
| 24th July | Negative damage value | Invalid | self.damage = -5 | Zombie doesn’t heal player; damage is clamped or ignored | Player health didn’t change | Added clamping for self.damage >= 0 |

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| Health Management & Death | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 10th July | Health bar synchronizes with health | Expected | zombie.take\_damage(50) | health\_bar.fullness becomes 0.5 | Health bar updated to half | No fix needed |
| 12th July | Taking damage reduces health | Expected | take\_damage(20) | current\_health decreases by 20 | Health dropped from 100 to 80 | No fix needed |
| 14th July | Taking fatal damage | Expected | take\_damage(max\_health) | State changes to DYING, health becomes 0 | State = DYING, health = 0 | No fix needed |
| 16th July | Removed from game\_view.enemies on death | Expected | Zombie dies | Instance removed from game\_view.enemies | Zombie removed from list | No fix needed |
| 18th July | Removed from scene "Enemies" on death | Expected | Zombie dies | Sprite removed from game\_view.scene.get\_sprite\_list("Enemies") | Zombie sprite removed | No fix needed |
| 20th July | Multiple take\_damage calls after death | Boundary | take\_damage(10) after DYING | Health stays 0; state remains DYING | Health remained 0, state = DYING | No fix needed |
| 22nd July | Negative damage in take\_damage | Invalid | take\_damage(-10) | Health doesn’t increase; method handles gracefully | Health unchanged | Added check for positive damage |

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| Animation & Debugging | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 15th July | Animation updates for IDLE state | Expected | Zombie in IDLE state | Idle\_ animation plays, or fallback to Walk\_ | Walk\_ animation played | No fix needed |
| 17th July | Animation updates for WALKING state | Expected | Zombie in WALKING state | Walk\_ animation plays | Walk\_ animation played | No fix needed |
| 19th July | Animation updates for ATTACKING state | Expected | Zombie in ATTACKING state | Attack\_ animation plays | Attack\_ animation played | No fix needed |
| 21st July | Animation updates for DYING state | Expected | Zombie in DYING state | Death animation plays once | Death animation played | No fix needed |
| 23rd July | Debug line when ENABLE\_DEBUG = True | Expected | ENABLE\_DEBUG = True, random\_move\_point set | Red line drawn to random\_move\_point | Line visible on screen | No fix needed |
| 25th July | No debug line when ENABLE\_DEBUG = False | Expected | ENABLE\_DEBUG = False | No debug line drawn | No line visible | No fix needed |
| 27th July | Debug info in update\_state() | Expected | update\_state called | Debug shows current\_animation\_type, state, frame, animation\_allow\_overwrite | Debug values updated correctly | No fix needed |
| 29th July | hunt\_player skipped when state is DYING | Boundary | EntityState.DYING | hunt\_player() is not called | hunt\_player skipped | No fix needed |

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| NAME | | | | | | |
| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
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**Debug Class**

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| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 5th July | Initial call to \_initialize | Expected | N/A | Debug.initialized becomes True; text\_objects list is populated | initialized set, list created with 20 objects | No fix needed |
| 5th July | Subsequent calls to \_initialize | Boundary | N/A | initialized remains True; no duplicates in text\_objects | State unchanged, no duplicates | No fix needed |
| 6th July | MAX\_DEBUG\_LINES boundary (low) | Boundary | Set MAX\_DEBUG\_LINES = 1 | text\_objects list has 1 element | List size was 1 | No fix needed (design verified) |
| 7th July | MAX\_DEBUG\_LINES boundary (high) | Boundary | Set MAX\_DEBUG\_LINES = 100 | text\_objects list has 100 elements | List size was 100 | No fix needed (design verified) |

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| Date | What is being tested | Test Type | Test Value | Expected Result | Actual Result | How it was fixed |
| 8th July | Adding a new debug key-value pair | Expected | Debug.update("PlayerPos", "100, 200") | "PlayerPos": "100, 200" is in debug\_dict | debug\_dict updated correctly | No fix needed |
| 8th July | Updating an existing debug key | Expected | Debug.update("PlayerPos", "150, 250") | "PlayerPos": "150, 250" replaces previous value | Updated correctly | No fix needed |
| 9th July | Adding multiple unique debug keys | Expected | Debug.update("FPS", "60"), "State", "WALKING" | All keys present in debug\_dict | All keys added | No fix needed |
| 10th July | Empty string for key | Invalid | Debug.update("", "Some Value") | Key is ""; render handles it gracefully | Displayed ": Some Value" | No fix needed (acceptable) |
| 11th July | None for key | Invalid | Debug.update(None, "Value") | Raises TypeError or converts to "None" | TypeError occurred | Added runtime check for str key |
| 12th July | Non-string text value | Invalid | Debug.update("Health", 75) | Value is stored as string | Stored as int, rendered fine | No fix needed (handled by Arcade) |

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| 13th July | render when ENABLE\_DEBUG is False | Expected | ENABLE\_DEBUG = False | render returns immediately | No debug text appeared | No fix needed |
| 14th July | render when ENABLE\_DEBUG is True | Expected | ENABLE\_DEBUG = True, update with "Test": "Value" | "Test: Value" is drawn | Text appeared | No fix needed |
| 15th July | render before \_initialize is called | Invalid | No \_initialize() call | Warning printed, no crash, no text drawn | Handled gracefully | No fix needed |
| 16th July | Rendering multiple debug lines | Expected | "Line1": "A", "Line2": "B", "Line3": "C" | Lines stacked vertically | All lines drawn correctly | No fix needed |
| 17th July | Lines exceed MAX\_DEBUG\_LINES | Boundary | Set MAX\_DEBUG\_LINES = 2; 3 lines added | First 2 drawn; warning for extras | Warning appeared, 2 drawn | No fix needed |
| 18th July | render clears unused text objects | Expected | Remove "L1", keep "L2" | Only "L2" drawn | "L1" cleared as expected | No fix needed |
| 19th July | Custom x and y for render | Expected | Debug.render(10, 700) | Text starts from (10, 700) and stacks downwards | Text appeared at correct coordinates | No fix needed |
| 20th July | Empty debug\_dict | Expected | Clear debug\_dict, then render | No text is drawn | No text appeared | No fix needed |
| 21st July | x or y as non-numeric | Invalid | Debug.render("invalid\_x", 100) | TypeError or ValueError | TypeError occurred | Added type hints for x, y |
| 13th July | render when ENABLE\_DEBUG is False | Expected | ENABLE\_DEBUG = False | render returns immediately | No debug text appeared | No fix needed |
| 14th July | render when ENABLE\_DEBUG is True | Expected | ENABLE\_DEBUG = True, update with "Test": "Value" | "Test: Value" is drawn | Text appeared | No fix needed |

**Test**

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**Whole Program**

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