

OVERHAUL OF EXPERIENCE GAINS IN SACRED PHOENIX

Introduction

Based on the flat formula from the 4th generation, the gains for each eligible Pokémon can be summarized as:

$$\text{Experience gained} = \text{Base Exp} \times \text{Overkill} \times \text{Individual factors}$$

The Base Exp corresponds to everything that is strictly related to the defeated Pokémon, namely the battle conditions and its experience rate.

The overkill is related to the way the Pokémon was defeated: if the fatal blow was particularly powerful, it will give up 2 or 4 times more experience!

The individual factors correspond to influences of each Pokémon which receives its share of experience: if it's exchanged, holds an item influencing the experience, its level compared to the soft level cap...

Before dissecting each factor, let us note that in Sacred Phoenix ...

- Fainting Pokémons get their share of experience: it is no longer a reason to be excluded. (You also learn from your defeats.) On the other hand, the dead no longer get experience.
- All intermediate calculations are done in floating-point numbers. The passage in integer is done only at the very end by rounding.

Base Exp

Base experience is what will serve as the common core for all those who are eligible for experience gain.

$$\text{Base Exp} = \text{Master coef} \times \text{Exp Yield} \times \text{Level} \times \text{Battle factors}$$

Master coef (master factor):

Affects all experience gains, used to balance overall gains.

Is **0.1** in Sacred Phoenix. (**0.1429** before the 5th generation, **0.2** in recent games.)

It has been reduced to account for the many multipliers that can apply in battle factors.

Exp Yield (experience rate):

The core experience left by the defeated Pokémon. It is specific to each species. Worth about **50** for an unevolved form, **100** for an intermediate form and **200** for a final evolved form. Legendaries and Ubers easily exceed **300**.

=> Sacred Phoenix plans to readjust the values for each species so that they correlate with their tier and rarity (an Over Used will have a higher experience rate than a Never Used, as will a rare Pokémon if compared to a common Pokémon.)

Level:

The level of the defeated Pokémon. The experience it will give up is therefore proportional to it.

Battle factors:

The Battle Factor is anything related to the battle conditions. This includes:

-  The Experience O-Power
-  The battle category (wild or trainer)
-  The battle mode (single or multi)
-  The fight importance

They will be described in the following section.

Battle factors

Experience O-Power

The hero can incant an O-Power of experience that will take effect for 3 hours (time measured in the Keltios clock). As long as it is active, the overall experience gains will be increased by a factor of:

- ×1 without this O- Power
- ×1.25 with the level 1 spell
- ×1.5 with the level 2 spell
- ×2 with the level 3 spell

Rank, category and mode of fight

To this will multiply three other factors depending on the solemnity of the fight that takes place.

Battle Factor Chart:

Rank	Typical situation	Fight importance	Category and battle mode			
			Wild battle		Trainer battle	
			Single	Multi	Single	Multi
0	PvP and Battle Tower	Special	×0	×0	×0	×0
1	Classical battle	Normal	×1.0	×1.2	×1.5	×1.8
2	Mini boss	Important	×1.5	×1.8	×2.25	×2.7
3	Rivals and Legendaries	Important	×2.0	×2.4	×3.0	×3.6
4		Important	×2.5	×3.0	×3.75	×4.5
5	Boss	Very important	×3.0	×3.6	×4.5	×5.4
6	Final Boss	Very important	×4.0	×4.8	×6.0	×7.2

- A battle is of rank 1 by default. Any other rank is necessarily the result of a manual setting.
- Any unscripted combat (typically random encounters) is mandatory rank 1.
- The wild/trainer and single/multi bonuses are automatically applied by the game.

- A multi battle is anything that is not a single battle. In other words, whenever one side sends 2 or more Pokémon at a time.
- If the combat is special, neither Experience nor EVs are distributed. The calculations stop there.

About the fight importance - mod Loyalty Overhaul:

The importance of the fight (determined by its rank) gives a friendship bonus to the player's entire party upon victory.

Fight importance	Friendship bonus at the end of the fight			Impact on Fullness and Enjoyment †
	♥ < 200	200 ≤ ♥ < 500	♥ ≥ 500	
Normal	No friendship gain			-1 or -3 ‡
Important	+ 3	+ 6	+12	-20
Very important	+ 6	+12	+24	-45

=> Friendship gains are multiplied by 2 for the Pokémon if it participated in the battle.

† Applied even in case of flee or defeat. Only counted if the Pokémon participated in the fight and at the end of it.

‡ -1 if it was a wild battle, -3 if it was a trainer.

Overkill

One of the major features brought by the Death Overhaul mod is the appearance of a negative HP bar. If the difficulty settings make a Pokémon deadly, its health bar may fill with red from the right, reflecting the amount of excess damage it has taken beyond the fainting threshold. -100% of the maximum HP corresponds to a completely filled red bar, which means death for the Pokémon.

If the finishing blow succeeds in filling it sufficiently, the defeated Pokémon will give up twice or even four times as much experience for everyone who fought it!

Negative HP rate	Victim's status	XP Boost
< 75%	Fainted	×1
75% ≤ HP < 100%	Fainted on the verge of death	×2
100% (overkill)	Dead	×4 + loot if wild Pokémon*

* Bonus loot not yet coded

- Triggering these bonuses is impossible if the mortality of opposing Pokémon is disabled.
- In Keltios, killing a wild Pokémon is considered a hunting activity and will definitely get you its possible held item. If it doesn't, its remains will grant you Everstones, Fluffs or Leathers, three basic crafting ingredients.



- Killing a Pokémon results in a Friendship and Dread penalty* for the one who dealt the deadly blow, especially if it was a non-hostile trainer's creature. The higher the friendship level, the greater the penalty.

* The penalty is about -3 against a wild Pokémon and -10 against a trained Pokémon. Against a hostile trainer, the penalty is negligible (-1 most of the time). (See the [Loyalty Overhaul documentation](#) for exact values.)

Excess damage mitigation:

To avoid uncontrollable loss of friendship due to overkill, an automatic excess damage mitigation mechanism is implemented: the more beloved the Pokémon feels, the more it will moderate the impact of the fatal blow by itself.

Friendship level	Mitigation of excess damage
♥ < 500	Nil
$500 \leq \text{♥} < 700$	33%
$700 \leq \text{♥} < 1000$	50%
♥ ≥ 1000	50% + mercy



Mercy means that the attacking Pokémon will always let its victim survive at least 1 HP from death if the killing blow is neither a Z-Move nor an attack performed in Aggressive Stance.

If the defeated Pokémon survives as a result of excess damage mitigation, a sentence will notify that whoever delivered the finishing blow spared it out of mercy.

A side effect of mitigation is that it reduces the chances of getting the overkill bonus, but it allows you to preserve the friendship of your Pokémons (and not worry about the strike force if your love-bathed creature has become merciful).

Individual factors

These factors individually weight the experience each Pokémon will receive.

$$\text{Indiv. factors} = \text{Presence ratio} \times \text{Outsider} \times \text{Friendship} \times \text{Lucky Egg} \times \text{Soft level cap}$$



Presence ratio

The presence ratio is the first individual factor calculated. It is defined as:

$$\text{Presence ratio} = [\text{Pasts turns} / \text{Cumulative turns} / \text{Exp Share boost}].\text{max}$$

Pasts turns:

Number of turns the Pokémon receiving experience spent in front of the defeated Pokémon.

Cumulative turns:

The number of turns each of your side's Pokémon has accumulated in front of the defeated Pokémon on the opposite side (defeating an ally doesn't pay off).

Example: In a single battle, if on turn 1, Pokémon A is switched by a Pokémon B, and this Pokémon B takes 3 turns to defeat the opponent, Pokémon A will have a presence ratio of 1/4 and Pokémon B a ratio of 3/4. They will receive 25% and 75% of the XP respectively.

Note: This is the vanilla behavior of the starter kit used in this fan-game. In the official Pokémon game, the experience is divided equally between all Pokémon that have seen the defeated one at least once.

Note 2: If the opposing trainer recalls his Pokémon and then sends it back, it doesn't reset the list of Pokémons that faced it (which is the case in the official game).

The Gems of Knowledge (Exp Share boost)

The bonus of the Exp Share kind items is calculated at the same time. If the rate guaranteed by these items is higher than the presence ratio, this value will be taken into account.

Giving a Gem of Knowledge is a good way to grant EVs and experience to a Pokémon without taking the risk of sending it into battle.



Stone of Knowledge

- If this item is held, guarantees a **presence ratio of 0.25** from the defeated Pokémon. It will be offered to you soon enough by Aerouna, as soon as you arrive in Gortelda.



Crystal of Knowledge

- If this item is held, guarantees a **presence ratio of 0.5** from the defeated Pokémon. You will find it in the sanctuary of the Fairy Mirror next to Fearnos.



Jewel of Knowledge

- If this item is held, guarantees a **presence ratio of 1** from the defeated Pokémon. It will be given to you by the High Priest of the Lake Guardians in Collia.

Uxie's Jewel (aka the Omni Exp or Exp All)

This is the Exp Share as it exists since the 6th Generation. Key item of the bag, activating it guarantees a presence ratio equal to:

- **1** for all of your Pokémon that fought the defeated creature. They will therefore receive the full base experience (multiplied by any overkill bonus).
- **0.5** for all other Pokémon on your party

It will be given to you by the Augur of the Lake Guardians in Collia after defeating the League of Keltios (so in post-game).

Enabling the Assist Mode in the difficulty settings will have the same effect as the Uxie's Jewel.

In summary, we get this table:

Held item	Minimum presence ratio
Stone of Knowledge	0.25
Crystal of Knowledge	0.5
Jewel of Knowledge	1
Uxie's Jewel (key item) or Assist Mode, effect on all party members	0.5 if the Pokémon has not fought 1 if it fought

Needless to say, the Uxie's Jewel (or the Assist Mode) will increase your earnings tenfold (and make the Stone of Knowledge and the Crystal of Knowledge obsolete). That's why it will only be given at the end of the game.

... and why this item has made the official Pokémon games so much easier, as all this multiplies with the bonuses that follow! (Even in vanilla!)

Vanilla Factors

Outsider Pokémon:

An **outsider** (traded) Pokémon has its experience gains multiplied by **1.5**.

Any Pokémon that does not have the same trainer's name or trainer ID is defined as outsider.

Sacred Phoenix does not support the nationality system, and it is not planned. So, the ×1.7 bonus does not exist.

Friendship Bonus:

A Pokémon that has a Friendship of **700** or more (2 hearts or more) has its experience gains multiplied by **1.2**.

Lucky Egg:

A Pokémon holding a **Lucky Egg** has its experience gains multiplied by **1.5**.

Soft level cap

Pokémon Sacred Phoenix has a soft level cap based on the player's progression in the main quest. This progression is measured through **the number of Talismans** and determines the experience multiplier to be applied according to the current level of its Pokémon.

The multipliers are:

×0.5 in case of overleveling. The malus will not go beyond that, but the loyalty will be impacted.

×1 if the player's Pokémon is within the recommended level range.

×2 if the player's Pokémon is under-levelled.

×4 if the player's Pokémon is clearly under-levelled (about 10 levels behind)

×8 if the player's Pokémon is completely under-leveled (more than 15 levels behind).

This mechanism replaces the scaled formula that appeared in 5th Generation, which has the flaw of being based on the level of the opposing Pokémon rather than the player's progress.

The exact levels of soft level cap and the reasons for this choice of game design are described in this dedicated 2-page PDF:

[www.sacredphoenix.fr/res/Telechargements/PDF/GDD/Soft_level_cap Sacred Phoenix_EN.pdf](http://www.sacredphoenix.fr/res/Telechargements/PDF/GDD/Soft_level_cap_Sacred_Phoenix_EN.pdf)

 **Note:** there is of course a **hard level cap** which corresponds to **level 100**. A Pokémon which has reached this level will no longer receive experience (and no sentence will announce any gains for it), but it will continue to receive EVs from as long as its presence ratio is not zero.

Experience distribution

Experience Quotes

Now that the gains are calculated for each of your creatures, it's time to announce them! As in any Pokémon game, a sentence is displayed for each Pokémon that gets a piece of the pie.

If your Pokémon has faced the defeated opponent for at least one turn:

Situation	Sentence displayed
• Gain a single experience point (always)	[Pokémon] gained 1 Experience Point!
• Experience gain without any bonus • Lucky Egg + overlevel malus • Outsider Pokémon + overlevel malus	[Pokémon] gained [number] Exp. Points!
• Boost ×2 of underlevel • Fainted on the verge of death + overlevel malus • Lucky Egg • Outsider Pokémon • Lucky Egg + Outsider Pokémon + overlevel malus	[Pokémon] gained a total of [number] Exp. Points!
• Boost ×4 of underlevel • Fainted on the verge of death (unless overlevel) • Lucky Egg + Outsider Pokémon (unless overlevel)	[Pokémon] gained a boosted [number] Exp. Points!
• Boost ×8 of underlevel (always) • Overkill (always)	[Pokémon] gained a critical boost of [number] Exp. Points!

If your Pokémon has not faced the defeated opponent at least once but gains experience from a Gem of Knowledge:

Situation	Sentence displayed
• The Pokémon holds the Stone of Knowledge	The Stone of Knowledge offers some [number] Exp. Points to [Pokémon].
• The Pokémon holds the Cristal of Knowledge	The Cristal of Knowledge offers [number] Exp. Points to [Pokémon].
• The Pokémon holds the Jewel of Knowledge	The Jewel of Knowledge offers a boosted [number] Exp. Points to [Pokémon].
• The Uxie's Jewel is owned and activated. • There is at least one Pokémon that has neither fought nor held a Gem of Knowledge.	The rest of your team gained Exp. Points thanks to the Uxie's Jewel! (Displayed only once per defeated Pokémon)
• The Uxie's Jewel isn't owned and activated. • The Assist Mode is enabled. • There is at least one Pokémon that has neither fought nor held a Gem of Knowledge.	The rest of your team gained Exp. Points! (Displayed only once per defeated Pokémon)

- If the presence factor is 0, the Pokémon receives no experience or EVs and no phrase is displayed.
- Any gain in experience systematically leads to a gain in EV.
- No sentence is displayed if a Pokémon eligible for experience has already reached level 100 (but will still get EVs).

EVs

The EVs in Sacred Phoenix are much more extensive than in the official game.

- The maximum per stat is **640** (instead of 252 in Vanilla). (I hesitate to go up to 768).
- The maximum cumulative on all stats is **1600** (instead of 510 in Vanilla).

This rewards long-term training of the same Pokémon (as in the first two generations) and mitigates the stats gap between a Poorly Used and an Uber with a maximum of **392 bonus points** that can be distributed at level 100 (compared to **127** in Vanilla).

The EV gain potions are of course adapted to this change and will give more EVs (the most powerful version will give 128 at once).

Another major change is the **EV overload**: above 256 on the same stat, it will no longer take 4 points but 8 EV points to raise the stat by one in level 100.

It is thus a piecewise linear function which, beyond the threshold of 256, decreases the progression by 50%.

Thus, the player will be able in both extreme cases:

- Maximize his 6 stats as in the first two generations by favoring a perfect distribution (which will give +64 on each of them + a remainder of 64 EVs allowing to add 8 points of stat to the places of his choice).
- Or on the contrary, concentrate on 2 stats + partially a third one which will be overloaded. The 2 overloaded stats with the maximum of 640 EVs will have 112 bonus points at level 100 and the third will have +72 points with the remaining 320 EVs. We then have only 296 bonus points instead of 392, but this is the price to pay for specialization.

The fact that an overloaded stat rises less quickly encourages a more homogenous distribution of EVs rather than the classic 252+252+4 that are seen in 80% of vanilla strategy sets. This will give more variety on optimal distributions.

Power items:

For each Pokémon defeated with a non-zero presence ratio, any “power” item held will give a bonus of 4 EVs on the stat it strengthens.

These items are:

- The Power Weight for HP
- The Power Bracer for Attack
- The Power Belt for Defense
- The Power Lens for Special Attack
- The Power Band for Special Defense
- The Power Anklet for Speed
- The Macho Brace, meanwhile, doubles the EVs earned in battles.

Experience candies

Sacred Phoenix does not provide for Rare Candies or Exp Candies (even though Rare Candies are present in the realm of Arceus or obtainable by cheating).

Instead, I prefer to implement NPC trainers who offer their services at fixed locations. The Pokémon Day Care is also a very good alternative at low level.

Either way, “artificial” level gains will be subject to a hard level cap which will prevent your Pokémon from exceeding the overlevel level.

Regarding leveling up via Rare Candy or a similar mechanic, it will actually give 100% of a level. This prevents waste when the Pokémon was at 99% progress before the next level and ultimately only gains 1% of this gauge by eating its treat.



(Trivia) What Sacred Phoenix originally planned in 2018

The experience was to be distributed “in real time”: as soon as any of these actions occurred, the blue XP bar was incremented.

- **The Pokémon discovers a new opponent:** 6% of the Base Exp, capped at 20% of the experience gauge of the current level because it is distributed immediately. (This can lead to a level increase or even an evolution from the beginning of the fight as we see in the Anime).
- **The Pokémon uses a skill:** 20% of the base experience of the opposing Pokémon that gives the most (even if it is not the target).
- **The Pokémon takes an attack:** 20% of the attacker’s base experience.
- **The opposing Pokémon is defeated:** 50% of the base experience of the defeated Pokémon, multiplied by the overkill bonus and divided equally among all those who fought it. Those

holding Exp Share items received the same rate, half or a quarter depending on the quality of the item.

The first three cases were done silently (no sentence announcing the gain, just the XP bar rising discreetly). When the 4th case occurred, the exact value of the experience gain was announced and the remaining difference was visibly returned.

This first Ideal was much more complicated to code. Distributing the earnings due only when the opposing Pokémon falls would simplify the task, but will require keeping a record of the exact earnings pending for each Pokémon.

In the end, I stayed on the vanilla presence ratio of my game engine, because it is relatively close to my original idea.

Experience curves

Distribution of experience groups

The changes are not limited to experience earnings: the distribution of the experience groups has also been redone!

Indeed, the official distribution is quite chaotic... Except for the Legendaries which inherit the Slow curve and the starters of the Parabolic, there is no logic for the other Pokémon.

Sacred Phoenix reshuffles the deck: the experience group now correlates with the most powerful evolutionary form of each family. Thus, a species with low potential will be compensated by a faster progression in levels, while those at the top of the food chain will have a slower growth: a high potential takes time to develop!

The distribution of experience groups according to the evolutionary families are listed [in the Excel of Keltios Pokédex](#).

The different experience curves

At the same time, a small adjustment has been made to the six existing curves. All of them now follow a formula based on cubic power in order to guarantee a homogeneous progression.

Name of the curve	Experience required (formula)	Experience at level 100	Tier of the Pokémon's evolved form (general case)
Very fast	$0.6 \times \text{Level}^3$	600,000 XP	Poorly Used
Fast	$0.8 \times \text{Level}^3$	800,000 XP	Never Used
Medium	$1 \times \text{Level}^3$	1,000,000 XP	Rarely Used
Quite slow	$1.1 \times \text{Level}^3$	1,100,000 XP	Under Used
Slow	$1.25 \times \text{Level}^3$	1,250,000 XP	Over Used
Very slow	$1.5 \times \text{Level}^3$	1,500,000 XP	Uber / Anything Goes

The Very fast curve replaces the Erratic curve.

The Quite slow curve replaces the Parabolic (Medium slow) curve.

The Very slow curve replaces the Fluctuating curve.

To determine the exact experience needed at a level, the result is always rounded down.