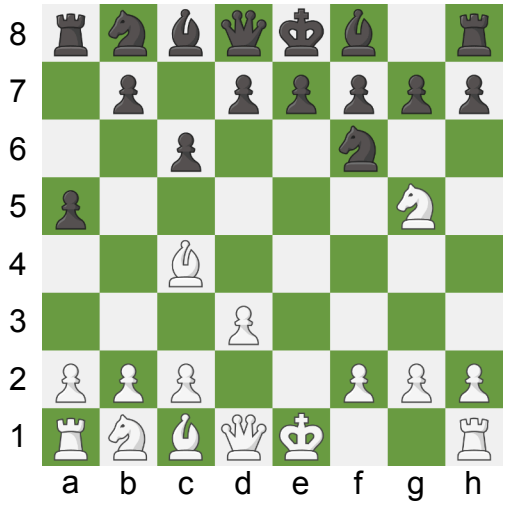
5. Elo Rating System

The Elo rating system was developed by a physicist name Arpad Elo.

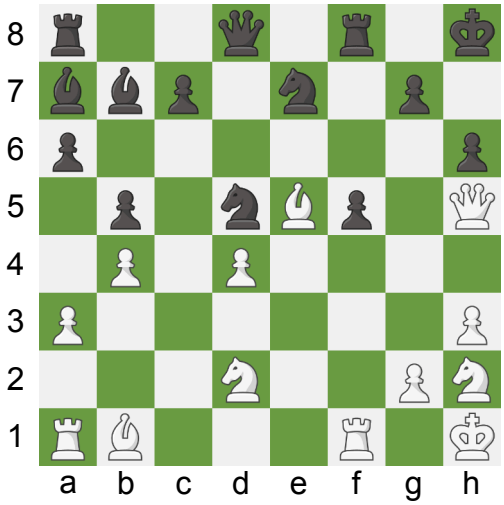
- A player with a 400 Elo advantage is 10 times more likely to win the game.
- The points lost by one player are gained by their opponent.
- When the outcome is what the ratings predict, then the rating change is small, but when the outcome is unlikely, a larger number of Elo points change hand. Strong players gain few Elo points from weaker opponents.

Challenge Puzzles

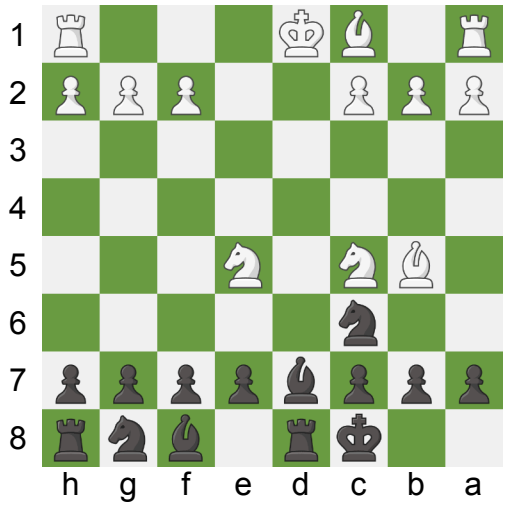
① White to play - mate in 1.



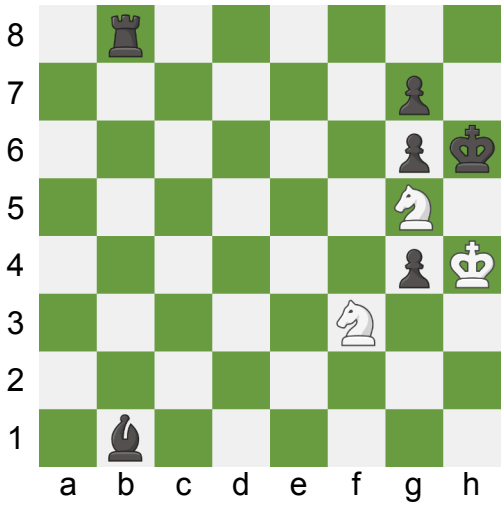
② White to play - mate in 2.



③ Black to play - mate in 2.



④ White to play - mate in 2.



Hints.

① There is only one piece that can check the king.

② Use the queen.

③ Look for a double check.

④ The black king is trapped and can't move.

Answers.

① 1. ♗xf7 # 1-0

② 1. ♕xh6+ ♔g8 2. ♕xg7 # 1-0

③ 1. … ♗g4+ 2. ♔e1 ♖d1 # 0-1

④ 1. ♘e5 Then checkmate on with ♘g4 or ♘f7 depending on black's response.

♔♕♖♗♘♙ ♚♛♜♝♞♟

This is how X's Elo score is updated after playing against Y:

- Let N be the difference of X's and Y's Elo ratings prior to the game (i.e., positive if X's rating was higher, and negative if Y's rating was higher).
- Calculate X's predicted odds of winnings: odds = $10^{N/400}$
- Calculate X's predicted winning probability: p = odds / (odds + 1)
- Take 16p Elo points from X.
- If X wins, give 16 Elo points to X.
- For a draw, give 8 Elo points to X.