



**Economic Prototyping Document**

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pink lemonade games.**

# Prototype

## How does it work?

The economic prototype will be made in unity. It will have minimal gameplay mechanics, with the player being able to kill 3 different types of enemies with basic AI, collect some basic form of gear / upgrades and the death loop. It will also feature a boss at the end of the level however this won't be measured during the test.

The values in this prototype that are changeable and being measured are all by scripts, shown below.

### Player values

- XP needed to level up
- XP multiplier
- Bullet (net) dmg,
- interval between net shots
- Player speed
- Player health
- Max player level

### Enemy values

- Enemy stat increases
- Score given from kill
- Dmg done to player
- Time interval between spawns
- Enemy speed
- Enemy health

### Gear / Item values

- Reduction between projectile shots
- Player damage boost given
- Player speed boost given
- Medkits, how much they heal and how often they spawn

All these values are shown below, in their scripts in engine.

**Enemy stat increases**

Stat Increase: 0

Stat Increase 1: 0.15

Stat Increase 2: 0.4

Stat Increase 3: 1

**interval updates**

Spawn Interval Small: 0

Spawn Interval Med: 0

Spawn Interval Large: 0

Spawn Interval Updated: ☐

Boss Is Alive: ☐

**Round 1 Spawn Intervals**

Spawn Interval Small 1: 2

Spawn Interval Med 1: 4

Spawn Interval Large 1: 20

**Round 2 Spawn Intervals**

Round 2 Start: 40

Round 2 End: 80

Spawn Interval Small 2: 2

Spawn Interval Med 2: 4

Spawn Interval Large 2: 10

**Round 3 Spawn Intervals**

Round 3 Start: 80

Round 3 End: 120

Spawn Interval Small 3: 15

Spawn Interval Med 3: 1

Spawn Interval Large 3: 5

**Round 4 Spawn Intervals**

Round 4 Start: 120

Round 4 End: 160

Spawn Interval Small 4: 2

Spawn Interval Med 4: 1

Spawn Interval Large 4: 2

**Round 5+ Spawn Intervals**

Round 5 Start: 160

Spawn Interval Small 5: 0

Spawn Interval Med 5: 0

Spawn Interval Large 5: 0

**Enemy Test (Script)**

Script: EnemyTest

Dmg Done To Player: 50

**Box Collider 2D**

Edit Collider:

Material: None (Physics Material 2D)

Is Trigger: ☒

Used By Effector: ☐

Used By Composite: ☐

Auto Tiling: ☐

Offset: X 0 Y 0

Size: X 0.8828125 Y 1

Edge Radius: 0

**Info**

**Rigidbody 2D**

**Enemy Health (Script)**

Script: EnemyHealth

**Health values**

Max Health: 300

Current Health: 0

**Score given to player on kill**

Score From Kill: 90

**Enemy HP% colours**

Low Health Color:

Med Health Color:

**Enemy values**

Move Speed: 1.75

**Sprites-Default (Material)**

Shader: Sprites/Default

**Add Component**

**EnemyLarge**

**Player Shooting (Script)**

Script: PlayerShooting

**Score & Leveling**

Player Level: 1

Score To Level Up: 0

Level Up Multiplier: 1.45

Score: 0

Player Level TMP: PlayerLevelTMP (Text Mesh Pro UGUI)

Score Xp: ScoreTMP (Text Mesh Pro UGUI)

**Weapon Values**

Bullet Prefab:

Bullet Dmg: 55

Bullet Speed: 15

Shoot Interval: 0.99

Bullet Lifetime: 3

Atk Speed Text: atk speed (Text Mesh Pro UGUI)

Bullet Dmg Text: dmg (Text Mesh Pro UGUI)

Atk Speed Lvl Value: 0

Shoot Upgrade Reduce: 0.12

Damage Increase: 25

**Health (Script)**

Script: Health

**Health values**

Max Health: 120

Current Health: 0

Is Alive: ☐

Player Object:

Game Manager:

**Movement (Script)**

Script: Movement

**Player Movement Speed**

Move Speed: 10

# Testing

The test itself will consist of tweaking all the values, to ensure the player does not become too powerful by the end of the level while also not making the game impossible.

The main focus is the core power scaling of the player and enemies (during the level), the chance of items appearing and different items won't be taken into account, this will instead be replaced with an upgrade system that will let the player pick one of 3 set upgrades per level..

The base level values were decided by splitting the level into 5 different rounds, the enemies scaling up per each. These rounds will all be the same length, and will be divided up over the initial 8 minute intended gameplay. After testing this, the gameplay was way TOO LONG and dragged on much more than I intended. I instead changed these 8 minute values to 5 minutes. This is the only value that was changing before testing began.

To test again, I will play / others will play through a complete level of the game from start to finish. I will record my raw observation data, as well as data collected on others taking part in the testing. Others who play will be questioned on 3 major questions, and then asked for any extra feedback.

These questions are as follows:

- Did the level feel too long?
- Did you feel too strong or too weak?
- Was enemy difficulty scaling obvious?
- Any extra feedback you would like to provide

All data collected will be refined into dot points and the data/findings will be stated at the beginning of each test report. The first two tests will be done by me and others, to ensure no bias towards any of the values. The final test (v3) will be done by me alone, to ensure the game aligns with my GDD and vision.

## Prototype Values

These are all the initial values that are being tested for the first prototype.

### Round Times

	Start	End	Small Enemy Spawn Rate	Med Enemy Spawn Rate	Large Enemy Spawn Rate
Round 1	0s	60s	2	7	20
Round 2	60s	120s	3	4	10
Round 3	120s	180s	2	1	5
Round 4	180s	240s	2	1	2
Round 5+	240s	n/a	0	0	0

### Enemy XP Stats

	Given XP
Small Enemy	25
Med Enemy	50
Large Enemy	75

### Player Stats (Placeholder for 3 types of Gear)

	Base	Upg 1	Upg 2	Upg 3	Upg 4	Upg 5	Upg 6	Upg 7 (max)
Damage	50	75	100	125	150	175	200	225
Speed	10	11	12	13	14	15	16	17
Rate of fire	0.99	0.84	0.69	0.54	0.39	0.24	0.09	0.01

### Player XP Stats

	Lvl 1	Lvl 2	Lvl 3	Lvl 4	Lvl 5	Lvl 6	Lvl 7	Lvl 8	Lvl 9	Lvl 10 (max)
XP multiplier	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
XP to level up	100	160	256	410	656	1050	1680	2688	4301	6881

### Health Stats

	Value
Spawn Rate	1/2s
How much do they heal?	100% HP
Player Health	100HP

### Enemy Health Stats

	Small Enemy Values	Med Enemy Values	Large Enemy Values
Base Health	100HP	150HP	300HP
Health Scaling RND 2	x15% base 115HP	x15% base 173HP	x15% base 345HP
Health Scaling RND 3	x40% base 140HP	x40% base 210HP	x40% base 420HP
Health Scaling RND 4	x80% base 180HP	x80% base 270HP	x80% base 540HP
Health Scaling RND 5	n/a	n/a	n/a

## Enemy Speed Stats

	Small Enemy Values	Med Enemy Values	Large Enemy Values
Base Speed	3	2.5	1.75
Speed Scaling RND 2	3	2.5	1.75
Speed Scaling RND 3	+1 4	+1 3.5	+1 2.75
Speed Scaling RND 4	+1 4	+1 3.5	+1 2.75
Speed Scaling RND 5	n/a	n/a	n/a

# Prototype V1 Test Report

(19/02/2024)

**Testers:** Brodie Frazier, Blake Andrews, Param Dhaliwal, Jayden Bonner

## Observation notes:

- Spawn patterns are too repetitive in each round, and the game becomes boring.
- Cant even notice “rounds” changing.
- Player is too fast at base level.
- Enemies don't scale enough
- Too many medkits
- If you just go all attack speed you win everytime.
- XP increase feels good with amount of enemies
- *“Boss just spawns in and kills you, can you even kill it?”*
- Gameplay takes too long in comparison to rate of upgrade
- Small enemy feels too slow

## Findings:

- Spawn patterns are too similar and drag on too long, the game starts to become a bit too stale.
- Once you're at the max path in any upgrade, you're pretty much unbeatable. This is the feeling I'm trying to achieve. (however this is pretty much impossible due to the multiplier)
- Upgrades feel useless unless you use them all in the same path.

These notes are a refinement of that data collected from observing all the testing as well as my experiences. These changes and a few minor ones will be updated in the values.

## Updated Values

### Round Times

	Start	End	Small Enemy Spawn Rate	Med Enemy Spawn Rate	Large Enemy Spawn Rate
Round 1	0s	30s	2	5	15
Round 2	30s	60s	2	4	10
Round 3	60s	90s	2	1	5
Round 4	90s	120s	1	1	2
Round 5+	150s	n/a	0	0	0



### Enemy XP Stats

	Given XP
Small Enemy	25
Med Enemy	50
Large Enemy	75

### Player Stats (Placeholder for 3 types of Gear)

	Base	Upg 1	Upg 2	Upg 3	Upg 4	Upg 5	Upg 6	Upg 7 (max)
Damage	50	75	100	125	150	175	200	225
Speed	10	11	12	13	14	15	16	17
Rate of fire	0.99	0.84	0.69	0.54	0.39	0.24	0.09	0.01

### Player XP Stats

	Lvl 1	Lvl 2	Lvl 3	Lvl 4	Lvl 5	Lvl 6	Lvl 7	Lvl 8	Lvl 9	Lvl 10 (max)
XP multiplier	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
XP to level up	100	140	196	275	385	538	753	1054	1476	2066

### Health Stats

	Value
Spawn Rate	1/3s
How much do they heal?	100% HP
Player Health	100HP

## Enemy Health Stats

	Small Enemy Values	Med Enemy Values	Large Enemy Values
Base Health	100HP	150HP	300HP
Health Scaling RND 2	x15% base 115HP	x15% base 173HP	x15% base 345HP
Health Scaling RND 3	x40% base 140HP	x40% base 210HP	x40% base 420HP
Health Scaling RND 4	x80% base 180HP	x80% base 270HP	x80% base 540HP
Health Scaling RND 5	n/a	n/a	n/a

## Enemy Speed Stats

	Small Enemy Values	Med Enemy Values	Large Enemy Values
Base Speed	4	2.5	1.75
Speed Scaling RND 2	4	2.5	1.75
Speed Scaling RND 3	+1 5	+1 3.5	+1 2.75
Speed Scaling RND 4	+1 5	+1 3.5	+1 2.75
Speed Scaling RND 5	n/a	n/a	n/a

# Prototype V2 Test Report

(26/02/2024)

**Testers:** Brodie Frazier, Jayden Bonner, Tristan Thorpe, Declan Cassidy, Brian McNamee, Blake Andrews

## Observation notes:

- Not intense enough at later round
- Boss is too easy
- Enemies scaling is now noticeable.
- Large enemies don't have enough pay off (in terms of xp given)
- Too many enemies at the very start
- Player health should be buffed by about 20%
- Medkits feel good now
- Small enemies too fast
- XP bar shouldnt reset when leveling up (any bonus xp should be added to next level)
- Rounds too short

## Findings:

- Speed scaling is now forcing the player to upgrade different paths to keep up with the enemies instead of just focusing one.
- Boss follows a unique path / pattern now, and does not instantly kill the player. Feels more fun and engaging.
- XP multiplier and play stats seem to be perfect - I don't really want to change them unnecessarily so I will let them be.

These notes are a refinement of that data collected from observing all the testing as well as my experiences. These changes and a few minor ones will be updated in the values.

## Updated Values

### Round Times

	Start	End	Small Enemy Spawn Rate	Med Enemy Spawn Rate	Large Enemy Spawn Rate
Round 1	0s	40s	3	5	20
Round 2	40s	80s	2	4	10
Round 3	80s	120s	2	1	5
Round 4	120s	160s	2	1	2
Round 5+	160s	n/a	0	0	0

### Enemy XP Stats

	Given XP
Small Enemy	25
Med Enemy	50
Large Enemy	90

### Player Stats (Placeholder for 3 types of Gear)

	Base	Upg 1	Upg 2	Upg 3	Upg 4	Upg 5	Upg 6	Upg 7 (max)
Damage	65	75	100	125	150	175	200	225
Speed	10	11	12	13	14	15	16	17
Rate of fire	0.99	0.84	0.69	0.54	0.39	0.24	0.09	0.01

### Player XP Stats

	Lvl 1	Lvl 2	Lvl 3	Lvl 4	Lvl 5	Lvl 6	Lvl 7	Lvl 8	Lvl 9	Lvl 10 (max)
XP multiplier	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
XP to level up	100	140	196	275	385	538	753	1054	1476	2066

### Health Stats

	Value
Spawn Rate	1/5s
How much do they heal?	65% HP
Player Health	120HP

## Enemy Health Stats

	Small Enemy Values	Med Enemy Values	Large Enemy Values
Base Health	100HP	150HP	300HP
Health Scaling RND 2	x15% base 115HP	x15% base 173HP	x15% base 345HP
Health Scaling RND 3	x40% base 140HP	x40% base 210HP	x40% base 420HP
Health Scaling RND 4	x100% base 200HP	x100% base 300HP	x100% base 600HP
Health Scaling RND 5	n/a	n/a	n/a

## Enemy Speed Stats

	Small Enemy Values	Med Enemy Values	Large Enemy Values
Base Speed	3.5	2.5	1.75
Speed Scaling RND 2	3.5	2.5	1.75
Speed Scaling RND 3	+1 4.5	+1 3.5	+1 2.75
Speed Scaling RND 4	+1 4.5	+1 3.5	+1 2.75
Speed Scaling RND 5	n/a	n/a	n/a

# Prototype V3 (Final)

(27/02/2024)

**Testers:** Brodie Frazier

## Observation notes & Findings:

- Game is way too easy now
- Player's movement speed is too high
- The bullet upgrade interval is too big, needs to be lowered or you basically get a machine gun
- Due to increase in enemy spawns, XP cap needs to be higher to balance.

## Final Values

These are the ultimate final values for the prototype. These were all tested by me and finally decided to feel balanced and suit the correct vision for the game. In this version I left the enemy values alone and just edited the player around them. (This was to ensure no colliding changes)

### Round Times

	Start	End	Small Enemy Spawn Rate	Med Enemy Spawn Rate	Large Enemy Spawn Rate
Round 1	0s	40s	2	4	20
Round 2	40s	80s	2	4	10
Round 3	80s	120s	2	1	5
Round 4	120s	160s	2	1	2
Round 5+	160s	n/a	0	0	0

### Enemy XP Stats

	Given XP
Small Enemy	25
Med Enemy	50
Large Enemy	90

### Player Stats (Placeholder for 3 types of Gear)

	Base	Upg 1	Upg 2	Upg 3	Upg 4	Upg 5	Upg 6	Upg 7 (max)
Damage	55	80	105	130	155	180	205	230
Speed	9	10	11	12	13	14	15	16
Rate of fire	0.99	0.87	0.75	0.63	0.51	0.39	0.27	0.15

### Player XP Stats

	Lvl 1	Lvl 2	Lvl 3	Lvl 4	Lvl 5	Lvl 6	Lvl 7	Lvl 8	Lvl 9	Lvl 10 (max)
XP multiplier	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45
XP to level up	100	145	210	305	442	640	928	1346	1952	2830

### Health Stats

	Value
Spawn Rate	1/6s
How much do they heal?	60% HP
Player Health	120HP

### Enemy Health Stats

	Small Enemy Values	Med Enemy Values	Large Enemy Values
<b>Base Health</b>	100HP	150HP	300HP
<b>Health Scaling RND 2</b>	x15% base 115HP	x15% base 173HP	x15% base 345HP
<b>Health Scaling RND 3</b>	x40% base 140HP	x40% base 210HP	x40% base 420HP
<b>Health Scaling RND 4</b>	x80% base 180HP	x80% base 270HP	x80% base 540HP
<b>Health Scaling RND 5</b>	n/a	n/a	n/a

### Enemy Speed Stats

	Small Enemy Values	Med Enemy Values	Large Enemy Values
<b>Base Speed</b>	3.5	2.5	1.75
<b>Speed Scaling RND 2</b>	3.5	2.5	1.75
<b>Speed Scaling RND 3</b>	+1 4.5	+1 3.5	+1 2.75
<b>Speed Scaling RND 4</b>	+1 4.5	+1 3.5	+1 2.75
<b>Speed Scaling RND 5</b>	n/a	n/a	n/a