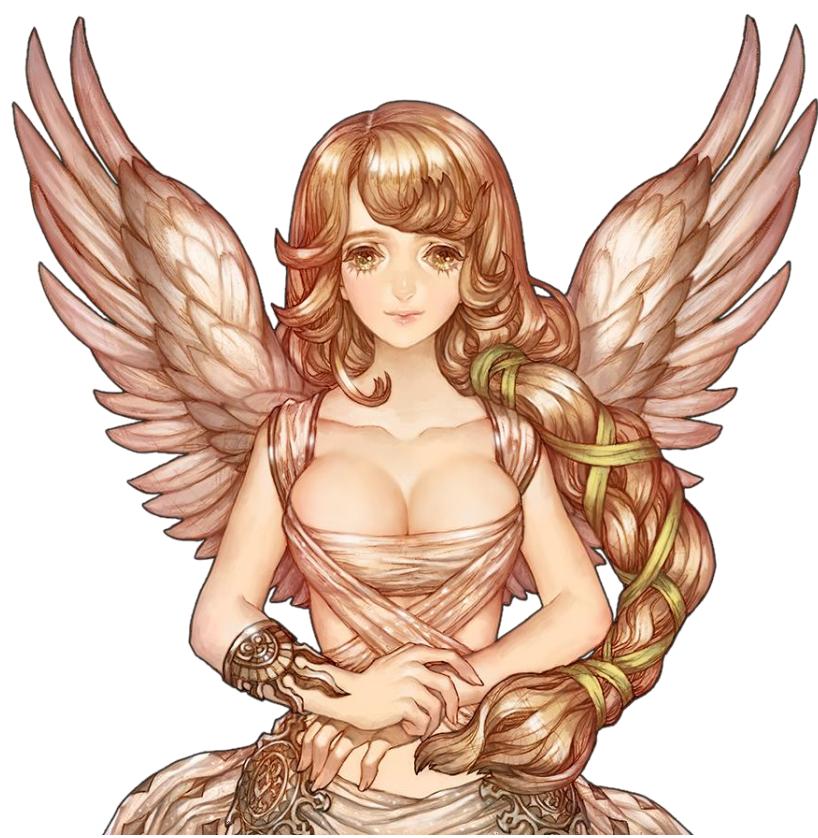


Tree of Savior

General Mechanics Guide

ver. 0.3.1

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Foreword

Just a couple of notes on this document. The main purpose of this guide is to consolidate the details of a number of gameplay mechanics that are either poorly explained or given no explanation at all. I have taken most opinion out therefore I would almost consider this a reference manual for those comfortable with the game rather than an introductory guide for newcomers (especially since I gloss over/ignore basic mechanics).

Secondly, this is just an initial iteration and is still incomplete due to inability to test or unreleased content. I don't claim that all information is correct however I have put a lot of effort into trying to make sure it is. Additionally, varying detail on certain topics is likely due to my level of familiarity on the mechanic. As more information comes out I will add further detail where I can. If you catch any errors, want to add additional information or have an idea for additional sections please feel absolutely free to write on the thread or contact me on the forums.

Finally, always round the final value down when performing calculations.

Stats

Main Stats

At level 1 your base stats depend on the class you have chosen, shown below.

	STR	CON	INT	SPR	DEX	Total
Archer	6	3	3	4	8	24
Cleric	5	6	4	4	3	22
Swordsman	7	8	2	3	5	25
Wizard	3	3	8	7	5	26

There are currently four ways to gain status points:

- (1) Leveling up your base level awards 1 status point.
- (2) Worshipping a Statue of Goddess Zemyna awards 1 status point.
- (3) Completing specific quests (typically but not limited to story line quests) can reward the player with up to 3 status points per quest.
- (4) Status Increase Potions and special quest items give 1 status point when consumed.

Methods (2) – (4) are limited in their amount, thus the majority of your points will come from levelling your character.

Stat Bonuses

When allocating a status point there is an opportunity to gain a bonus point depending on how many points you have allocated into that single stat.

Bracket	Points Allocated	Bonus Point	Total Bonus Points
1	0 - 50	Every 5 th point	$\frac{P}{5}$
2	51 – 150	Every 4 th point	$10 + \frac{P - 50}{4}$
3	151 – 300	Every 3 rd point	$35 + \frac{P - 150}{3}$
4	301 – 500	Every 2 nd point	$85 + \frac{P - 300}{2}$
5	500+	Every point	P - 315

To explain the above table, depending on how many points you have allocated to a stat (P), you will receive a bonus point for further points you invest.

This bonus is independent of items which provide raw stats but is affected by buffs and your initial starting stats. Therefore if an item provides +50 STR this does not count towards Points Allocated and will also not receive the bonus

that allocating 50 points into STR would give (If you had 200 STR and equip this item, your new STR will be 250).

As an example, if you have allocated 350 points into DEX as an Archer while you have a buff which provides 30 DEX and an item with 20 DEX your final DEX will be:

$$350 + 85 + \frac{350 + 8 + 30 - 300}{2} + 20 = 499 \text{ DEX}$$

In addition to these bonus points, every class receives a +10% bonus multiplier to their INT and STR each time they rank up. Again, only buffs and your starting stats are included in this bonus. If we use the previous example but instead switch the stats to STR while assuming the character is Rank 7, your final STR will be:

$$1.6 \times (350 + 85 + \frac{350 + 6 + 30 - 300}{2}) + 20 = 784 \text{ STR}$$

Sadly there is no current way to view a breakdown of your total vs base stats so you must track your own point allocation.

Strength (STR)

When a point is allocated to STR:

- (1) Minimum/Maximum physical attack is increased by 1.
- (2) Critical attack is increased by 1.
- (3) Weight limit is increased by 5.

Strength is recommended for classes which rely on normal attacks or physical damage skills (which gain damage from PATK). Your final base STR also gains an additional 10% bonus each time you rank up.

Constitution (CON)

When a point is allocated to CON:

- (1) Max HP is increased by 85.
- (2) HP recovery is increased by 1.
- (3) Critical hit resistance is increased by 1.
- (4) Weight limit is increased by 5.
- (5) Shield block is increased by 1.

Constitution is recommended by all classes to improve their maximum hit points. As the defense/magic defense stat is currently underwhelming to prevent damage the alternative is for every class to build CON for survivability.

Intelligence (INT)

When a point is allocated to INT:

- (1) Minimum/Maximum magic attack is increased by 1.

INT is important for Wizards and magic based Cleric classes as magic attack increases damage dealt by all magic skills (and Wizard's auto attack) while also boosting the potency of healing spells.

Note: There is a 10% bonus to your base Intelligence each time you rank up.

Spirit (SPR)

When a point is allocated to SPR:

- (1) Max SP is increased by 13.
- (2) SP recovery is increased by 1.
- (3) Block penetration is increased by 1.
- (4) Magic defense is increased by 0.2.

Spirit is recommended for cleric classes whose skills scale with SPR and to an extent, SP heavy casters. Early game casters may find themselves out of mana often, however mana issues are resolved later on with potions and higher base SP and recovery. It is therefore not effective to invest heavily into SPR for this reason.

Dexterity (DEX)

When a point is allocated to DEX:

- (1) Accuracy is increased by 1.
- (2) Critical rate is increased by 1.
- (3) Evasion is increased by 1.

Dexterity is recommended for classes which depend on physical attacks and skills. Because physical damage skills also have the opportunity to proc critical hits the best damage dealing builds find a balance between STR and DEX stat distribution. Also, due to the low impact of Defense items for damage mitigation, Evasion and its chance to nullify damage completely becomes important for tanking roles.

Sub Stats

This section details the sub stats listed in the character section. Additional damage and resistance stats are not discussed here and have instead been moved to the Damage section of this guide as their interactions with the calculation of damage is convoluted.

Hit Points (HP)

Your maximum hit points are determined by your level, CON and a multiplier depending on your class:

Class	Archer	Cleric	Swordsman	Wizard
Multiplier (M)	1.4	1.5	3.3	1.1

The final formula is:

$$MHP = 85 \times CON + 17 \times M \times (Lv - 1)$$

Spell Points (SP)

Your maximum spell points are determined by your level, SPR and a class multiplier with an additional bonus for Cleric classes.

Class	Archer	Cleric	Swordsman	Wizard
Multiplier (M)	0.9	1.2	0.8	1.2

The final formula is:

$$MSP = 13 \times SPR + 6.7 \times M \times (Lv - 1) + [1.675 \times Lv]$$

Where the red section indicates the additional bonus for the Cleric class tree.

HP Recovery (RHP)

The HP recovery stat is a flat recovery value based on your CON and level:

$$RHP = CON + \frac{Lv}{2}$$

The rate at which you recover health depends on your stance mode¹:

- (1) Standing provides 1 tick of RHP every 20 seconds.
- (2) Sitting provides 1 tick of RHP every 10 seconds.
- (3) Sitting with a bonfire provides 1 tick of RHP every 10 seconds and 1 tick of $\frac{RHP}{2}$ every 2 seconds ($3.5 \times RHP$ every 10 seconds).

Natural HP recovery is prevented while affected by Bokor's Hexing.

Currently the HP recovery mechanic can be exploited by sitting momentarily to gain the sitting recovery rate. It is not necessary to sit for the whole 10 seconds, only to sit once during this 10 second period.

Note: The rate in this instance refers to reduced recovery time. Therefore with Aukuras Lv. 15 the HP recovery time would be -6.4 seconds, meaning you would receive 1 tick of HPR every 3.6 seconds if you were sitting, and 13.6 seconds if standing.

SP Recovery (RSP)

The SP recovery stat is a flat recovery value based on your SPR and level with bonus for Cleric classes:

$$RSP = SPR + \frac{Lv}{2} + [\frac{Lv}{4}]$$

Where the blue section indicates the additional bonus for the Cleric class tree.

The rate at which you recover SP depends on your stance mode¹:

- (1) Standing provides 1 tick of RSP every 20 seconds.
- (2) Sitting provides 1 tick of RSP every 10 seconds.
- (3) Sitting with a bonfire provides 1 tick of RSP every 10 seconds and 1 tick of $\frac{\text{RSP}}{2}$ every 2 seconds ($3.5 \times \text{RSP}$ every 10 seconds).

Natural SP recovery is prevented while your SP is being drained or while affected by Bokor's Hexing.

Currently the SP recovery mechanic can be exploited by sitting momentarily to gain the sitting recovery rate. It is not necessary to sit for the whole 10 seconds, only to sit once during this 10 second period.

Physical Attack (PATK)

Physical attack determines your primary weapon attack and the additional damage dealt by physical skills. This is based on your level and STR:

$$\text{PATK} = \text{STR} + \text{Lv}$$

The primary modifier for PATK will be your main hand weapon (offhand weapons do not modify physical attack unless explicitly stated).

Secondary Physical Attack (SATK)

Secondary physical attack determines the damage dealt by your secondary weapon attack and has the same base formula as PATK:

$$\text{SATK} = \text{STR} + \text{Lv}$$

SATK only affects damage dealt by your secondary weapon and is only directly modified by buffs which explicitly state secondary physical attack.

Magic Attack (MATK)

Magic attack determines Wizard's primary attack damage, Sadhu's Out of Body melee attack damage and the additional damage dealt by magic skills. This is based on your level and INT:

$$\text{MATK} = \text{INT} + \text{Lv}$$

The primary modifier for MATK is your weapon, being either Rods, Staffs, Maces or Wands.

AOE Attack Ratio (SR)

AOE Attack Ratio determines how many mobs can be hit with your skills and normal attacks. Each class begins with a different Attack Ratio:

Class	Archer	Cleric	Swordsman	Wizard
SR	0	3	4	3

This ratio is only increased by equipment, buffs and AOE potions and is additive to the SR of skill. Therefore as an example if you have an SR of 5, the skill Earthquake (which has a base SR of 4) will now show an Attack Ratio of 9. This rule applies for every skill (even those without explicit ratios) except a select few which have their own stated formulas. All mobs must be inside the skill area of an attack to be hit by the AOE.

AOE Defense Ratio (SDR)

AOE Defense Ratio is used against AOE Attack Ratio to reduce the number of mobs which are hit with AOE attacks and is currently only increased by equipment. To determine the number of mobs hit with an attack we calculate the attack ratio (SR) compared to the defense ratio (SDR) for the first mob hit:

$$SR_{new} = SR - SDR$$

If SR_{new} is larger than 0 then the next mob is targeted and the calculation is repeated with the new SR until it falls to zero or below².

As an example, if there are four mobs with an SDR of 1 and you are to use a 4 SR attack, you will hit all four mobs. However if their SDR is changed to 2 or 3, using the same attack will now only hit 2 of the mobs. If their SDR is now changed to 4 you will only be hitting one of these mobs (as $4 - 4 = 0$).

The general rule of thumb for SDR is that small monsters have a ratio of 1, medium monsters have a ratio of 2, large monsters have a ratio of 3 and boss monsters have a ratio of 5. If it is possible to target your skill, aim at the monster with the lowest SDR so it will still bounce to larger mobs (which may not happen vice-versa).

Critical Attack (CRTATK)

Critical attack is the additional damage added to a critical strike attack or skill and is based on your STR:

$$CRTATK = STR$$

CRTATK is added to the damage formula after the base damage has been multiplied by the critical attack bonus of 50%. Therefore if you have a CRTATK of 100 and the base damage for your attack is 500, a critical strike will deal:

$$500 \times 1.5 + 100 = 750 + 100 = 850 \text{ DMG}$$

The enemy's Physical Defense is taken into account by the base damage (if the enemy in the previous example has a DEF of 100, it would instead be 400×1.5) thus critical damage can be thought of as 'pure' damage in the sense that defense has already been incorporated.

Critical Rate (CRTHR)

Critical rate is used to determine the chance of an attack doing critical damage and is based on your DEX with a bonus for Archer classes:

$$\text{CRTHR} = \text{DEX} + \left[\frac{\text{Lv}}{5} \right]$$

Where the green section indicates the additional bonus for the Archer class tree.

The formula for determining the percentage chance of performing a critical attack is based on your CRTHR, the enemy's CRTDR and your character's level³:

$$\% = \frac{42 \times (\text{CRTHR} - \text{CRTDR})}{\text{Lv}}$$

Therefore at Lv. 500 you need roughly 600 CRTHR more than the enemy's CRTDR to achieve a 50% critical rate. As the chance to critical is inversely proportional to your level, this means it becomes inherently harder to critical any mob without increasing your CRTHR proportionally. This also means that 600 CRTHR would still only give you a 50% chance to critical against Lv. 1 mobs at Lv. 500.

Critical Resistance (CRTDR)

Critical resistance is used to reduce the chance of a critical attack occurring against you and is based on your CON:

$$\text{CRTDR} = \text{CON}$$

Because of the way that critical chance scales with level (see Critical Rate section for formula), your CRTDR does not have to be unreasonably large (like DEF) to make a difference. Below is a table indicating the amount of CRTDR necessary to reduce critical chance by 10% at certain levels.

Level	CRTDR
100	24
200	48
300	71
400	96
500	120

Evasion (DR)

Evasion refers to your ability to dodge physical attacks/skills (magic cannot be dodged) and is based on your level and DEX with a bonus for Archers:

$$\text{DR} = \text{Lv} + \text{DEX} + \left[\frac{\text{Lv}}{8} \right]$$

Where the green section indicates the additional bonus for the Archer class tree.

The formula for determining the percentage chance of dodging a physical attack is based on your Evasion, the enemy's Accuracy as well as the level of both you and your enemy:

$$\% = \frac{DR_{player} - HR_{monster}}{(0.3605 \times LV_{player} + 18.64) \times LV_{monster}}^{0.335}$$

With a maximum dodge rate of roughly 80-85%.

Because the relationship is exponential with your level you are required to have more evasion as your level increases to provide the same dodge percentage. The following table shows the DR difference (DR – HR) required to increase your dodge chance by 10% at different levels:

Level	DR
100	26
200	53
300	85
400	120
500	158

Note: This formula was generated through my own brute testing and cannot be considered 100% accurate. It holds up well for everything I've tested it with but it may fall apart at higher levels. If anyone does more testing and wants to pass me data that would be helpful.

Accuracy (HR)

Accuracy is your ability to hit enemies with physical attacks/skills and is based on your level and DEX with a bonus for Archers:

$$DR = Lv + DEX + \left[\frac{Lv + 4}{4} \right]$$

Where the green section indicates the additional bonus for the Archer class tree.

Seen in the previous Evasion section was the formula for dodge chance as well as a table indicating the amount of evasion needed to increase your dodge chance by 10% at certain levels. What this shows is that the accuracy required to hit an enemy only needs to be on par with the enemy's evasion rate, not above.

Magic Amplification (MHR)

Magic Amplification supplements your MATK by giving your magic attacks the chance to do extra damage. The formula for the effect of amplification is:

$$DMG = MATK + MHR \times (0 \sim 100\%)$$

For example if your MATK is 100 and your MHR is 50, your spells now have the possibility of doing 100 – 150 DMG. Therefore MHR can just be thought of as maximum MATK in the same sense as min/max physical attack (I just cut MHR in half and call it MATK since over time the damage will average to the middle). MHR is currently only increased through equipment and potions.

Physical Defense (DEF)

Physical Defense helps reduce damage against physical attacks/skills and is based on your level with a bonus for Swordsman class:

$$\text{DEF} = \frac{\text{Lv}}{2} + [\frac{\text{Lv}}{4}]$$

Where the orange section indicates the additional bonus for the Swordsman tree.

To determine the damage taken after DEF, the basic formula is a simple reduction:

$$\text{DMG} = \text{ATK} - \text{DEF}$$

Magic Defense (MDEF)

Magic Defense helps reduce damage against magical attacks/skills and is based on your level and SPR with a bonus for Wizard class:

$$\text{MDEF} = \frac{\text{Lv}}{2} + \frac{\text{SPR}}{5} + [\frac{\text{Lv}}{4}]$$

Where the purple section indicates the additional bonus for the Wizard tree.

To determine the damage taken after MDEF, the basic formula is a simple reduction:

$$\text{MDMG} = \text{MATK} - \text{MDEF}$$

As magic damage is unavoidable, MDEF is the only way to protect against magic attacks.

Block (BLK)

Block refers to your ability to block physical attacks and is based on your level, CON, the Block Rate (RATE) of your shield as well as an additional modifier for Swordsman class:

$$\text{BLK} = \frac{\text{Lv}}{2} + \text{CON} + (0.03 \times \text{RATE} \times \text{Lv}) \times 2$$

Where the orange section indicates the additional bonus for the Swordsman tree.

The higher your block is to the enemy's block penetration (BLKBR), the more chance you have to block attacks. Attacks are only able to be blocked when equipped with a shield, while using Highlander C1's skill Cross Guard or while Priest C3's skill Stone Skin is active.

Block Penetration (BLKBR)

Block penetration refers to your ability to overcome an enemy's block and is based on your level and SPR:

$$\text{BLK} = \frac{\text{Lv}}{2} + \text{SPR}$$

Note: Block and Block Penetration work similarly to Evasion and Accuracy however

Stamina (STA)

Stamina is an energy source increased by equipment and potions which can be expended by:

- (1) Running without stopping uses 1 STA every 8.5 seconds.
- (2) Dashing with Swordsman uses 1 STA every 0.75 seconds.
- (3) Monk's Double Punch uses 2 STA each use.

Stamina can be recovered naturally by:

- (1) Standing still recovers 1 STA every 2 seconds.
- (2) Sitting recovers 1 STA every 2 seconds.
- (3) Sitting with a bonfire recovers 1.5 STA every 2 seconds.

Natural STA recovery is blocked while running or while affected by Bokor's Hexing.

Weight Limit

Your Weight Limit determines the number of items you are capable of holding until you are counted as overweight. Weight Limit begins at 5000 and is increased through your CON and STR:

$$\text{Max Weight} = 5000 + 5 \times \text{CON} + 5 \times \text{STR}$$

While overweight your movement speed is reduced to 10 and you become unable to purchase items from NPCs. There is currently no maximum overweight limit, meaning you can hold unlimited items in your inventory from crafting or other means.

Movement Speed (MSPD)

The Movement Speed is the speed which your character moves at with a default MSPD of 30 for all characters. There are a number of core ways to improve your movement speed:

- (1) Mounting your companion gives 3 MSPD.
- (2) Swordsman's Dash gives 10 MSPD.
- (3) Cataphract's Trot can give up to 20 MSPD.
- (4) Archer's Swift Step gives up to 19% increase in MSPD while attacking.
- (5) Chronomancer's Haste gives up to 15% increase in MSPD to everyone in the party (tooltip says max is 7% but this currently isn't true [6 – 15%]).
- (6) Scout's Cloaking attribute can give up to 5 MSPD.
- (7) Wind Runner boots give 3 MSPD.
- (8) Movement Speed Potions give 3 MSPD.

Note: This is not a complete list as it only shows skills or items which can be shared/generally available.

Skills which buff MSPD can be further improved through Divine Might and monster gems. The max movement speed for players is currently 60 MSPD (some buffs may be able to get past this limit but will need to test).

Hidden

Provocation (Threat / Hate)

Provocation comes up in two forms. The first form, Threat, refers to the character in which a monster chooses to target. Sustained threat currently appear to be DPS based, where the monster will target the character dealing the highest damage.

The second, Hate, refers to the maximum number of enemies which will follow you (aggro you). This number is constant for every character and is dependent on the map, with field maps generally having a max Hate of 5 and dungeon maps with a max Hate of 7 - 8.

The only skill which currently improves your Hate count is Peltasta C1's skill Swashbuckling. Characters, pets and summons each have their own Hate count therefore you can use this to 'increase' the amount of enemies which will aggro you (turning pet off/on or summoning instantly gets aggression in dungeons).

Buff Limit

Buff Limit refers to the maximum amount of buffs which your character can have at one time. For every class this limit is 5, except for Swordsman whose limit is 7. This limit only counts for buffs on the top line of the buff section, where you can have an unlimited number of second line buffs. Krivis C1's skill Daino allows you to increase this buff limit depending on its skill level (Daino also does not count as a buff).

Combat

Damage

Classifications

All attacks are categorised into certain classifications, each with their own unique interactions.

Physical

All melee attacks, in addition to many of Swordsman's skills, are considered physical damage. The properties of all physical type damage are:

- (1) Based on PATK.
- (2) Reduced by an enemy's DEF.
- (3) Has the chance to be dodged and/or blocked.
- (4) Has the chance to perform critical strikes.
- (5) Is separated into three further categories depending on your weapon or skill:

Category	Weapon
Slash, Cut	1H Sword, 2H Sword
Stab, Pierce	1H Spear, 2H Spear, Dagger, Rapier
Hit, Strike, Blunt	Mace

Depending on the type of physical damage indicated by (5), damage bonuses or penalties occur against different armor types:



A monster's armor type can be found in the database:

<http://www.tosbase.com/database/monsters/>

Note: Your character's armor type depends on your Shirt. It is also possible to be of type Ghost with the Banshee Veil shirt.

Magical

Wizard's normal attacks as well as many skills are considered magical damage. The properties of all magical type damage are:

- (1) Based on MATK.
- (2) Reduced by an enemy's MDEF
- (3) Cannot be blocked or dodged.
- (4) Cannot perform critical strikes.
- (5) Does 50% extra damage to Ghost armored monsters.
- (6) Is separated into eight further elemental categories; Normal, Fire, Ice, Lightning, Poison, Earth, Holy and Dark.

Depending on the element of magical damage indicated by (6), damage bonuses or penalties occur against enemies of other elemental types:

	Defense	Offensive	Fire	Water	Air	Earth	Hell
Defense			50% Decrease	50% Increase			
Offensive			50% Increase	50% Decrease			
Fire				100% Increase	50% Decrease	50% Decrease	
Water						50% Decrease	50% Increase
Air							50% Increase
Earth							100% Increase
Hell							100% Increase

Note: Auto-attacks as well as magic skills which do not have a listed element are categorised as 'Normal' and do not have any bonuses or penalties versus other elements. There are also a few instances where elemental damage can be applied to physical damage.

Missile

Missile damage is currently unique to Archers and their skills. Missiles have the same properties as physical attacks except that instead of Slash, Stab and Pierce damage types, damage penalties based on the size of the enemy occur. These penalties are:

Size	Penalty
Small	0%
Medium	10%
Large	15%
Extra Large	15%

As seen, any missile damage versus a large monster will do 15% less damage.

Another mechanic for missiles is that each missile attack reduces an enemy's DEF by 10% per stack with up to 50% DEF reduction. Therefore if you an enemy is receives 300 damage with 200 DEF and 0 stacks, with 5 stacks the enemy will now receive 400 DMG (minus 100 DEF aka 50%).

Primary Formula

The complete formula for damage calculation is as followed⁴:

$$[(\text{ATK} + \text{ATK}_{\text{SKILL}} + \text{AMP}) \times T_0 - ((\text{DEF} - \text{DEF}_{\text{DEBUFF}}) \times \text{LV}_{\text{PENALTY}} + \text{RES}_{\text{ELEM}})] \times \text{CRIT} + \\ [\text{CRITATK} + \text{ATK}_{\text{ELEM}} + \text{ATK}_{\text{TYPE}}] \times T_1 \times T_2 \times T_3 \times \text{ENHANCE} + \text{BONUS}$$

With a brief description of each variable shown below:

Variable	Description	Example
AMP	Random value based on your Magic Amplification stat if using magic	Magic Amplification = 70, AMP = 0 - 70
ATK	Character's ATK (PATK if physical, MATK if magical)	If PATK = 200, ATK = 200
ATK _{SKILL}	Skill's damage (if using a skill)	Lv. 1 Bash, ATK _{SKILL} = 54
ATK _{ELEM}	Sum of attack from elemental attack stats	Arde Dagger, ATK _{ELEM} = 153
ATK _{TYPE}	Sum of attack to specific enemy types when versing specific type	+15 Damage to Beasts, ATK _{TYPE} = 15
BONUS	Sum of pure bonus damage as shown in yellow writing	Lv. 1 Blessing, BONUS = 15
CRIT	Critical bonus if the attack is critical	CRIT = 1.5 if critical, CRIT = 1 if not critical
CRITATK	Extra damage added if the attack is critical	CRITATK = 100 if critical, CRITATK = 0 if not critical
DEF	Defense stat of enemy	If enemy DEF = 200, DEF = 200
DEF _{DEBUFF}	Enemy defense debuff	If -100 DEF, DEF _{DEBUFF} = 100
ENHANCE	Skill enhancement based on the attribute level of enhance	Lv. 67 Enhance, ENHANCE = 1.67
LV _{PENALTY}	Penalty based on the level difference of you and your enemy	LV _{YOU} = 90, LV _{MOB} = 100, LV _{PENALTY} = 0.5
RES _{ELEM}	Enemy's flat resistance to elements	Lightning Resistance = 40, RES _{ELEM} = 40

T_0	Base Damage Modifier (%)	Sky Liner vs Bleeding, $T_0 = 2.0$
T_1	Skill Damage Modifier (%)	Meteor, $T_1 = 4.0$
T_2	Common Modifier (%)	Fire vs Ice Elemental, $T_2 = 1.5$
T_3	Target Modifier (%)	Cleave vs Stunned, $T_3 = 1.5$

Note: These are very brief overviews. For more detail as well as lists for each modifier, see: <https://forum.treeofsavior.com/t/damage-guide-the-big-formula-modifier-types-and-how-they-interact/118950>

Additional Attacks

Some skills provide the ability to perform an additional attack only when performing either physical or magical auto-attacks. This can be achieved from:

Source	Class
Enhance Fire	Pyromancer C1
Sacrament	Priest C2
Aspergillum	Chaplain C1
Last Rites	Chaplain C1
Cafrisun 4-Set	ALL

Where the damage formula is:

$$(ATK_{SKILL} + ATK_{ELEM}) \times T_1 \times T_2 \times T_3$$

Abnormal Status

Abnormal statuses are status effects which negatively impact a character. Abnormal statuses are divided into a number of tiers as characterised by their ability to be removed by certain methods. E.g. a spell which removes a rank 3 status will also remove a rank 1 status, however a spell which removes a rank 1 status will not remove a rank 3 status.

The following sections indicates the ranks of most statuses alongside their type of debuff and which classes can inflict them. Some spells do not cause debuffs but still have debuff like effects (debuff is indicated by a debuff icon), e.g. Snow Rolling and Frost Pillar. These do not fall under the ranking system and thus can't be prevented through ranked status removal methods.

Rank 1

Almost all unique debuffs fall under this tier. Except for a number of statuses inflicted by late game classes, it can generally be assumed that a debuff will be Rank 1. The following table is a list of the most common Rank 1 statuses monsters and players can inflict.

Status Effect	Type	Classes
Armor Break	DEF Debuff	Highlander, Peltasta, Monk
Bind	Root	Linker, Squire, Sadhu, Corsair, Hoplite
Blind	ACC Debuff	Rogue, Rodelero, Bokor, Sorcerer
Bleeding	DOT	Fletcher, Rogue, Corsair, Monk, Hoplite, Swordsman
Chaos	Confusion	Wugushi, Scout, Chronomancer, Hunter, Sadhu
Decay	DOT	Necromancer
Disable	Incapacitate	Psychokino, Hunter, Corsair, Cataphract
Flame	DOT	Pyromancer, Fletcher, Sorcerer
Freeze	Incapacitate	Cryomancer, Elementalist
Petrification	Incapacitate	Elementalist
Poison	DOT	Wugushi
Silence	Silence	Dievdirby, Monk, Fletcher
Sleep	Incapacitate	Wizard
Slow	Slow	Chronomancer, Squire, Ranger, Rodelero, Archer, Swordsman, Cryomancer
Stop	Incapacitate	Chronomancer
Stun	Incapacitate	Swordsman, Rogue, Barbarian, Rodelero, Quarrel Shooter, Psychoking, Hunter, Cataphract, Peltasta

Note: This is not the complete Rank 1 status table, it is only listing the most common effects. If a debuff is not listed elsewhere then it is Rank 1. A list with more detailed descriptions can be found at:

http://wiki.tosbase.com/wiki/Status_Effects

Rank 2

Skill Name	Type	Classes
Exorcise	DOT	Priest
Death	Death	Oracle
Growling	Root / Fear	Hunter
Jincan Gu	Spawn / DR Debuff	Wugushi
Blood Bath	DOT	Featherfoot
Headshot	INT & SPR Debuff	Musketeer
Rain	Slow / Misc	Elementalist
Feint	DR Debuff	Rogue
Chortasmata	Type Change	Druid
Mastema	Type Change	Warlock
Invocation	Spawn	Warlock
Pole of Agony	DOT	Warlock

Note: Growling's Fear status is counted as a Rank 2 debuff where Scout's is only a Rank 1.

Rank 3

Skill Name	Type	Classes
Incineration	DOT	Plague Doctor

Rank 10

Rank 10 refers to debuffs which are not able to be prevented (currently).

Skill Name	Type	Classes
Joint Penalty	Link	Linker
Ogoueve: Decrease Strength	STR Debuff	Bokor
Scan / Hounding	Reveal	Scout, Hunter
Coursing	MDEF/DEF Debuff	Hunter
Back Masking	Time Reversal	Chronomancer
Iron Hook	Bind	Corsair
Telepath	Control	Druid
Collar Bomb	Damage	Sapper

Status Removal

This section details the skills/items which either remove or prevent status ailments. The rank column indicates the highest rank the skill can remove.

Skill Name	Rank	Target	Type	Class
Dispeller Scroll	1	Self	Removal	Item
Cure	1	Magic Circle	Removal	Cleric
Indulgentia	2	Party	Removal	Pardoner
Counter Spell	2	Party	Removal	Oracle
Prophecy	1	Party	Prevention	Oracle
Bloodletting	2	Party	Prevention	Plague Doctor
Fumigate	3	Party	Removal	Plague Doctor
Beak Mask	3	Self	Prevention	Plague Doctor

Knockdown

Knockdown is a mechanic separate to ranked statuses and refers to being hit down by skills. The only true way to guard against knockdown is through Swordsman C1's skill Pain Barrier, however Wizard C1's Reflect Shield and Cryomancer C2's Subzero Shield provide partial knockdown defense.

Skills

This section is a brief discussion of some skill mechanics as a whole as well as an overview of a number of skills with their own unique mechanics that are not discussed elsewhere.

Mechanics

Leveling

Skills are permanently levelled up when applying skill points gained from Job Levels. Each Circle of the same class increases the maximum points that can be put into a skill by 5 giving a maximum level of 15, 10 and 5 for Circle 1, 2, 3 respectively (unless otherwise capped). However a skill can be levelled past the Circle cap through three methods:

- (1) Some equipment provides skill level bonuses for certain classes.
- (2) Monster gems provide +1 level to specific skills.
- (3) Cleric C2's skill Divine Might buff provides +1 level to any skill used while active.

Overheat

Overheat describes the mechanic for some skills to have multiple uses before cooldown. This means if a skill has 2 Overheat and you use the skill once – unless you wait out the duration of the cooldown – the second time will trigger a full cooldown for both uses.

Note: There is currently a bug (maybe) where you have to wait 2× the CD for the first overheat to reset.

Stance

Certain skills require a specific Stance to be performed that is dependent on the weapons equipped by the player. Appendix A is a list of skills which require a Stance to use.

Scaling

The majority of skills in ToS deal with flat values which scale linearly with their skill level. As a result, skills which are useful in early game for their buffs or DPS can lose utility going into late game. Here are some tips for scaling skills as you level:

- (1) Physical and Magical Attack spells scale with ATK and MATK respectively ($DMG_{total} = DMG_{spell} + ATK$). This is less noticeable early on but as the damage from your weapons increase and your STR/INT receive a 10% bonus every Rank, your ATK begins to outweigh the skill damage.
- (2) Many skills have Enhance attributes which can increase buff potency and improve skill damage by up to 100%.

- (3) Some skills actually scale with your stats. This includes important buffs such as Heal, Monstrance and Swift Step.
- (4) Multi hit skills scale very well as your ATK/MATK and Elemental DMG is added to each damage instance.
- (5) Many skills have attributes which give bonus damage or utility through skill synergy, debuffs and target type (armour, element, race, size).

Attributes

Attributes are class specific ability's which can be levelled up at class NPC's at the cost of silver and time. In most cases the attributes of a class are as important as their skills due to their ability to upgrade skills and provide passive buffs. Therefore it is important to look at a class' attributes alongside their skills. A list of all attributes can be found at:

<http://www.tosbase.com/database/attributes/>

Cost

Enhance attributes are the game's big silver sink as their damage increase is necessary for skills to stay relevant but the cost to upgrade grows exponentially. As such it is helpful to have some foresight in this cost.

Damage Enhance

Damage enhance attributes have a maximum level of 100 for a 100% (2x) damage increase. The cost to upgrade to a certain level is dependent on the Rank which the skill belongs to, where the formula is:

$$\text{Cost} = 1000 \times \text{Rank} \times 1.07^{\text{LV}-1}$$

For example, the cost to upgrade Enhance: Hexen Dropper (Corsair C2 aka Rank 6) from Lv 31 to Lv 32 would be $1000 \times 6 \times 1.07^{32-1} = 96136$ silver.

To work out the total cost to reach a certain level the formula is approximately:

$$\text{Total Cost} = 14286 \times \text{Rank} \times 1.07^{\text{LVMAX}} - 14286 \times \text{Rank} \times 1.07^{\text{LVMIN}}$$

Where LVMIN is the level you are beginning on and LVMAX is the level you want to reach. Below is a table indicating the total cost for a number of level milestones:

Rank	Lv 20	Lv 30	Lv 40	Lv 50	Lv 60	Lv 70	Lv 80	Lv 90	Lv 100
1	40,996	99,463	199,639	406,537	813,537	1,614,166	3,189,126	6,287,311	12,381,909
2	81,993	188,925	399,278	813,074	1,627,073	3,228,333	6,378,253	12,574,622	24,763,819
3	122,989	283,338	598,917	1,219,611	2,440,610	4,842,499	9,567,379	18,861,934	37,145,728
4	163,985	377,851	798,556	1,626,148	3,254,147	6,456,666	12,756,506	25,149,245	49,527,638
5	204,982	472,313	998,196	2,032,865	4,067,683	8,070,832	15,946,632	31,436,556	61,909,547
6	245,978	566,776	1,197,835	2,439,222	4,881,220	9,684,999	19,134,759	37,723,867	74,291,547
7	286,974	661,239	1,397,474	2,845,759	5,694,757	11,229,165	22,323,885	44,011,178	86,673,336
8	327,970	755,701	1,597,113	3,252,296	6,508,293	12,913,332	25,513,012	50,298,489	99,055,275

Buff Enhance

Buff enhance attributes have a maximum level of 50 and require both silver and time to upgrade. The formula for the silver cost is linear, however the formula across different ranks is more inconsistent. Because of this, just a silver table is provided below for the total cost to a number of level milestones:

Rank	Lv 10	Lv 20	Lv 30	Lv 40	Lv 50
1	6,350	15,700	28,050	43,400	61,750
2	21,200	52,400	93,600	144,800	206,000
3	58,600	145,200	259,800	402,400	573,000
4	137,450	339,900	607,350	939,800	1,337,350
5	288,850	726,700	1,313,550	2,049,400	2,934,250
6	559,000	1,448,000	2,667,000	4,216,000	6,095,000
7	1,020,800	2,741,600	5,162,400	8,283,200	12,104,000
8	1,781,500	4,983,000	9,604,500	15,636,000	23,107,500

Armor Mastery

Armor masteries are available from your Rank 1 class NPC and are the same across all classes. The tooltip can be unclear so below is a table of the masteries and their attribute bonuses:

Type	3+ Set	4 Set
Cloth	+Lv×10.05 SP, 5% Magic Res	+Lv/2 MDEF, 10% Magic Res
Leather	+Lv Evasion	+0.5×Lv Evasion
Plate	+Lv×34 HP, 5% Physical Res	+0.33×STA, 10% Physical Res

Note: The 4 Set bonuses are additive to the 3 Set bonuses.

Skill-Specific Mechanics

While all skills work slightly differently to each other, there are a few skills which require more explanation than given by the tooltip.

Summoning / Create Shoggoth – Sorcerer C1 / Necromancer C1

Summoning and Create Shoggoth work similarly enough to be put under a single heading as both skills allow the player to summon boss monsters from cards. The only key differences are that:

- (1) Summoning can only summon Devil type monsters while Create Shoggoth can only summon Insect, Plant and Mutant type monsters.
- (2) Summoning constantly drains SP.
- (3) Summoning allows you to order, ride and control your summon.
- (4) Create Shoggoth can be improved with attributes.
- (5) Create Shoggoth requires a Corpse mechanic to be used.

While it is known that the ATT and DEF of summons depend on the caster's INT and SPR, each different card and their summoned monster have their own unique stat distribution and properties. The following table details each summon's base properties:

Name	STR	CON	INT	SPR	DEX	MSPD	Element	Type	Armor
Abomination	5	5	5	5	5	16	Dark	Demon	Leather
Archon	8	9	3	1	4	56	Fire	Mutant	Plate
Cerberus	7	8	2	3	4	24	Fire	Demon	Leather
Chapparition	3	3	9	7	4	24	Dark	Demon	Ghost
Deathweaver	6	5	4	3	7	24	Dark	Demon	Plate
Dullahan	5	5	5	5	5	24	Dark	Demon	Ghost
Elllaganos	5	5	5	5	5	40	Dark	Demon	Leather
Firelord	7	2	7	7	2	25	Fire	Demon	Cloth
Glackuman	10	10	2	1	2	45	Melee	Mutant	Plate
Harpeia	4	3	3	4	12	24	Lightning	Demon	Leather
Kanseril	4	9	5	5	3	24	Ice	Insect	Iron
Lithorex	5	5	5	5	5	24	Lightning	Demon	Ghost
Manticen	7	7	3	5	3	40	Poison	Insect	Leather
Mineloader	8	8	4	2	3	40	Lightning	Mutant	Plate
Minotaur	9	12	2	2	1	24	Fire	Demon	Leather
Mummyghast	7	8	3	3	4	40	Dark	Demon	Plate
Necroventer	3	2	9	9	2	24	Dark	Demon	Ghost
Netherbovine	8	8	1	3	5	24	Dark	Demon	Leather
Nuaelle	5	6	3	4	4	25	Dark	Demon	Cloth
Prisoncutter	10	5	2	2	6	40	Dark	Demon	Plate
Riteris	5	6	3	4	4	32	Dark	Demon	Ghost
Shadowgaler	7	4	5	6	4	24	Dark	Demon	Cloth
Sparnasman	7	5	3	4	6	24	Dark	Demon	Plate
Spector Monarch	4	5	10	8	2	24	Dark	Demon	Ghost
Templeshooter	4	2	2	2	15	24	Dark	Demon	Leather
Throneweaver	3	4	7	5	6	24	Poison	Demon	Cloth
Unknocker	7	7	6	4	1	32	Dark	Demon	Plate

Because the summon's stats scale slightly irregularly with levels these base stat rates are provided to show the general stat distribution of the monster. The higher the rate, the greater that stat increases with each level. Note that level in this respect refers to the summoned monster's level which is the same as the player's base level. While ATK and DEF are determined by STR and INT, other sub stats which are affected by the primary stats are the same as the player's. Therefore higher CON means more health and higher DEX means higher critical rate and evasion.

The stats of a summon are additionally increased by the level of the card. Every extra Star improves the summon's abilities by 10% and can be upgraded by sacrificing other cards through the Card Enhancement screen. The number of cards needed to level is the same as the star in which you are trying to reach (9 cards to go from 8 to 9 Stars), with a 10 Star card requiring 54 cards in total to achieve.

Spiritual Chain – Linker C2

Spiritual Chain links allies in a party and allows them to share buffs. Though this is can be redundant as many buffs are already shared party wide (and it does not bypass buff limit), there are a few self-buffs which can use this mechanic:

Name	Class
Beak Mask	Plague Doctor C1
Cloaking	Scout C1
Ein Sof	Kabbalist C1
Guardian	Peltasta C1
Gung Ho	Swordsman C1
Healing Factor	Plague Doctor C1
Restrain	Swordsman C2
Quick Cast	Wizard C1

Note that a skill must be cast after Spiritual Chain is used for it to be linked and that Spiritual Chain itself counts towards the buff limit.

Base Camp/Refreshment Table – Squire C2

Base Camp allows the player to set a temporary base site up in open field maps (no indoor maps/dungeons). The benefits of a base camp are:

- (1) Buffs used nearby the camp have an increased 20% duration.
- (2) The camp acts as a storage where party members are able to store their own items.
- (3) Party members can teleport to the base camp at any time (click on profile picture to teleport).
- (4) Party members can choose to respawn near the base camp after they die.
- (5) Refreshment tables are able to be opened near the base camp.

The base camp duration depends on its level and can be extended by 1 hour for 2000 silver.

Refreshment Table is a skill which can be used near a base camp to provide party members (and non-party members if you choose) foods that buff the player. Below is a list of the food and their effect:

Food	Effect
Sandwich	$+(10 + 2 \times \text{SLv})\% \text{ SP}$
Soup	Decrease SP Regen time by $1 \times \text{SLv}$ seconds
Salad	$+(10 + 2 \times \text{SLv})\% \text{ HP}$
Yoghurt	Decrease HP Regen time by $1 \times \text{SLv}$ seconds

The duration of these buffs begins at 30 mins and increases with the food's specific attribute level.

Simony – Pardoner C1

Simony allows the Pardoner class to create scrolls of certain Cleric skills that are usable by other players of any class at the cost of silver and materials. The current skills which are scroll-able are:

Skill	Class
Cure	Cleric C1
Deprotected Zone	Cleric C1
Aukuras	Krивис C1
Daino	Kривис C1
Zalciai	Kривис C1
Monstrance	Priest C1
Restoration	Paladin C1
Turn Undead	Paladin C1
Barrier	Paladin C3
Arcane Energy	Oracle C1
Clairvoyance	Oracle C1
Forecast	Oracle C1

The level of Simony determines the spell level of the scroll and the cost of creation. In addition to these spells an attribute can be learnt to create a Dispeller scroll allowing the user to remove Lv 1 debuffs.

Oblation – Pardoner C2

Oblation allows the Pardoner to set up a shop near Goddess Statues where players can sell their items to the shop for 20% less than its sell price (which comes out of the Pardoner's funds). The Pardoner has a choice to sell these items (but not use) for a 20% profit, or to keep them in Oblation to provide +1 DMG per slot for Indulgentia.

Magnum Opus – Alchemist C2

Magnum Opus combines different items together in certain shapes in order to create a new item. No 'recipes' are shown meaning the player has to already know correct combinations or use trial and error to find combinations. Currently there is no practical use to this skill (except for Sign of Wealth) as the majority of recipes use a few of the same material items to create other material items which are worse than the ones you began with. Appendix B is an incomplete list of Magnum Opus recipes. If you want the full list of recipes I can send them to you in a raw format, but for those curious they don't have anything immediately useful. Feel free to help make them readable though.

There was mention of IMC using this mechanic to create meaningful items so keep an eye open.

Companions

Companions act as AI pets (as well as mounts in some cases) and are available for all classes. There are current companions can be seen below:

Name	Cost	Mountable	Class
Velheider	110,000	Yes	All
Hoglan	453,600	Yes	All
Hawk	453,600	No	Falconer
Piggy	Guild Taming	Yes	All
Lesser Panda	Guild Taming	Yes	All
Guinea Pig	Guild Taming	Yes	All

Note: In order to mount a companion you need the Companion Riding attribute available only to Cataphract and Schwarzer Reiter classes.

Future companions will be available through Guild mechanics.

While a companion is equipped and activated by a character it is able to aggro, attack and be attacked by enemies. Companions are also able to be transferred across all your characters on a server, making them useful in helping kill monsters on alternative characters.

Stats

Companions have level mechanics similar to characters where leveling up the pet's base level increases their stats. Instead of status points however, a pet's stats automatically increase every level. The rate of increase for each stat is:

Name	STR	CON	INT	SPR	DEX
Velheider	7	9	2	2	5
Hoglan	5	8	2	1	7
Hawk	9	4	2	2	8
Piggy	5	8	3	4	5
Lesser Panda	10	4	2	2	7
Guinea Pig	9	4	2	2	8

Where the formula for a stat at a certain level is:

$$\text{Stat} = \text{Rate} + 0.04 \times \text{Rate} \times (\text{Lv} \times 1.5 + 40)$$

The stat vs sub stat interaction is similar but not the same as your character's interaction. In addition to some of the formulas changing, certain sub stats are also able to be upgraded through silver. The following table lists the formulas for each sub stat:

Stat	Formula
MHP	$17 \times (40 + Lv) + 34 \times CON + 27 \times SLv$
ATK	$Lv + STR + 40 + SLv$
DEF	$0.5 \times (40 + Lv) + SLv$
MDEF	$0.5 \times (40 + Lv) + SLv$
Accuracy	$Lv + 40 + DEX + SLv$
Crit Rate	$DEX + SLv$
Evasion	$Lv + 40 + DEX + SLv$

Note: Lv refers to the companion's level while SLv refers to the level you have upgraded a stat to.

The cost to upgrade a stat grows exponentially with level:

$$\text{Cost} = 300 \times 1.08^{SLv - 2}$$

Where the total cost to upgrade a stat up to a certain level is:

$$\text{Total Cost} = 3750 \times 10^{0.07691 \times MAXLV} - 3750 \times 10^{0.07691 \times MINLV}$$

In this case MAXLV refers to the level you are trying to reach while MINLV is the level you begin at (initial is 0). Both of these costs are doubled for the DEF skill.

A point to remember is that companions are also affected by the attack level penalty, therefore if your companion is not in the monster's level range it will not deal proper damage.

Mounting

As mentioned previously some classes are able to mount companions. While mounted your movement speed increases, stat bonuses are gained from your pet and you are able to perform normal attacks alongside a number of skills.

Skill Compatibility

Mounting your companion limits skill compatibility as some skills are unable to be used on mounts while some can only be used mounted. Appendix C holds tables describing the skills which are restricted to mounts and skills which can be used while both mounted and unmounted.

Stat Bonus

While mounted a percentage of your companion's stats are added to your character. These stats are:

Stat	Character Bonus
MHP	+25% MHP _{Companion}
DEF	+10% DEF _{Companion}
Evasion	+8% DR _{Companion}

Equipment

Potential

Potential is named as such as it refers to an item's potential to be improved. The more potential an item has, the more it can be enhanced and given better stats. An item loses potential by:

- (1) Trading or successfully marketing an item removes 1 potential.
- (2) Failing a refinement removes 1 potential.
- (3) Opening a gem socket removes 1 potential.
- (4) Attaching an amulet removes 1 potential.
- (5) Awakening an item removes 1 potential.
- (6) Briquetting a weapon removes 1 potential.

When an item reaches 0 potential none of the above actions can be performed except failing a refinement, which will destroy the item if you are not using a golden anvil. There are no current ways to restore potential.

Durability

Durability can be considered the health of an item. As attacks are performed or hits are taken, the durability of weapons and armour respectively decrease. When the durability reaches 0, the item can still be worn but will provide no stats to the user. An equipment's durability can be repaired by either the Blacksmith NPC or by Squire characters.

Enhancement

Equipment has a number of different ways to improve their stats. This is done at the cost of either silver, potential, materials or chance.

Refinement

An equipment's refinement level is indicated by the +Lv in front of its name and can be improved by using an Anvil and spending silver. By refining equipment you improve the primary stat of the item (damage for weapons, evasion for boots etc.). There is no current limit to the level you can refine an item to, however after Lv. 5 for weapons and Lv. 3 for armour the chance to successfully refine your equipment begins to reduce (with increased benefits) as follows:

Refine Lv.	Weapon	Armour
1	100%	100%
2	100%	100%
3	100%	100%
4	100%	88.4%
5	100%	77.8%
6	88.4%	68.1%
7	77.8%	59.2%
8	68.1%	51.2%
9	59.2%	51.2%
10+	51.2%	51.2%

If a refinement fails the item will lose 1 potential, the item will drop 1 Refine Lv and you will lose the silver spent for that upgrade attempt. If an item with 0 potential fails it will be destroyed. Because an item can continued to be refined until it is destroyed, items with higher potential have a greater chance at reaching higher refinement levels. Appendix D is a success chance table for Refinement Level vs Potential.

The improvement to your equipment through refinement depends on the item's primary stat, the item's star level (STAR) and the current refinement level (LV). The following table shows the stat bonus Formula 1 for LV 1 – 5 refinement (1 – 3 for armour) and Formula 2 for Lv 6+ (Lv 4+ for armour):

Equip	Primary Stat	Formula 1	Formula 2
Weapon	ATK/MATK	$LV \times (\text{STAR} + 2)$	$(5 + (LV - 5) \times 2) \times (\text{STAR} + 2)$
Armour	DEF	$LV \times (1 + \lfloor \text{STAR}/2 \rfloor)$	$(1 + \lfloor \text{STAR}/2 \rfloor) \times (3 + (LV - 3) \times 2)$
Armour	MDEF	$LV \times (1 + \lfloor \text{STAR}/2 \rfloor)$	$(1 + \lfloor \text{STAR}/2 \rfloor) \times (3 + (LV - 3) \times 2)$
Armour	ACCURACY (HR)	$LV \times (1 + \lfloor \text{STAR}/5 \rfloor)$	$(1 + \lfloor \text{STAR}/5 \rfloor) \times (3 + (LV - 3) \times 2)$
Armour	EVASION (DR)	$LV \times (1 + \lfloor \text{STAR}/5 \rfloor)$	$(1 + \lfloor \text{STAR}/5 \rfloor) \times (3 + (LV - 3) \times 2)$
Armour	MAGIC AMP (MHR)	$LV \times (1 + \lfloor \text{STAR}/2 \rfloor)$	$(1 + \lfloor \text{STAR}/2 \rfloor) \times (3 + (LV - 3) \times 2)$

Note: $\lfloor x \rfloor$ means the floor of x (you round down). So $\lfloor \text{STAR}/2 \rfloor$ means that a 5 STAR item would give $\lfloor 5/2 \rfloor = \lfloor 2.5 \rfloor = 2$. This is just a nice math way of showing that the refinement bonus increases every 2 (or 5) STARS.

The cost for refinement also depends on the stat, star level, refinement as well as the item level and the item slot. The rough cost guide is as follows (where I is initial cost to Lv. 1 and M is Lv. 2+ cost):

Equip	Stars											
	1		2		3		4		5		6	
Equip	I	M	I	M	I	M	I	M	I	M	I	M
Weapon	125	200	500	820	2500	4200	8200	13700	15600	26000	30500	50800
Armour	100	150	350	600	1900	3200	6200	10000	10500	17500	20700	34500

For refinement levels above 2, multiply the Lv. 2 cost by $(Lv - 1)$. E.g. Upgrading a 5 Star weapon from Lv. 5 to Lv. 6 will cost approximately $26000 \times (6 - 1) = 130000$ silver. The total cost to upgrade to a certain level is (assuming no failures):

$$\text{Total Cost} = M \times (0.5 \times Lv^2 + Lv) + I$$

This simplified formula can be useful for selling/buying upgraded weapons. A more accurate upgrade cost guide can be found in Appendix E which takes into consideration the chance to reach upgrade levels.

Golden Anvils can be used to refine equipment with 0 potential past Lv 10 without the risk of it being destroyed. Instead, if refinement fails it will only reduce the refinement level by 1.

Refining your weapon to +15 gives a white glow effect to the item. Refining past +15 gives the weapon a red glow which grows stronger each level up to +20 (not 100% sure it is 20 but definitely stops close to this).

Gems

Gems are used to imbue equipment with additional properties at the cost of potential and silver. There are currently 2 types of gems, shape gems which add sub-stats and monster gems which level up class skills.

To add a gem to an item it must have a gem socket and at least 1 potential. Before the gem is inserted the socket must be opened by a Blacksmith NPC, costing silver and removing 1 potential. Once a gem is inserted it can only be removed from the Blacksmith which again costs silver and reduces the Gem level by 1 (Lv. 1 Gems are destroyed on removal; you can also remove gems from 0 potential equipment).

Gems fall onto the ground upon death in 2 star maps and can be lost permanently on 3 star maps.

Shape Gems

Shape gems, also known as coloured gems, add sub stats to your equipment depending on which gem you use, the level of the gem and the equipment slot you use the gem on. Below are the tables for the gem bonuses, where the + column is the bonuses and the - column are the penalties:

SQUARE GEM										
	Weapon		Offhand		Top/Leg		Shoes		Gloves	
	+	-	+	-	+	-	+	-	+	-
STAT	MATK	MSP	BLK	MHP	MSP	CRTDR	MDEF	RHP	RSP	DR
Lv. 1	5	-15	1	-4	30	-5	1	-1	2	-1
Lv. 2	7	-24	4	-16	48	-8	2	-3	4	-2
Lv. 3	10	-36	10	-40	72	-12	3	-5	8	-4
Lv. 4	14	-51	19	-76	102	-17	4	-7	14	-7
Lv. 5	19	-69	30	-120	138	-23	5	-9	22	-11
Lv. 6	25	-90	44	-176	180	-30	6	-11	32	-16
Lv. 7	32	-114	60	-240	228	-38	7	-13	44	-22
Lv. 8	40	-141	79	-316	282	-47	8	-15	58	-29
Lv. 9	49	-171	100	-400	342	-57	9	-17	74	-37
Lv. 10	59	-204	124	-496	408	-68	10	-19	92	-46

STAR GEM										
	Weapon		Offhand		Top/Leg		Shoes		Gloves	
	+	-	+	-	+	-	+	-	+	-
STAT	CRTATK	HR	CRTATK	BLKBR	DEF	MHP	MHP	MATK	BLKBR	MAXATK
Lv. 1	6	-3	7	-4	1	-17	15	-2	1	-1
Lv. 2	9	-5	9	-5	2	-26	40	-4	4	-2
Lv. 3	14	-7	15	-8	3	-40	75	-8	10	-4
Lv. 4	20	-10	21	-11	4	-56	120	-13	19	-7
Lv. 5	27	-14	29	-15	5	-76	175	-19	30	-10
Lv. 6	36	-18	39	-20	6	-99	240	-27	44	-15
Lv. 7	47	-24	49	-25	7	-125	315	-35	60	-20
Lv. 8	59	-30	63	-32	8	-155	400	-44	79	-27
Lv. 9	72	-36	77	-39	9	-188	495	-55	100	-34
Lv. 10	87	-44	93	-47	10	-224	600	-67	124	-42

DIAMOND GEM										
	Weapon		Offhand		Top/Leg		Shoes		Gloves	
	+	-	+	-	+	-	+	-	+	-
STAT	CRTHR	CRTATK	CRTHR	MAXATK	CRTDR	MSP	DR	RSP	HR	MINATK
Lv. 1	2	-1	3	-1	1	-6	2	-8	2	-1
Lv. 2	4	-2	5	-2	3	-18	4	-16	4	-2
Lv. 3	8	-5	10	-3	5	-30	6	-24	8	-4
Lv. 4	14	-8	18	-6	9	-54	10	-40	14	-7
Lv. 5	22	-13	29	-10	15	-90	17	-68	22	-11
Lv. 6	32	-19	42	-14	21	-126	24	-96	32	-16
Lv. 7	44	-26	57	-19	29	-174	32	-128	44	-22
Lv. 8	58	-35	75	-25	38	-228	42	-168	58	-29
Lv. 9	74	-44	96	-32	49	-294	54	-216	74	-37
Lv. 10	92	-55	120	-40	61	-366	68	-272	92	-46

CIRCLE GEM											
	Weapon		Offhand		Top/Leg		Shoes		Gloves		
	+	-	+	-	+	-	+	-	+	-	
STAT	MAXATK	MINATK	PATK	DEF	MHP	DR	RHP	MDEF	CRTATK	HR	
Lv. 1	4	-1	5	-1	23	-1	2	-1	5	-3	
Lv. 2	6	-2	7	-2	60	-3	4	-2	8	-4	
Lv. 3	9	-3	11	-4	113	-6	8	-4	11	-6	
Lv. 4	13	-4	16	-5	180	-10	14	-5	16	-8	
Lv. 5	18	-6	22	-7	263	-15	22	-7	23	-12	
Lv. 6	24	-8	29	-10	360	-21	32	-10	30	-15	
Lv. 7	31	-10	37	-12	473	-28	44	-12	39	-20	
Lv. 8	39	-13	47	-15	600	-36	58	-16	49	-25	
Lv. 9	48	-16	58	-19	743	-45	74	-19	60	-30	
Lv. 10	58	-19	70	-23	900	-55	92	-23	73	-37	

A gem can be levelled from the gem enhancement screen by sacrificing items. The experience given by items can be seen below:

Item	Experience
Materials	5
Equipment	iLevel
Talt	100
Monster Gems	7550
Lv. 1-3 Gem	$100 \times 3^{(LV - 1)}$
Lv. 4-7 Gem	$10800 \times 4^{(LV - 4)}$
Lv. 8 Gem	864000
Lv. 9 – 10 Gem	4320000
Lv. 1 Gem Abrasive	3000
Lv. 2+ Gem Abrasive	$15500 \times 2^{(LV - 2)}$

Consumables cannot be used for experience and not all materials can be sacrificed. The experienced needed for each gem level is in the table below, alongside the total experience needed to reach a certain level:

Level	Experience	Total Experience
2	300	300
3	900	1200
4	2700	3900
5	10800	14700
6	43200	57900
7	172800	230700
8	864000	1094700
9	4320000	5414700
10	4320000	9734700

To remove the penalties from gems they can be roasted by Alchemist C2's skill Gem Roasting. This skill sets up a shop where you can pay the Alchemist to remove the penalties of your gem. This skill has 10 levels which corresponds to the highest gem level it can remove penalties from. E.g. an Alchemist with Lv. 5 Gem Roasting can completely remove the penalties from a Lv. 5 gem, but not from a Lv. 6 gem.

Monster Gems

Monster gems improve the skill level of skills and have a 0.01% (1 in 10000) chance to drop from almost all non-boss mobs. Each monster drops a unique gem which corresponds to a different skill. The list of current skills, their corresponding monster gem and their item slot can be found at (I might compile a better list into an Appendix):

<http://www.tosbase.com/database/items/gems/>

Monster gems are slotted the same way as shaped gems. Currently all monster gems are Lv. 1 and only provide +1 to a skill, however there are plans for higher level monster gems. A monster gem will only work if you have already learnt the appropriate skill (skill must be at least Lv. 1). You are also unable to socket multiple of the same gem (will still only give +1).

Monster gems are unable to be traded and break on removal of equipment. It is still possible to trade equipment with monster gems equipped however.

Amulets

Note: Amulets are currently removed from the game.

Amulets equip onto your weapons and offhand equipment and provide the chance for certain effects. These amulets can be found from dungeons and field bosses. The current amulets are:

Name	Effect
Cube Amulet	15% chance to increase your damage by 20% on knocked-down enemies
Pumpkin Amulet	3% chance to decrease an enemy's SP by 1096 when attacking it from behind
Skull Amulet	When you are hit with your HP below 10% there is a 4% chance to recover 2100 HP over 6 seconds
String Amulet	20% chance to decrease the enemy's DEF and MDEF by 50% for 10 seconds after a successful block

All items are able to have up to 3 amulets attached and consume 1 potential for each amulet equipped. The effects of the amulets do not stack, therefore 3 string amulets will still only provide a 20% chance.

Awakening

Item awakening is an Alchemist C1 skill which adds permanent additional properties to any equipment slot at the cost of 1 potential. When an item is awakened the Alchemist's party enters an item dungeon where the monsters begin at the item's iLevel and increases by 1 each wave. The number of waves depend on the item's grade:

$$\text{Number of Waves} = 5 \times \text{Grade}$$

Where Grade is 1 for White, 2 for Blue, 3 for Purple and 4 for Orange.

Every 5 waves takes roughly 6 minutes (waves continue to spawn even if you have not defeated the previous wave) and the final wave is a boss monster. If you die in an item dungeon you can only be revived by a Priest. If the whole party wipes the item loses potential and does not gain the awakening bonus.

The additional stat is chosen randomly while its value is randomly selected between a minimum – maximum of values dependant on the number of stars and grade of the item (higher the grade and stars, the better the awakening). The following table lists each attribute and their respective formula for the awakening value:

Stat	Minimum	Maximum
ATK	$0.06 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$	$0.12 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$
HP	$1.36 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$	$2.72 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$
HPR	$0.1 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$	$0.2 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$
SPR	$0.1 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$	$0.2 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$
DEF	$0.02 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$	$0.04 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$
Type DEF	$0.025 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$	$0.05 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$
Other	$0.02 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$	$0.04 \times \text{LV} \times (1 + 0.1(\text{Grade} + 1))$

Note: LV in this formula refers to the level required to equip the item. So a 3 star item has a LV of 40. ATK can refer to ATK, MATK or elemental attack damage. Type DEF refers to specific type resistances such as fire, large, cloth etc. Other encompasses accuracy, evasion, critical rate.

Maintenance

Maintenance is a temporary equipment boost which can be provided by Squire C1 shops at the cost of the player's silver. There are two maintenance abilities, Armor Maintenance and Weapon Maintenance, as well as one repair ability Repair. A Squire can only have open one of these shops at a time though it can be left open while offline.

Weapon Maintenance

Weapon maintenance improves the primary ATK/MATK of the chosen weapon for a certain number of hits or until the 1 hour duration runs out. The formula for the increased damage is:

$$+\text{DMG} = (\text{SLv} + 1) \times \text{STAR}$$

Both normal attacks and skills count towards the hit count.

Armor Maintenance

Armor maintenance repairs and improves the primary DEF of Tops, Pants and Shields for a certain number of shots or until the 1 hour duration runs out. The formula for the increased DEF is:

$$+\text{DEF} = \text{SLv}$$

Repair

Repair allows the Squire to repair all armour equipment as well as increasing the maximum durability of those items. The formula for the increased Durability is:

$$+\text{Durability} = \text{SLv}$$

Briquetting

Briquetting is an Alchemist C1 skill which lets the Alchemist combine 2 of the same weapon for the chance to permanently improve or decrease the ATK/MATK by a certain percentage. The formula for the change is:

$$\pm \text{DMG\%} = 5 + 0.5 \times (\text{SLv} - 1)$$

This means at max level there is a chance to for $\pm 12\%$ to the weapons damage at the sacrifice of a second weapon and 1 potential. Leave this for end game Min-Maxing.

Gameplay

Experience

There are a few concepts to do with experience that are helpful to understand for leveling purposes. Firstly, the base levels that roughly correlate to class ranks are:

Rank	Base Level
1	1
2	15
3	45
4	78
5	127
6	177
7	223

Looking at the experience table (<http://www.tosbase.com/game/exp-tables/>) it can be seen that there are a number of levels where the required experience is reduced. This is done in parallel to rank-ups to make it easier for them to regulate experience across 500 levels. A result of this is that experienced gained from high level monsters is not much greater than that gained from low level monsters.

A handy tool for levelling is Excrulon's great experience viewer found here:
<https://github.com/Excrulon/Tree-of-Savior-Experience-Viewer-Lua-Mod/releases>

Penalties

Since experience gained from monsters is similar across all levels, artificial methods (penalties) are introduced to prevent high level characters from farming low level monsters. The experience penalty is that:

A monster 5 levels below you has its experience reduced by 5% with an extra 5% reduction for each level past this.

Therefore if you are 14 levels above a monster it will only give you 50% of its normal experience while being 24 levels above a monster gives you 1 exp. For monsters higher than you:

A monster 11 levels higher than you has its experience reduced by 5% with an extra 5% reduction for each level past this up to a maximum 20% reduction.

A maximum 20% reduction means you or your party can still gain relevant experience from high level monsters. Because there is no level gap penalty between you and your party members this means low level players can leech experience. While in a party the experience gained is also penalised depending on the number of members. The following table lists what percentage of the original experience you gain from killing a monster:

Members	Exp Rate
1	100%
2	60%
3	50%
4	45%
5	44%
6	41.67%

Cards

Experience cards give you experience based on the level of the card. The experience given, alongside the level of the quests which reward the cards is shown below:

Level	Base Experience	Class Experience	Quest Lv	Daily/Mission Lv
1	500	385	1	
2	2,686	2,068	13	
3	8,442	6,500	32	
4	22,860	17,602	65	
5	24,571	18,919	86	
6	60,312	46,440	110	100
7	142,150	109,445	137	136
8	209,334	161,187	160	166
9	237,943	183,216	187	186
10	541,023	416,587	211	
11	608,115	468,279		
12	1,344,829	1,035,518		

In addition to map quests, cards can also be dropped by monsters and acquired through daily and mission quests. The drop rate from monsters is roughly 0.01 – 0.02% (5000 – 10000 mobs) with the card level being based on the level of the monster (corresponds roughly to the quest level seen in the exp table). The mission and daily rewards cards based on the character's level as seen in the above table.

Bonus

There are a number of ways to gain increased experience points:

- (1) Blue mobs give 250 times the normal monster experience and have a 0.0083% (1 in 12000) chance of replacing a mob spawn.
- (2) Thaumaturge C1's skill Swell Body doubles the experience gained from monsters that are defeated while the effect is active.
- (3) Doppelsoeldner C1's skill Double Pay Earn doubles the experience gained from monsters that are defeated in the limited number of attacks.

Adventure Journal

Your Adventure Journal tracks and scores the progress you have made in the game on that character. This score is primarily based around world discovery and can be thought of as an encyclopaedia for items, monsters and maps you have encountered. Silver rewards are given as the score for different indexes reaches certain milestones while your total score determines your rank against other players on that server. The table below lists each journal score component and their score contribution:

Index	Description	Score
Adventure	Total journal score	Adventure is the sum of all other indexes
Growth	Character level up	Base: +5, Job: +5
Item	Item discovery	Equip: +(10×STAR + Refine), Books: +10, Others: +1
Monster	Monster discovery	Normal: +10, Boss: +50
NPC	Important NPC discovery	+1
Exploration	Map discovery	10% Exploration: +1
Mission	Party mission completion	+5
Quest	Quest completion	+1
Achievement	Achievement	Achievement Dependent: +(5 - 20)
Crafting	Crafting items	+10
Collection	Collection discovery/completion	Discovery: +5, Completion: +45

Note: You or your party member must have the final hit on a monster for it to count. Remember all these points are for the first occurrence of these events only.

Notice that the score given by equipment depends on both its STAR rating as well as its refinement level. Below demonstrates the scores achievable by equipment based on STAR vs Refine Level with +10 providing the maximum score:

Stars							
	1	2	3	4	5	6	7
+0	10	20	30	40	50	60	70
+1	10.3	20.6	30.9	41.2	51.5	61.8	72.1
+2	10.6	21.2	31.8	42.4	53.0	63.6	74.2
+3	10.9	21.8	32.7	43.6	54.5	65.4	76.3
+4	11.2	22.4	33.6	44.8	56.0	67.2	78.4
+5	13.0	26.0	39.0	52.0	65.0	78.0	91.0
+6	15.4	30.8	46.2	61.6	77.0	92.4	107.8
+7	18.4	36.8	55.2	73.6	92.0	110.4	128.8
+8	22.0	44.0	66.0	88.0	110.0	132.0	154.0
+9	26.2	52.4	78.6	104.8	131.0	157.2	183.4
+10	40.0	80.0	120.0	160.0	200.0	240.0	280.0

Future

Planned for v0.4:

- (1) Guild section
- (2) Block/Block Penetration formula
- (3) Knockdown/Knockdown Defense stat section
- (4) Wugushi boss card/poison buff interaction
- (5) Companion skill/food/closeness mechanics

For release:

- (1) PvP
- (2) Economy - Trading / Marketplace
- (3) Dungeons / Missions / Raids
- (4) Stat/Skill interactions

Credits

- (1) <https://forum.treeofsavior.com/t/game-mechanics-discussion/23863>
- (2) https://www.reddit.com/r/treeofsavior/comments/3w3kjv/aoe_attack_ratio/
- (3) <https://forum.treeofsavior.com/t/critical-rate-formula-icbt2-updated/124745>
- (4) <https://forum.treeofsavior.com/t/damage-guide-the-big-formula-modifier-types-and-how-they-interact/118950/1>

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- Those actively posting information on the forum: DiscKZee, Gwenyth, Doddler, EternalDream
- My guild, for dealing with constant questions

Appendix A – Skill Stances

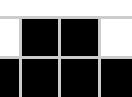
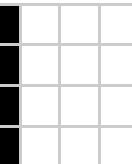
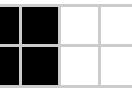
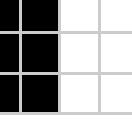
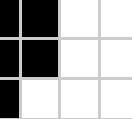
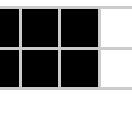
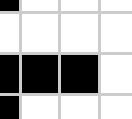
Name	Class	Stance
Multishot	Archer	1H Bow, 2H Bow
Fulldraw	Archer	1H Bow, 2H Bow
Oblique Shot	Archer	1H Bow, 2H Bow
Heavy Shot	Archer	1H Bow, 2H Bow
Twin Arrows	Archer	1H Bow, 2H Bow
Cannon Shot	Cannoneer	1H Bow + Cannon
Shootdown	Cannoneer	1H Bow + Cannon
Siege Burst	Cannoneer	1H Bow + Cannon
Cannon Blast	Cannoneer	1H Bow + Cannon
Impaler	Cataphract	1H Spear, 2H Spear
Earth Wave	Cataphract	1H Spear, 2H Spear
Doom Spike	Cataphract	1H Spear, 2H Spear
Rush	Cataphract	1H Spear, 2H Spear
Dust Devil	Corsair	Dagger
Hexen Dropper	Corsair	Dagger
Zornhau	Doppelsoeldner	2H Sword
Redel	Doppelsoeldner	2H Sword
Zucken	Doppelsoeldner	2H Sword
Dragontooth	Dragoon	1H Spear, 2H Spear
Serpentine	Dragoon	1H Spear, 2H Spear
Soar	Dragoon_Dragon	1H Spear, 2H Spear
Gae Bulg	Dragoon_Gae	1H Spear, 2H Spear
Hanging Shot	Falconer	1H Bow, 2H Bow
Attaque Composee	Fencer	Rapier
Lunge	Fencer	Rapier
Sept Etoiles	Fencer	Rapier
Attaque Coquille	Fencer	Rapier
Esquive Toucher	Fencer	Rapier
Preparation	Fencer	Rapier
Flanconnade	Fencer	Rapier
Broad Head	Fletcher	2H Bow
Bodkin Point	Fletcher	2H Bow
Barbed Arrow	Fletcher	2H Bow
Crossfire	Fletcher	2H Bow
Magic Arrow	Fletcher	2H Bow
Singijeon	Fletcher	2H Bow
Cross Guard	Highlander	2H Sword
Synchro Thrusting	Hoplite	1H Sword + Dagger, 1H Spear + Dagger

Finestra	Hoplite	1H Spear, 2H Spear
Spear Lunge	Hoplite	1H Spear, 2H Spear
Long Stride	Hoplite	1H Spear + Shield, 2H Spear
Throwing Spear	Hoplite	1H Spear + Shield, 2H Spear
Covering Fire	Musketeer	Musket
Headshot	Musketeer	Musket
Snipe	Musketeer	Musket
Penetration Shot	Musketeer	Musket
Butt Stroke	Musketeer	Musket
Bayonet Thrust	Musketeer	Musket
Umbo Blow	Peltasta	Shield
Rim Blow	Peltasta	Shield
Shield Lob	Peltasta	Shield
High Guard	Peltasta	Shield
Butterfly	Peltasta	Shield
Umbo Thrust	Peltasta	Shield
Swash Buckling	Peltasta	1H Sword, 1H Spear, Rapier
Deploy Pavise	Quarrel Shooter	1H Bow, 2H Bow
Scatter Caltrop	Quarrel Shooter	1H Bow, 2H Bow
Stone Shot	Quarrel Shooter	1H Bow
Rapid Fire	Quarrel Shooter	1H Bow
Teardown	Quarrel Shooter	1H Bow
Running Shot	Quarrel Shooter	1H Bow
Barrage	Ranger	1H Bow, 2H Bow
High Anchoring	Ranger	1H Bow, 2H Bow
Critical Shot	Ranger	1H Bow, 2H Bow
Time Bomb Arrow	Ranger	1H Bow, 2H Bow
Bounce Shot	Ranger	1H Bow, 2H Bow
Spiral Arrow	Ranger	1H Bow, 2H Bow
Shield Charge	Rodelero	Shield
Targe Smash	Rodelero	Shield
Shield Push	Rodelero	Shield
Slithering	Rodelero	Shield
Shooting Star	Rodelero	Shield
Shield Bash	Rodelero	Shield
Shield Bash	Rodelero	Shield
High Kick	Rodelero	1H Sword, 1H Spear, Rapier
Vendetta	Rogue	1H Bow, 2H Bow
Backstab	Rogue	1H Bow + Dagger
Concentrated Fire	Schwarzer Reiter	1H Bow + Pistol
Caracole	Schwarzer Reiter	1H Bow + Pistol

Limacon	Schwarzer Reiter	1H Bow + Pistol
Retreat Shot	Schwarzer Reiter	1H Bow + Pistol
Wild Shot	Schwarzer Reiter	1H Bow + Pistol
Flu Flu	Scout	1H Bow, 2H Bow
Flare Shot	Scout	1H Bow, 2H Bow
Split Arrow	Scout	1H Bow, 2H Bow

Appendix B – Magnum Opus Recipes

Just note this list is incomplete. To quote myself previously, if you want the full list of recipes I can send them to you in a raw format, but for those curious they don't have anything immediately useful. Feel free to help make them readable though.

Formation Types	
Hat 1	
Vertical	
Square	
Rectangle 1	
P Shape	
H Shape	
Rectangle 2	
Single	
L Shaped	

Input Item	Amount	Output Item	Output Type	Formation
Groll Thorn	4	Ammon Backbone	Material	Square
Pendinmire	4	Anchor	Material	Square
Drake meat	4	Arma Thorn	Material	Square
Rubblem fragment	4	Armorite Plate	Material	Square
Hamming Leaf	4	Ashrong Stem	Material	Square
Coliflower Stem	4	Bagworm Shell	Material	Sqaure
Panto Horn	4	Banshee Spirit Matter	Material	Square
Jukopus Leaf	4	Bat Wing	Material	Square
Tipio Stamen	3	Beetow Feeler	Material	Square
Blood Eyeball	4	Belfigi Beads	Material	Square
Shaman doll core	4	Black Shaman doll core	Material	Square
Honeybean Stinger	4	Blood Eyeball	Material	Square
Hallowventer handbone	4	Boowok Core	Material	Square
Cockatrice Feather	4	Bushspider leaf	Material	Square
Maize spore Pocket	4	Caro Leaf	Material	Square
Operor Thorn	6	Chafperor	Material	Rectangle 1
Meduja Tentacle	4	Chromadog Bone	Material	Square
Leafbug Shell	4	Chupacabra Tooth	Material	Square
Gepetto Stem	4	Chupaluka fur	Material	Square
Kepo Fluff	4	Cockatrice Feather	Material	Square
Galok Leather	3	Coliflower Stem	Material	Vertical
Caro leaf	4	Corylus Horn	Material	Vertical
Yekubite Antennae	4	Crystal Spider Feeler	Material	Square
Loftlem Debris	4	Cyst Needle	Material	Square
Chafperor Wing	6	Dandel Wing	Material	Rectangle 1
Chromadog Bone	4	Desmodus Tooth	Material	Square
Banshee Spirit matter	4	Doyor Leaf Bunch	Material	Square
Fishing Rod	4	Drake Horn	Material	Square
Vikaras Core	4	Echad Core	Material	Square
Yognome Core	4	Egnome Core	Material	Square
Bushspider leaf	4	Ellomago leaf	Material	Square
Cyst Needle	4	Elma Hair	Material	Square
Minos Bone	4	Fishing Rod	Material	Vertical
Mantiwood Skin	4	Galok Leather	Material	Square
Matsum Stem	4	Geppetto Stem	Material	Square
Griba Stem	6	Griba Bamboo Hat	Material	Rectangle 2
Moya Fragment	4	Griba Stem	Material	Square
Griba Bamboo Hat	4	Gribaru Drop	Material	Square
Velwriggler Feather	4	Groll Horn	Material	Square
Jukopus Leaf	6	Grummer Leaf	Material	Rectangle 2
Hogma Tusk	4	Hallowventer Hand Bone	Material	Square
Tontulia Thorn	4	Hamming Leaf	Material	Square
Yellow Gorgon golem core	4	Harugal Bone	Material	Square
Vubbe Token	6	High Vubbe Token	Material	Rectangle 1
Desmodus Tooth	6	Hoglan Beak	Material	Rectangle 1
Griba Bamboo Hat	3	Honeybean Stinger	Material	Vertical
Tripede Thorn	4	Infro Blood Stem	Material	Square

Kepo Skin	4	Infrobork Shell	Material	Square
Chupacabra Tooth	4	Jukopus Leaf	Material	Square
Shackle	6	Karas Fragment	Material	Rectangle 1
Meduja Tentacle	4	Kepo Wing	Material	L Shaped
Lepusbunny Hair	4	Kepo fluff	Material	Square
Madakia horn	4	Kepo Skin	Material	Square
Large Hook	4	Kitcher Knife	Material	Square
Treegool Stem	4	Kodomor Thorn	Material	Square
Panto Horn	3	Large Hook	Material	Vertical
Shackle	4	Lauzinate Skin	Material	Square
Rocktor Skin	4	Lemuria Tail	Material	Square
Chupaluka Fur	4	Lepusbunny hair	Material	Square
Siaulamb Fur leaf	4	Levi Fur	Material	Square
Kodomor thorns	4	Lizardman Bones	Material	Square
Rondo Shell	4	Loftlem Debris	Material	Square
Kepa Wings	4	Lomor Leaf	Material	Square
Vekarabe Shell	4	Madakia Horn	Material	Square
Doyer Leaf Bunch	4	Maize Spore Pocket	Material	Square
Arma Thorn	4	Maleech Shell	Material	Square
Venucelos Core	4	Mauros core	Material	Square
Old Kepa Shell	4	Meduja Tentacles	Material	Vertical
Infroblood Stem	7	Melatinum Heart	Material	H Shape
Phyracon Leaf	4	Minivern skin	Material	Square
Lizardman Fang	4	Minos Bone	Material	Square
Lizardman Bones	4	Mole Claw	Material	Square
Mole Claw	4	Moya Fragment	Material	Square
Infrobork Shell	4	Old Kepa Shell	Material	Square
Stone Orca Core	6	Panto Horn	Material	Rectangle 1
Stoulet Heart	4	Pokubon Leather	Material	Square
Chinency Leaf	4	Pokubu Skin	Material	Square
Kepa Stem	4	Popolion Meat	Material	Square
Pyrostone	1	Pyranium	Material	Single
Big Siaulamb Sinew	4	Rambear Bone	Material	Square
Lauzinite Skin	4	Ridimed Stem	Material	Square
Siaulamb Mask	4	Rocktor Skin	Material	Square
Ducky Leather	4	Rubabos Leather	Material	Square
High Vubbe Token	4	Rubblem Fragment	Material	Square
Egnome Core	4	Sauga Core	Material	Square
Firent Flower	4	Seedmia Seed	Material	Square
Drake Horn	4	Shaman Doll Core	Material	Square
Vesper Counterweight	4	Shnayim Fragment	Material	Square
Elma Hair	4	Siaulamb Fur Leaf	Material	Square
Wooden pile	4	Siaulamb mask	Material	Square
Gold Bar	6	Sign of Wealth	Hat	Hat 1
Minivern Skin	4	Slick Sap	Material	Square
Melatinum Heart	4	Socket Shell	Material	Square
Bat Wing	4	Stone Orca Core	Material	Square
Ashrong Stem	4	Stoulet Heart	Material	Square

Wendigo Tooth	4	Ticen bone	Material	Square
Seedmia Seed	3	Tipio Stamen	Material	Vertical
Phyracon Leaf	3	Treegol Stem	Material	Vertical
Zinute Skin	4	Tucen Skin	Material	Square
Beetow Feeler	4	Upent Bark	Material	Square
Ridimed Stem	4	Varv feeler	Material	Square
Varv Skin	4	Vekarabe Shell	Material	Square
Corpse Hand	4	Velwriggler Feather	Material	Vertical
Shnaymin Fragment	4	Venucelos Core	Material	Square
Boowok Core	4	Vesper Counterweight	Material	Square
Weaver Feeler	4	Vubbe Token	Material	Square
Cronewts bone	5	Wendigo Tooth	Material	P Shape
Black Shaman doll core	4	Yellow Egnome Core	Material	Square
Tama Leaf	4	Yellow Egnome Core	Material	Square
Kitchen Knife	4	Yognome Core	Material	Square
Crystal Spider Feeler	4	Zignuts Stem	Material	Square
Ammon Backbone	4	Zinute Skin	Material	Square
Mauros Core	4	Zorem Core	Material	Square

Appendix C – Mount - Skill Compatibility

Skills only available while mounted

Name	Class
Impaler	Cataphract C1
Earth Wave	Cataphract C1
Trot	Cataphract C1
Steed Charge	Cataphract C1
Doom Spike	Cataphract C2
Rush	Cataphract C3
Concentrated Fire	Schwarzer Reiter C1
Caracole	Schwarzer Reiter C1
Limacon	Schwarzer Reiter C1
Retreat Shot	Schwarzer Reiter C1

Skills available while both mounted and unmounted

Name	Class
Multishot	Archer C1
Fulldraw	Archer C1
Swift Step	Archer C1
Oblique Shot	Archer C1
Heavy Shot	Archer C2
Twin Arrows	Archer C3
Helm Chopper	Barbarian C1
Warcry	Barbarian C2
Frenzy	Barbarian C2
Pouncing	Barbarian C3
Iron Hook	Corsair C1
Keel Hauling	Corsair C1
Unlock Chest	Corsair C1
Double Weapon Assault	Corsair C2
Hexen Dropper	Corsair C2
Pistol Shot	Corsair C3
Deeds of Valor	Doppelsouldner C1
Mordschlag	Doppelsouldner C1
Double Pay Earn	Doppelsouldner C1
Zornhau	Doppelsouldner C2
Redel	Doppelsouldner C2
Zucken	Doppelsouldner C2
Broad Head	Fletcher C1
Bodkin Point	Fletcher C1
Barbed Arrow	Fletcher C1
Crossfire	Fletcher C1

Magic Arrow	Fletcher C2
Singijeon	Fletcher C3
Wagon Wheel	Highlander C1
Crown	Highlander C1
Cross Guard	Highlander C1
Moulinet	Highlander C2
Skyliner	Highlander C2
Skull Swing	Highlander C3
Stabbing	Hoplite C1
Pierce	Hoplite C1
Finestra	Hoplite C1
Synchro Thrusting	Hoplite C1
Spear Lunge	Hoplite C2
Throwing Spear	Hoplite C3
Umbo Blow	Peltasta C1
Rim Blow	Peltasta C1
Swashbuckling	Peltasta C1
Guardian	Peltasta C1
High Guard	Peltasta C2
Umbo Thrust	Peltasta C3
Langort	Peltasta C3
Scatter Caltrop	Quarrel Shooter C1
Stone Shot	Quarrel Shooter C1
Rapid Fire	Quarrel Shooter C2
Barrage	Ranger C1
High Anchoring	Ranger C1
Critical Shot	Ranger C1
Steady Aim	Ranger C1
Time Bomb Arrow	Ranger C2
Bounce Shot	Ranger C3
Spiral Arrow	Ranger C3
Shield Charge	Rodelero C1
Shield Shoving	Rodelero C1
Slithering	Rodelero C2
Shield Bash	Rodelero C2
Shooting Star	Rodelero C3
Sneak Hit	Rogue C1
Evasion	Rogue C2
Wild Show	Schwarzer Reiter C2
Flu Flu	Scout C1
Flare Shot	Scout C1
Scan	Scout C2
Split Arrow	Scout C2
Mitigate Penalty	Squire C3
Thrust	Swordsman C1
Bash	Swordsman C1
Gung Ho	Swordsman C1

Concentrate	Swordsman C1
Pain Barrier	Swordsman C1
Restrain	Swordsman C2
Pommel Beat	Swordsman C2
Double Slash	Swordsman C3
Summon Guild Member	Templar C1
Warp to Guild Member	Templar C1
Build Guild Tower	Templar C1
Reduce Craft Time	Templar C1
Battle Orders	Templar C1
Detoxify	Wugushi C1
Needle Blow	Wugushi C1
Bewitch	Wugushi C1
Wugong Gu	Wugushi C1
Zhendu	Wugushi C1

Appendix D – Refinement Chance Table

The following tables show the chance (%) to reach a certain refinement level, with potential in the columns and the level on the rows. This table is for weapons, however the armour chance can be found by assuming the refinement level starts at +4 instead of +6 and adjust accordingly (just minus 2 from refinement level). This table also assumes you will stop at 0 Potential. If you don't mind breaking your equipment then you can add an extra potential and look at that column (a 10 potential weapon would look at the 11 column if you are fine to risk it breaking).

Potential

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
+6	88.36	98.49	99.83	99.98	100	100	100	100	100	100	100	100	100	100	100
+7	69.03	90.62	96.97	99.09	99.73	99.95	99.97	100	100	100	100	100	100	100	100
+8	46.40	74.02	86.10	93.45	96.69	98.37	98.99	99.42	99.67	99.94	99.94	99.99	99.99	100	100
+9	27.91	51.53	67.82	78.16	85.40	90.37	93.47	95.69	97.25	98.05	98.82	99.07	99.34	99.62	99.72
+10	14.51	30.11	45.67	56.21	65.24	72.34	77.83	83.04	86.87	89.44	91.67	93.29	94.84	96.09	96.72
+11	7.77	17.24	27.31	37.37	45.35	52.88	58.67	65.01	70.23	73.45	77.00	80.58	82.65	85.70	87.82
+12	3.53	9.06	17.27	23.98	30.30	37.19	43.73	48.69	53.77	58.25	62.43	65.63	68.79	72.12	74.37
+13	1.73	5.26	10.18	15.42	20.86	25.02	31.28	35.54	40.00	43.78	46.74	50.77	54.23	58.30	60.84
+14	0.87	2.96	5.98	8.79	13.69	16.91	21.07	25.51	28.71	33.48	36.48	39.64	42.08	46.03	47.78
+15	0.49	1.73	3.66	5.62	8.09	12.08	14.35	17.20	21.36	24.11	27.42	29.61	32.43	35.30	39.06
+16	0.26	0.87	2.03	3.51	5.20	7.21	9.96	11.77	14.64	17.31	20.00	21.93	24.72	27.91	29.90
+17	0.11	0.38	1.09	2.27	3.24	4.89	6.50	8.30	10.26	13.02	14.19	16.56	18.30	20.45	22.45
+18	0.06	0.35	0.73	1.22	2.10	3.03	4.23	5.86	7.09	9.06	10.47	12.57	13.33	15.83	17.31
+19	0.04	0.18	0.42	0.78	1.28	2.01	2.70	3.80	4.98	6.11	7.60	8.63	10.38	11.67	13.05
+20	0.00	0.10	0.25	0.49	0.59	1.21	1.92	2.44	3.41	4.10	4.82	6.51	7.50	8.22	9.46
+21	0.00	0.02	0.09	0.22	0.38	0.82	1.18	1.66	2.52	3.01	3.59	4.55	5.62	6.15	7.06
+22	0.00	0.03	0.04	0.17	0.34	0.57	0.88	1.07	1.54	1.97	2.51	3.01	3.61	4.07	5.16
+23	0.00	0.02	0.03	0.06	0.20	0.25	0.35	0.73	1.01	1.38	1.53	2.14	2.49	2.82	3.99
+24	0.00	0.00	0.03	0.08	0.07	0.20	0.32	0.55	0.59	0.95	1.24	1.65	1.73	2.24	2.53
+25	0.00	0.00	0.01	0.02	0.08	0.06	0.19	0.28	0.42	0.62	0.69	1.18	1.08	1.58	2.11
+26	0.00	0.00	0.01	0.02	0.02	0.11	0.17	0.22	0.23	0.35	0.62	0.53	0.87	0.89	1.32
+27	0.00	0.00	0.00	0.02	0.01	0.03	0.04	0.14	0.16	0.25	0.32	0.58	0.71	0.99	1.19
+28	0.00	0.00	0.00	0.00	0.00	0.04	0.03	0.09	0.04	0.14	0.25	0.24	0.37	0.52	0.68
+29	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.03	0.07	0.21	0.24	0.26	0.39	0.45
+30	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.02	0.07	0.10	0.09	0.07	0.14	0.16	0.34

Note: I created this table through simulation therefore these aren't exact values – which is obvious with some the values less than 0.1%. ±0.1 variance shouldn't anger anyone but if it does I can redo it to greater accuracy.

Appendix E – Weapon Refinement Cost Table

The following table shows the average cost C to achieve the chance shown by the table in Appendix E for weapons.

		Enhance Level									
		+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
Potential	1	15	20	25	29	31	33	34	34	34	34
	2	16	24	33	41	47	51	54	55	56	57
	3	16	25	37	49	60	67	71	75	77	78
	4	16	25	38	54	69	80	87	92	96	98
	5	16	26	40	58	77	91	102	109	115	118
	6	16	26	40	60	82	101	115	125	132	137
	7	16	26	40	62	87	110	127	140	149	156
	8	16	25	40	62	91	117	138	153	165	174
	9	16	26	40	63	93	123	146	166	180	192
	10	16	26	41	64	96	129	156	178	195	207
	11	16	26	40	63	98	133	164	189	208	224
	12	16	26	41	64	100	137	172	199	221	239
	13	16	26	41	64	100	141	177	208	234	254
	14	16	26	40	64	101	144	184	218	245	268
	15	16	26	40	64	102	147	190	226	256	281
formula is cost = c * mult + initial											
mult is the cost multiplier (cost to level to +2)											
initial is the cost to level to +1											
cost to level from +1 - +5 are: initial + (0, 1, 3, 6, 10)*mult respectively											

As an example, if we look at the weapon Twinkle Rod (<http://www.tosbase.com/database/items/144103/>). The initial price to upgrade is 640 with the level 2 price being 1068 (this is the cost multiplier). The chance to upgrade a 7 potential weapon – without breaking it – to +10 is 77.83%. The C value for +10, 7 potential is 87. Therefore the cost is initial + C×Multiplier = 640 + 87×1068 = 93556 silver. This means it costs you 93556 silver for a 77.83% chance at reaching +10.

The proper statistical foundations of this are pretty shaky so take it with a grain of salt, however it is nice to have a general idea of the cost. You can optimise your enhancing by recognising you have failed enough that it is uneconomical/unlikely to reach the level you want with the potential you have left.