

arena round stats(4 nerds)

badger code

2023-07-20

enemy data table:

Name	Health	Damage	Skill
Goblin	50	10	Pilger
Troll	100	20	Troll's Blood
Werewolf	175	35	Howl
Vampire	350	50	Seduce
Dragon	500	60	Hellfire
Lich	700	70	Paralyze
Math Teacher	999	99	Fail

line of best fit(using linear regression) for enemies' values:

$$\begin{cases} y_{enemy_health} = (156.1 \times x_{round}) - 214 \\ y_{enemy_damage} = (14 \times x_{round}) - 6.857 \end{cases}$$

stats. abt. da round:

$$\begin{aligned}
 \text{improvement} &= \sum_{a=1}^a \left(\left(\underbrace{20}_{\text{health multiplier}} \times \underbrace{a}_{\text{round}} \right) + \underbrace{100}_{\text{player.health_max}} \right) + \\
 &\quad \sum_{a=1}^a \left(\left(\underbrace{10}_{\text{damage multiplier}} \times a \right) + \underbrace{10}_{\text{player.damage}} \right) \\
 \text{adversity} &= \sum_{a=1}^a \left(\left(\underbrace{156.1}_{\text{health multiplier}} \times \underbrace{a}_{\text{round}} \right) + \underbrace{-214}_{\text{health constant}} \right) + \\
 &\quad \sum_{a=1}^a \left(\left(\underbrace{14}_{\text{damage multiplier}} \times a \right) + \underbrace{-6.857}_{\text{damage constant}} \right) \\
 \text{vec} &= \{ \text{improvement}, \text{adversity} \} \\
 \text{difficulty} &= |\Delta \text{vec}|
 \end{aligned}$$

ex.:

$$\begin{aligned}
 \text{improvement}_7 &= \sum_{a=7}^a \left(\left(\underbrace{20}_{\text{health multiplier}} \times \underbrace{a}_{\text{round}} \right) + \underbrace{100}_{\text{player.health_max}} \right) + \\
 &\quad \sum_{a=7}^a \left(\left(\underbrace{10}_{\text{damage multiplier}} \times a \right) + \underbrace{10}_{\text{player.damage}} \right) \\
 &\quad = 320 \\
 \text{adversity}_7 &= \sum_{a=7}^a \left(\left(\underbrace{156.1}_{\text{health multiplier}} \times \underbrace{a}_{\text{round}} \right) + \underbrace{-214}_{\text{health constant}} \right) + \\
 &\quad \sum_{a=7}^a \left(\left(\underbrace{14}_{\text{damage multiplier}} \times a \right) + \underbrace{-6.857}_{\text{damage constant}} \right) \\
 &\quad = 969.843 \\
 \text{vec}_7 &= \{ \text{improvement}_7, \text{adversity}_7 \} \\
 \text{difficulty}_7 &= |\Delta \text{vec}| \\
 &= |320 - 969.843| \\
 &= \boxed{649.843} \text{Hard}
 \end{aligned}$$

difficulty chart:

qualitative	quantitative
Easy	0-199
Medium	200-499
Hard	500+

difficulties:

round	difficulty
1	190.757
2	50.657
3	89.443
4	229.543
5	369.643
6	509.743
7	649.843

difficulty per arena round

