

DAMAGE CALCULATION

CLASSICAL DAMAGE CALCULATION

In order to limit rounding bias, the official damage formula has been slightly adjusted. The most notable change is that all intermediate calculations are done in floating point (decimal number). Also, some factors influencing the total damage have been moved to other categories in the formula.

Damage formula

$$\text{Damage} = [0,02 \times \text{Power} \times \text{STAB} \times \text{Level factor} \times \text{Attack} / \text{Defense} | 1].\text{max} \\ \times \text{Affinity} \times \text{Critical hit} \times \text{Modifiers} \times \text{Damage roll}$$



Power

The real power of the attack taking into account:

- Ability boosts impacting specific moves without involving the choice of a target (Technician, Overgrow, Blaze, Torrent, Aerilate, Sand Force, Fairy Aura ...)
- Held items impacting specific capacities or a specific type (Plates, Gems, Charcoal, Griseous Orb, Metronome ...)
- The influence of the weather and the battlefield (Field Effects, Mud Sport, Water Sport ...).
- Buffs and debuffs from other moves that impact power (Electric move after Charge, Defense Curl over Rollout ...)
- Situations that are related to the move and vary its power (Eruption, Water Spout or Wring Out which depend on a HP rate; Gyro Ball or Electro Ball which are tied to a speed ratio; number of times an attack with consecutive blows could be linked ...)
- Except for the attacks which have a power range, any element that involves the choice of a target is not taken into account here and will be calculated in the last modifier.



STAB

Same type attack bonus: worth 1.5 if the launcher is of the same type as the attack and 2 if he has the Adaptability ability in addition. Otherwise, it is worth 1. (Indirectly, it's a boost to the power of the attack).



Level factor

Power bonus based on the level of the Pokémon. Worth $2 + 0.4 \times \text{launcher's level}$. Keeping the float point avoids a threshold effect every 2 or 3 levels.

Attack

True Attack of the launcher (or Special Attack if the attack is special) taking into account if the attacker has to ignore some changes (Critical hits, Unaware ...)

Enter in this calculation:

- The base stat (not modified)
- The stat stage (any malus here is ignored if there is a critical hit)
- The burn malus
- The held item if it directly impacts the stat (Life Orb, Choice Band, Choice Specs, Muscle Band, Soul Dew ...)
- The ability if it directly impacts the stat (Huge Power, Guts, Hustle, Slow Start, Flower Gift, Solar Power, Plus, Minus ...)

Defense

True Defense of the target (or Special Defense if the attack hits on special) taking into account if the defender has to ignore some changes (Critical hits, Unaware ...)

Enter in this calculation:

- The base stat (not modified)
- The stat stage (any bonus here is ignored if there is a critical hit)
- The weather bonus and field effects (Special Defense $\times 1.5$ if Rock Pokémon under the sandstorm)
- The held item if it directly impacts the stat (Eviolite, Assault Vest, Deep Sea Scale, Metal Powder, Soul Dew ...)
- The ability if it directly impacts the stat (Marvel Scale, Fur Coat, Multiscale, Shadow Shield, Flower Gift ...)

** At this stage of the calculation, if the result is less than 1, we bring back to 1 **

Affinity

True affinity factor as calculated by Effectiveness overhaul. Varies from -0.5 (negative affinity, absorption) to 4 (extremely effective attack, maximum possible). If the result is less than or equal to 0.125 (immunity threshold), the damage will be nullified downstream.

Do not forget that the affinity impacts the probability of harmful side effects if the target is different from the launcher. It is therefore an important value.

Are included in the affinity:

- The relations in the type chart
- Possible changes of affinity specific to certain attacks (Freeze-Dry, Scald, Flying Press ...)
- Grass-type immunity to powder and Ghost-type immunity to debuffs of their type.
- Abilities that modify the effectiveness of one or more types on a defending Pokémon: Water Absorb, Wonder Guard, Flash Fire, Thick Fat, Solid Rock, Levitate, Fluffy (only for the Fire-type here), Heatproof, Dry Skin, Tinted Lens ...
- The tarring debuff (double the affinity to the Fire-type).
- Items or effects that deactivate an immunity (usually turned into a simple weakness, except with the Ring Target where it becomes a normal weakness).

– Anti-damage Berries when activated. (They reduce affinity by 62,5%, so damage at the same rate.)

– When a frozen attacker launches a move that thaws and must sacrifice part of its power to free itself from the ice. (Affinity is divided by 2.)

The Neuroforce ability and the Expert Belt item are the only exceptions and are counted in the modifier at the end of the formula (because the impact is on the launcher's side).



Critical hit

Critical bonus if a critical hit is scored. Is worth 1.5 or 2 if the attacker has the Sniper ability. Is worth 1 if there is no critical hit.



Modifiers

Factors influencing the damage of the attack but not included in the definition of its power, nor in the affinity, nor in the offensive or defensive stats.

Included here are:

- The screens (Reflect, Light Screen and Aurora Veil)
- Power scattering malus when more than one enemy is targeted while sparing allies ($\times 0.667$ if two enemies, $\times 0.5$ if 3 or more enemies).
- The Friend Guard ability
- The Neuroforce ability
- The Rivalry ability (the malus is removed, so it's either neutral or positive for damage.)
- The Stakeout ability
- The Analytic ability
- The Expert Belt item
- The Fluffy ability if the attack suffered is a melee move.
- A target vulnerable to certain moves by being minimized or out of range
- The boost from Me First and Helping Hand
- The 0.25 factor for the second strike of Parental Bond
- The factor of 0.25 in case of partial bypass of Protect



Damage Roll

Randomly selected integer between 85 and 100 (inclusive), then divided by 100.

Consequences of this new calculation method

- Each point of difference on a stat has an influence on the damage expectation (disappearance of all threshold effects).

- There is no more addition, only multiplications. Reversing the order of the factors has almost no impact (and even none if the first part of the formula gives a result greater than 1). So, a $\times 2$ multiplier will really double the damage wherever it is.

- At very low damage values, the increase caused by the absence of truncations is compensated by the disappearance of the “+2 damage” at the beginning of the formula, replaced by a “minimum 1”. The results are thus very close to the official formula.

- At medium and high levels of damage, the absence of truncation increases the damage expectation very slightly (on the order of +3%).

Post-damage adjustments

The formula here gives the raw damage. The result must be processed one last time to get the final damage.



Passage to integer

- If the value is zero or negative, we are in a case of immunity or absorption. The final result will be 0.
- If not, the value is truncated. If the result is 0, it is set to a minimum of 1.



Loyalty Overhaul mitigations – final damage calculation

- If a substitute doll has taken the attack instead of the target, the damage will be at the maximum of the decoy's HP and will be definitive. (The calculation stops there.)
- If the attack must leave the opponent at least 1 HP (False Swipe), the damage will be capped at the remaining HP - 1. The Struggle attack, on the other hand, limits the damage to the remaining HP.
- If there is excess damage, high friendship from the launcher will mitigate it by a third or half.
- If the targeted Pokémon is able to take the attack with 1 HP (regardless of the reason: Friendship, Endure, Focus Sash ...), the damage will be capped at the remaining HP - 1.

** At this stage of the calculation, if the attack is not or no longer fatal, the damage is final **

- If the attacker is bathed in love and sees that its attack was lethal (except if aggressive stance or Z-Move), the damage will be capped at remaining HP + max HP - 1. The target will survive and a message of mercy will be displayed. This message will also be displayed if the natural one-third or one-half excess damage mitigation has turned an initially deadly hit into non-deadly.
- If the defending Pokémon's Friendship is strong enough, and the lethal attack didn't inflict more than 2 times its max HP, it has a chance to survive. If the result is favorable, the damage will be capped at remaining HP + max HP - 1 and it will survive being KO'd on the verge of death.
- If the Pokémon can't die for scriptural reasons ("immortal" tag), the damage is capped at remaining HP + max HP - 1 and a phrase of survival by fate is displayed.
- If the attack is definitely deadly, the consequences will be applied and the appropriate messages displayed.

** The damage is definitely returned (whether the attack was fatal or not). **

Finally, HP are decremented. A final limit is set at the very bottom.

- If the Pokémon is not mortal, the HP loss and HP bar animation will not go below 0.
- If the Pokémon is mortal, the HP loss and the animation of the HP bar will not go below the -max HP (full red bar).

BIND DAMAGE

When a Pokémon is immobilized by a Bind kind attack, 5 parameters are recorded:

- The launcher of the attack and therefore its characteristics (held item, Attack stat ...)
- The name of the immobilizing move
- The type of the immobilizing move
- The category (Physical or Special) of the immobilizing move
- The victim and therefore its characteristics (Defense stat, held item ...)

All these parameters have an impact on the damage inflicted and animations.

Hybrid damage formula

$$\text{Damage} = (\text{HP}_{\max}/16 + (\text{HP}_{\max}/16) \times \text{Field} \times \text{Atk}_{\text{im}} / \text{Def}_{\text{target}}) \times \text{BB}_{\text{bonus}} \times \sqrt{\text{Affinity}}$$

Everything is calculated in floating numbers.

The change to an integer is made only at the end, by truncation.

If the result is 0, we set it to 1, except in case of null or negative affinity.

HP_{max} / 16

Fraction of one-sixteenth of the victim's HP.

Compared to the vanilla formula, it's a 1/8th split in two: one half (almost) flat and another half that will be weighted by an attack / defense ratio and a field factor.

Field

The climatic influence and the field effects are included in the weighted part.

For the moment, only rain and sunlight impact the power, which results in the addition of a factor:

Move	Torrential rain	Rain	Sun	Scorching sun
Fire Spin and Magma Storm	×0	×0.5	×1.5	×1.5
Whirlpool and Clamp	×1.5	×1.5	×0.5	×0

Nothing else is impacted for the moment but it could diversify with the "Field Effects". (For example, a Sand Tomb will be reinforced on a sandy ground).

Atk_{im} = Attack (or Special Attack) of the immobilizer

True Attack from whoever immobilized the Pokémon. The true Attack takes into account all modifiers, including abilities or held items. (An immobilizer holding a Life Orb will thus boost the indirect damage of its immobilizing attack).

Of course, the Special Attack stat is used if the immobilizing attack was special.



Def_{target} = Defense (or Special Defense) of the target

True Defense of the trapped Pokémon. The true Defense takes into account all modifiers, including abilities or held items. (A trapped Pokémon holding a functional Eviolite will thus reduce the indirect damage it takes.)

Of course, the Special Defense stat is used if the immobilizing attack was special.



BB_{bonus} = Binding Band bonus

Is equal to **1.333** if the launcher is holding the Binding Band item, **1** otherwise.

Note that this is rechecked each round: if the launcher loses its Binding Band, the bonus is also lost.



Affinity

The Affinity is the affinity of the target Pokémon to the immobilizing move's type. All affinity factors are taken into account, except for Anti-Damage Berries, which do not apply to indirect damage. It is raised to the square root in order to limit the amplitude.

Note that affinity is recalculated each turn: if the target's affinity is modified (for example by undergoing a Soak attack), this will immediately impact the bind damage inflicted.

Zero or negative affinity will result in the immobilizing attack being interrupted. Thus, a Pokémon trapped in Sand Tomb can break free if it finds a way to become airborne.

Affinity determines the damage sound and the phrase displayed when the victim takes bind damage.

Consequences of this new calculation method

The vanilla formula is a fixed fraction of 1/8th of the target's max HP (1/6th with the Binding Band).

This has the disadvantage of allowing a Pokémon that is very weak in level or attack to inflict enormous damage (compared to the strength of its opponent). On the other hand, in case of level advantage (typical case in adventure), it makes these moves uncompetitive.

Also, affinity is not taken into account at all, so a Whirlpool will inflict as much indirect damage to a Fire / Rock type as a Fire Spin. The initial damage, often negligible compared to the damage over time (except with Magma Storm), does not compensate.

Finally, on the PvP side, if a player switches to an immobilizing attack, his Pokémon will always lose its eighth of HP per turn, except in rare cases of immunity. We lose the "who's going to take it better?" aspect that is present with a classic offensive attack.

Sacred Phoenix's hybrid formula corrects these flaws while not straying too far from 1/8th thanks to a semi-fixed half. The choice of immobilizing attack has a real impact on the overall damage dealt. If the initial hit damage is great, the damage over time will be great too.

SCREEN DAMAGE MITIGATION

The damage mitigation by screens is slightly modified, especially in case of critical hit.

- The screens protect a little better in case of multi battle.
- In case of a critical hit, the effect of the screen is only cancelled by half.

=> Both changes go into improving their effects.

Here are the exact values:

	<i>No critical hit</i>	<i>Critical hit</i>
Single battle	× 0,5 (vanilla: ×0.5)	× 0.75 (vanilla: ×1)
Multi battle	× 0,6 (vanilla: ×0.667)	× 0.8 (vanilla: ×1)