

# Proposed ELO rating for PUGs

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## Actual score

A team's score can range from 0.0 to 1.0 and the sum of both team's scores always equals 1.0. The closer the scores are to 0.5 the more evenly matched both teams were. The proposed scoring (Table 1) can be adapted to include flag captures if necessary.

Table 1: Scoring

	Winner	Loser	Tie
3 maps	0.6	0.4	-
2 maps	0.75	0.25	0.5
1 map	1.0	0.0	-

## Expected score

A teams rating is the average rating of its players:  $R_a = \langle \vec{r}_a \rangle$ ,  $R_b = \langle \vec{r}_b \rangle$ . If a player doesn't have a rating yet he is assigned a rating of 1000. A difference of 200 rating points would mean that the stronger team has an expected score of approximately 0.75. The expected scores (using the logistic curve):

$$E_a = \frac{1}{1 + 10^{(R_b - R_a)/400}}$$

$$E_b = \frac{1}{1 + 10^{(R_a - R_b)/400}}$$

## New rating

With the actual scores ( $S_a, S_b$ ) and the  $k$  factors (see below) of the individual players in each team ( $\vec{k}_a, \vec{k}_b$ ) the updated ratings are

$$\vec{r}_a' = \vec{r}_a + \vec{k}_a (S_a - E_a)$$

$$\vec{r}_b' = \vec{r}_b + \vec{k}_b (S_b - E_b)$$

## K-factor

The  $k$  factor of a player depends on his rating (Table 2). This is multiplied by

$$1 + 1.2^{10-N}$$

with  $N$  the number of matches played by that player. That way the changes in ELO for a newly rated player (roughly the first 20 games) are more volatile in the beginning and slowing down when more data is available.

Table 2: K-factor

Rating	K-factor
<2100	32
2100-2400	24
>2400	16