

Retrograde Analysis

Ishwar Suriyaprakash

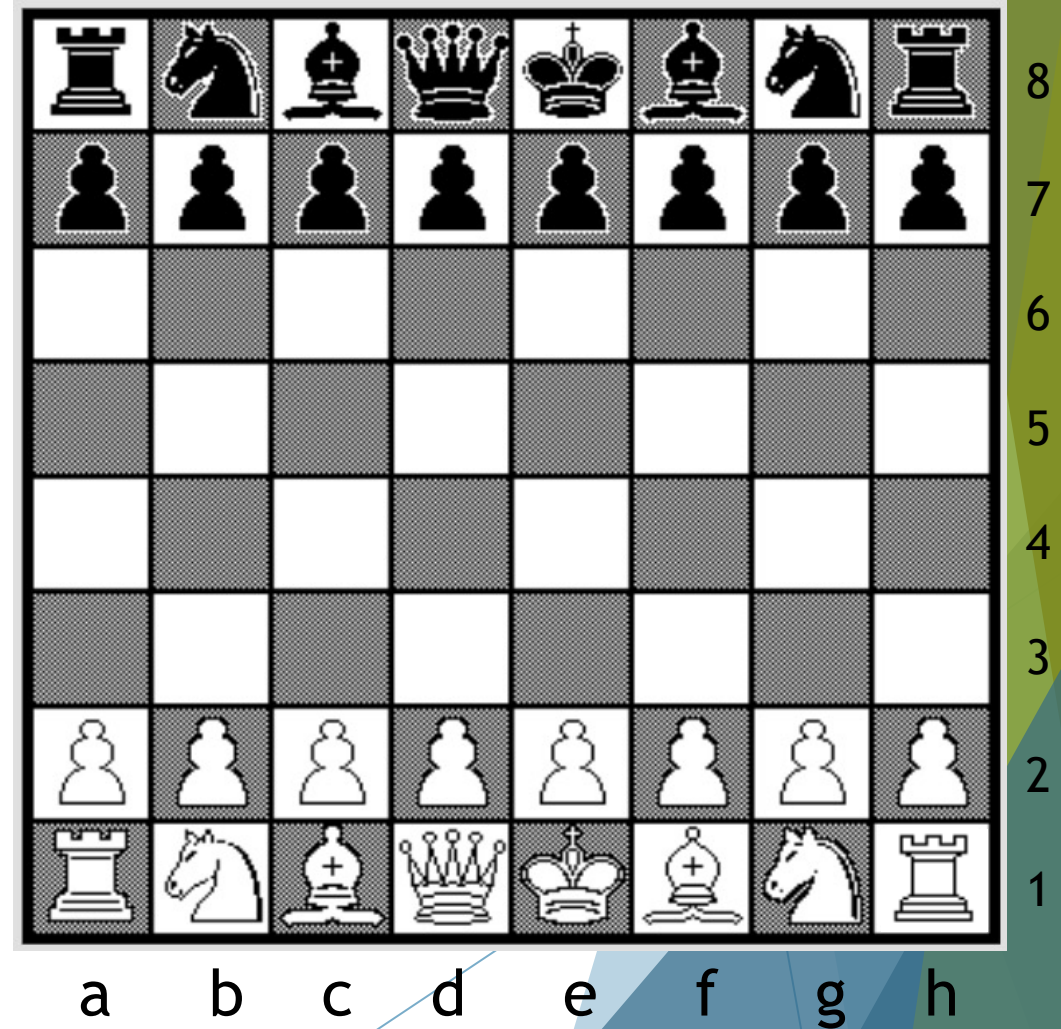
Pictures & examples from www.janko.at/Retros/PedagogicalCollection.htm

What is Retrograde Analysis?

- ▶ Strategy used in game theory to aid decision making
- ▶ Analysis of what could have resulted in a specific state
- ▶ Work backwards from end state to prior choices
- ▶ We will see examples in Chess today!
 - ▶ Assume only that players play legally

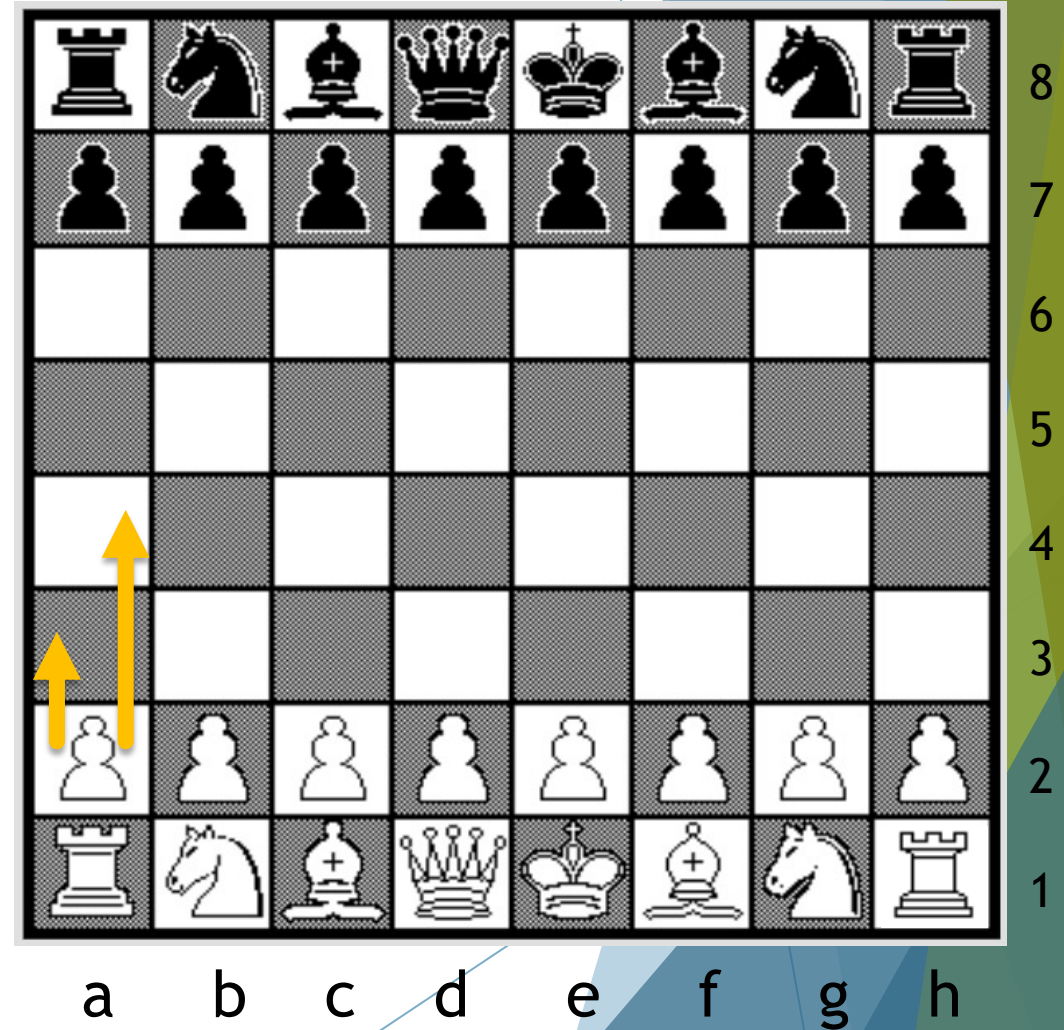
Basic Rules of Chess

- ▶ 8 x 8 checkered board
- ▶ Two players - Black & White
- ▶ 16 pieces per player
- ▶ Each piece has defined legal move
- ▶ Goal is to trap the opponent King



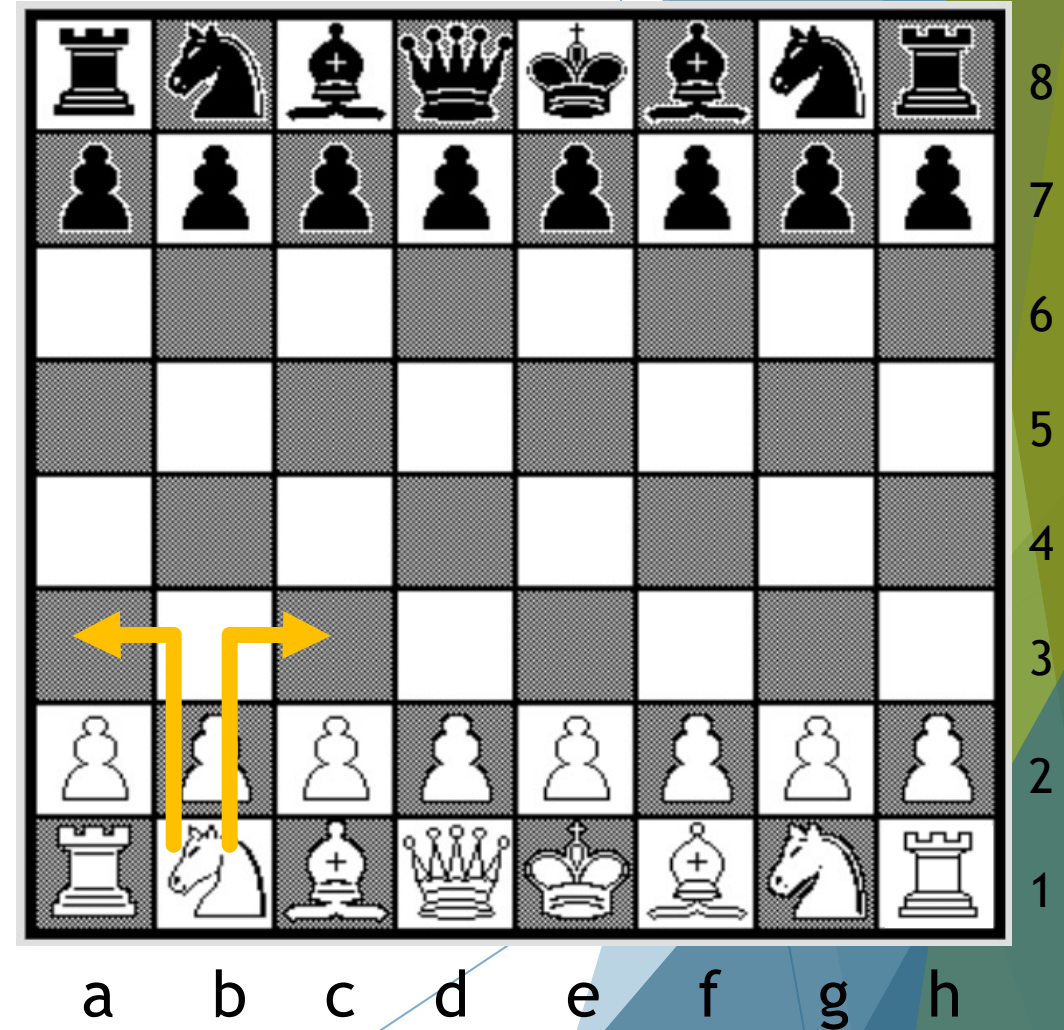
Legal moves of pieces

- ▶ 8 Pawns
 - ▶ Moves 1 or 2 squares at start
 - ▶ Only one square thereafter
 - ▶ At 8th row, converts to another piece



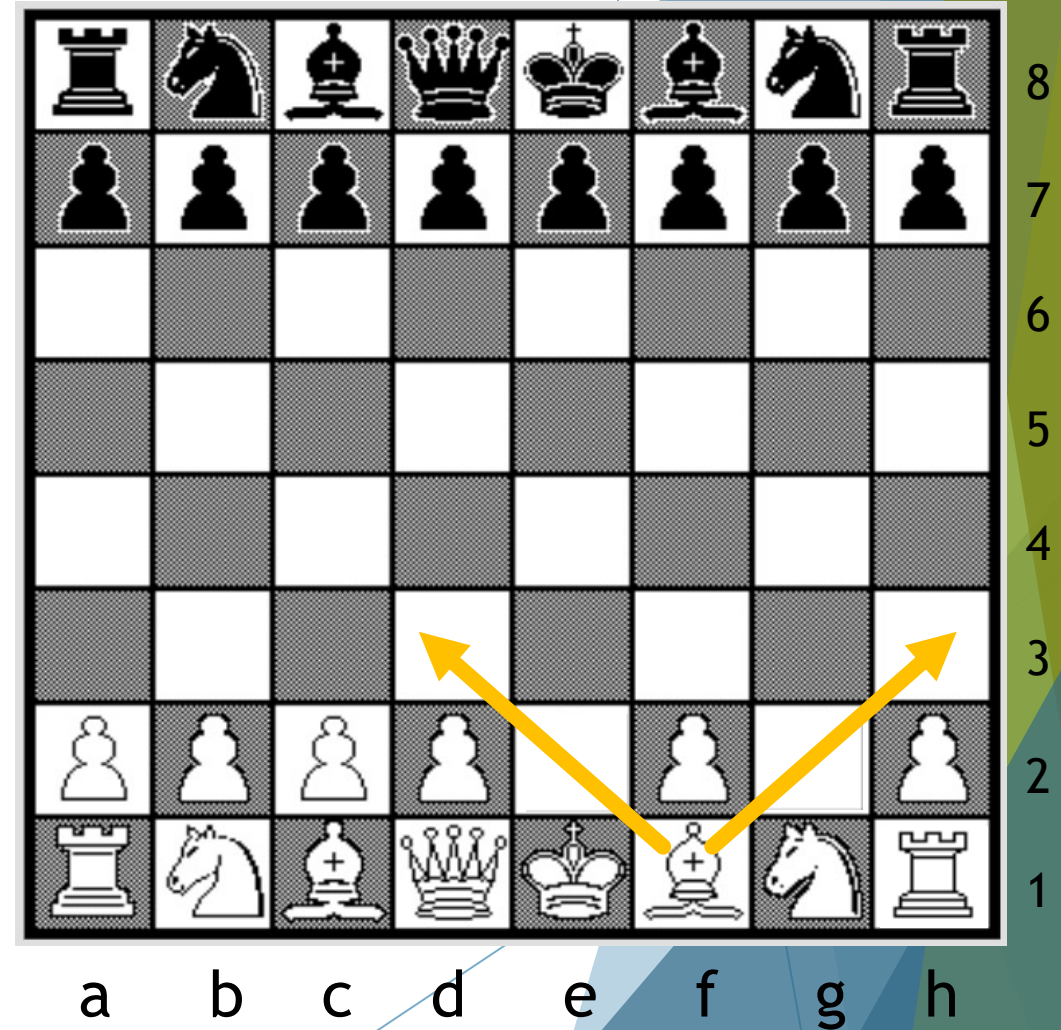
Legal moves of pieces

- ▶ 8 Pawns
- ▶ 2 Knights - L jumps



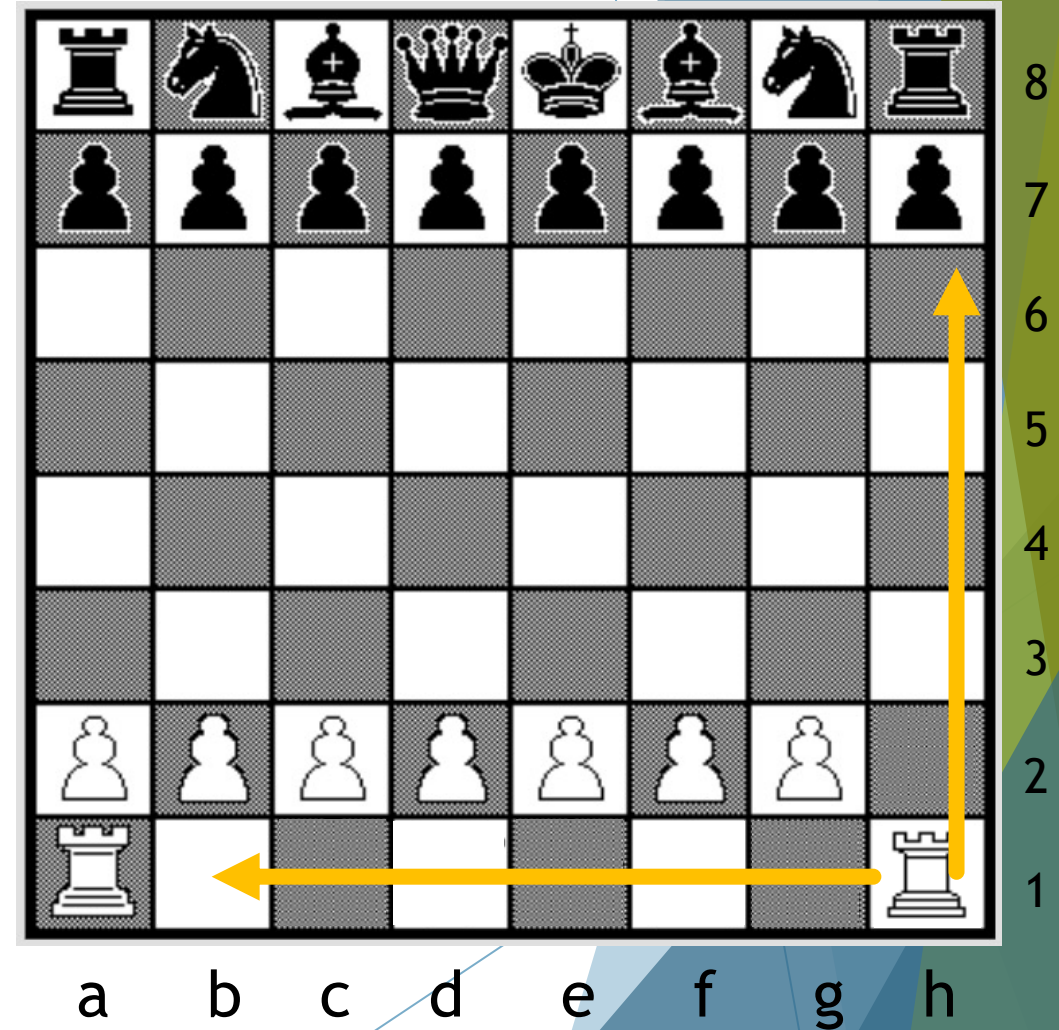
Legal moves of pieces

- ▶ 8 Pawns
- ▶ 2 Knights - L jumps
- ▶ 2 Bishops - Diagonal



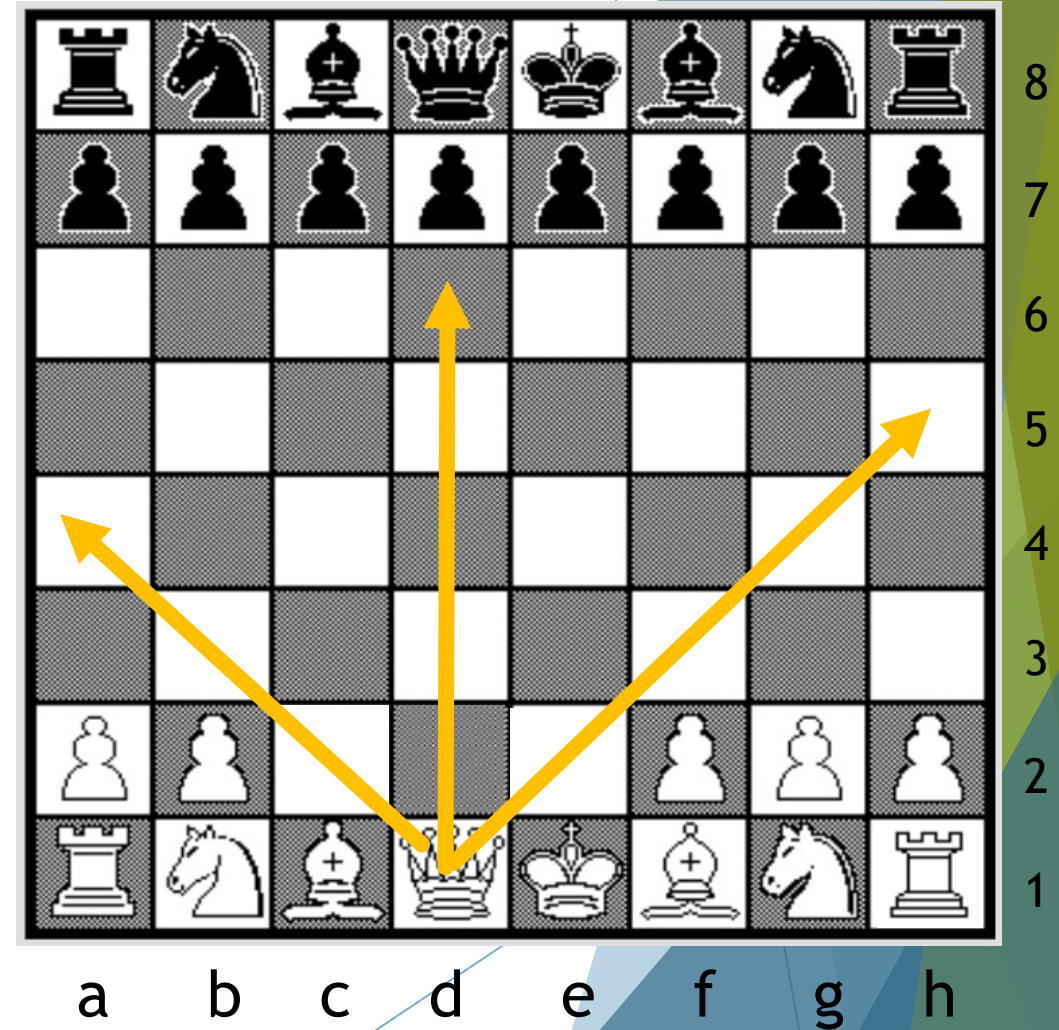
Legal moves of pieces

- ▶ 8 Pawns
- ▶ 2 Knights - L jumps
- ▶ 2 Bishops - Diagonal
- ▶ 2 Rooks - Row/column



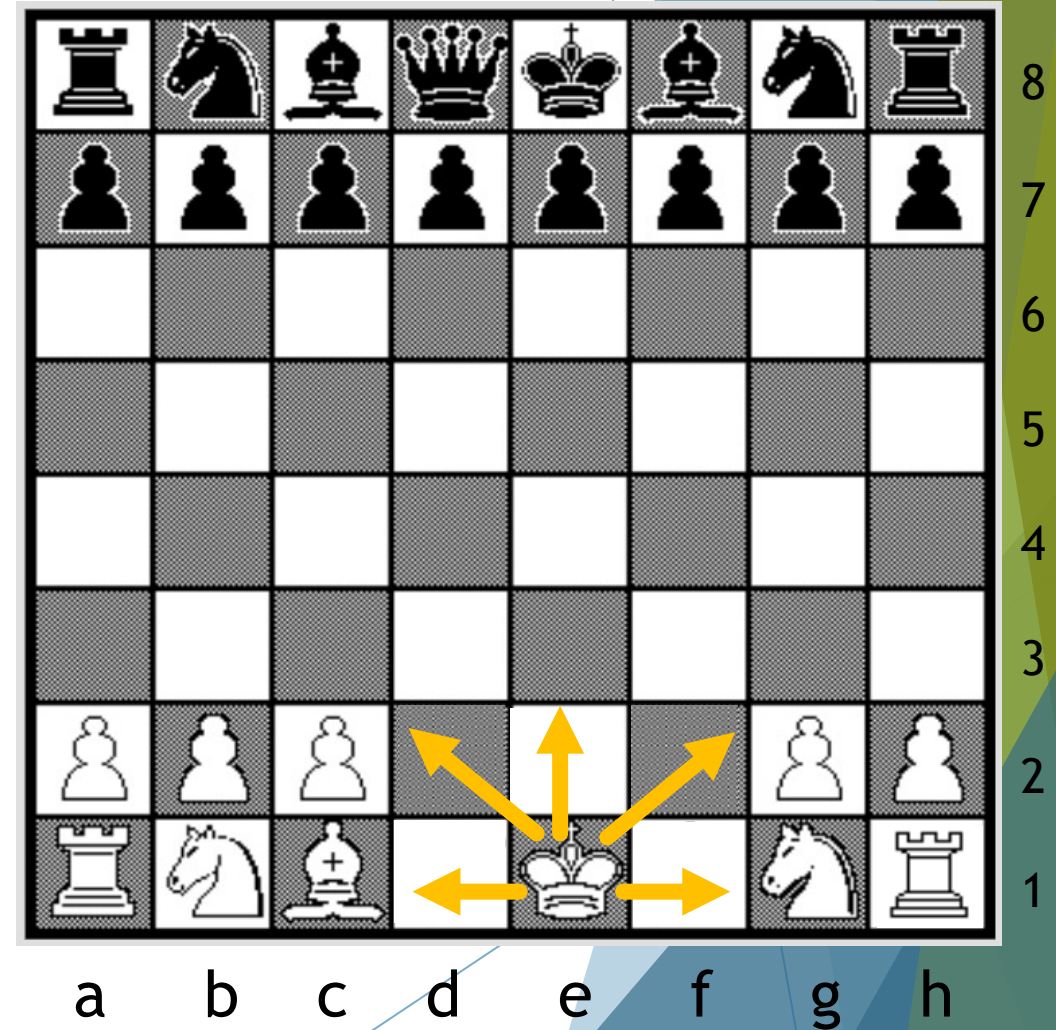
Legal moves of pieces

- ▶ 8 Pawns
- ▶ 2 Knights - L jumps
- ▶ 2 Bishops - Diagonal
- ▶ 2 Rooks - Row/column
- ▶ 1 Queen - Diagonal/row/column



Legal moves of pieces

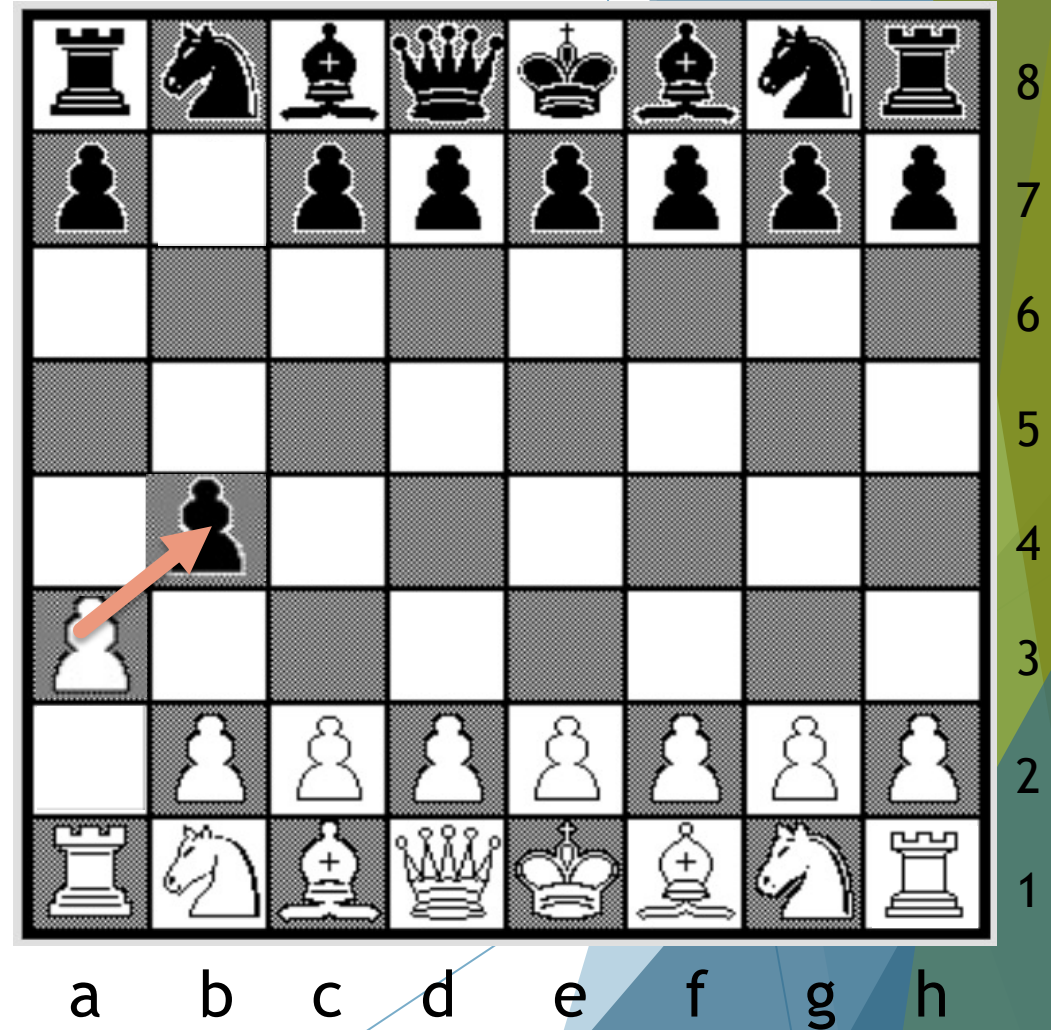
- ▶ 8 Pawns
- ▶ 2 Knights - L jumps
- ▶ 2 Bishops - Diagonal
- ▶ 2 Rooks - Row/column
- ▶ 1 Queen - Diagonal/row/column
- ▶ 1 King - 1 step in all directions



Legal moves of pieces

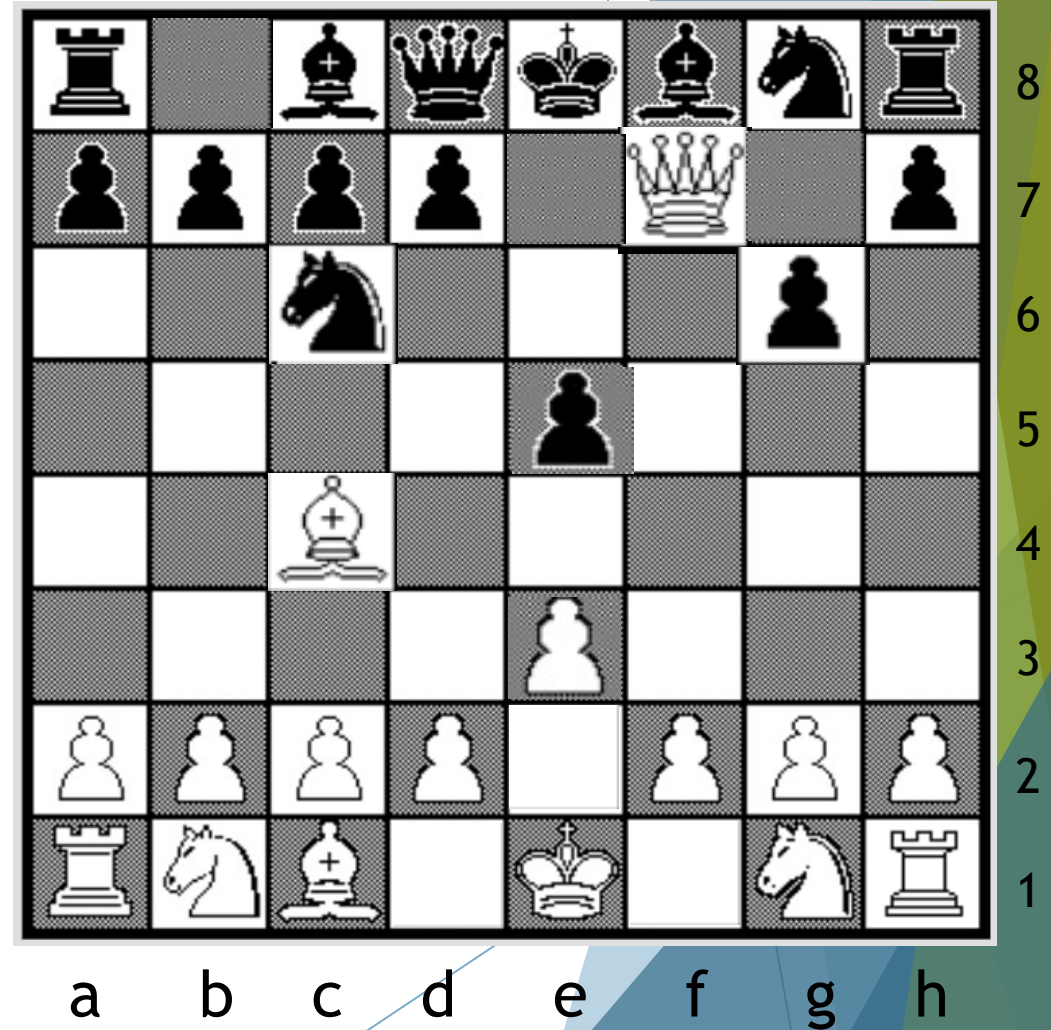
- ▶ 8 Pawns
- ▶ 2 Knights
- ▶ 2 Bishops
- ▶ 2 Rooks
- ▶ 1 Queen
- ▶ 1 King

- ▶ Piece can capture opponent's
 - ▶ Pawns capture across diagonal square
 - ▶ Other pieces capture in direction of move



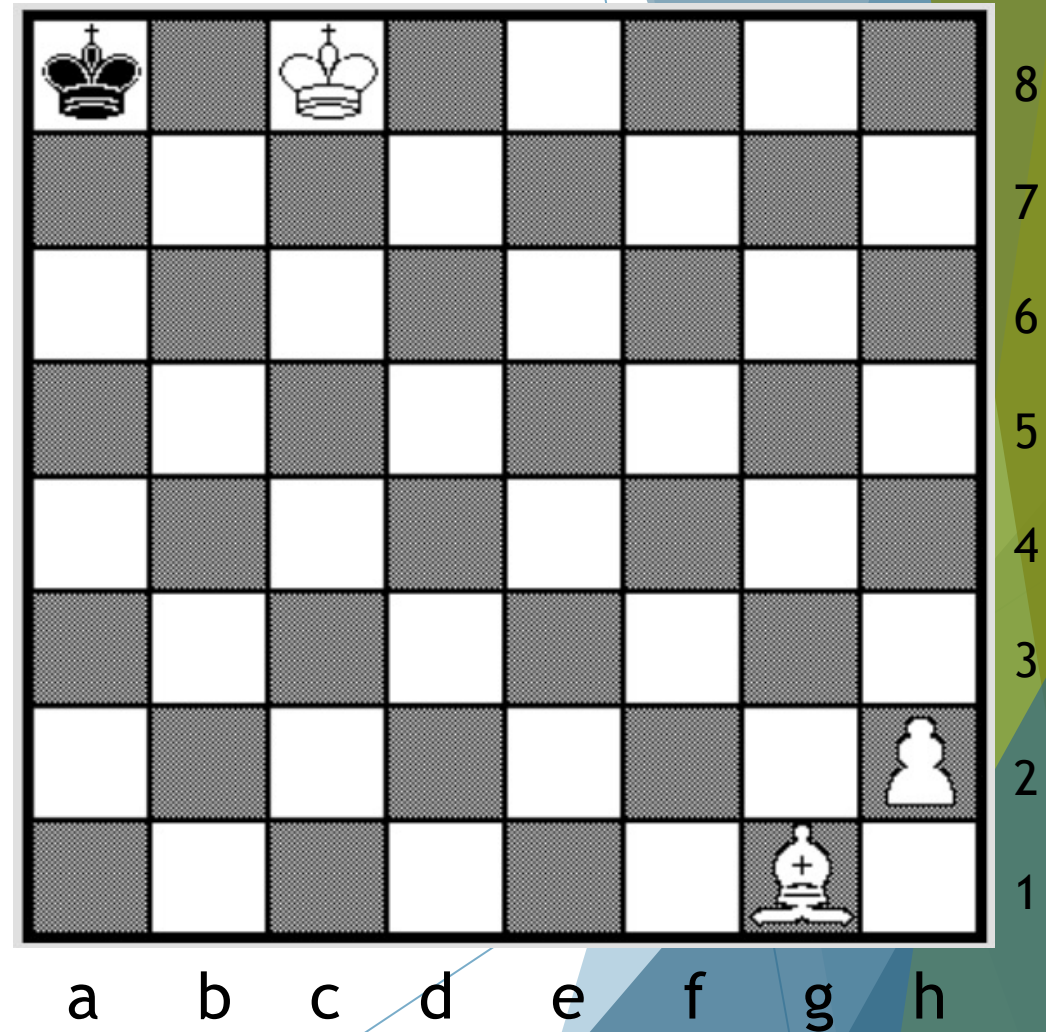
Legal moves of pieces

- ▶ 8 Pawns
- ▶ 2 Knights
- ▶ 2 Bishops
- ▶ 2 Rooks
- ▶ 1 Queen
- ▶ 1 King
- ▶ Example: White checkmates Black!



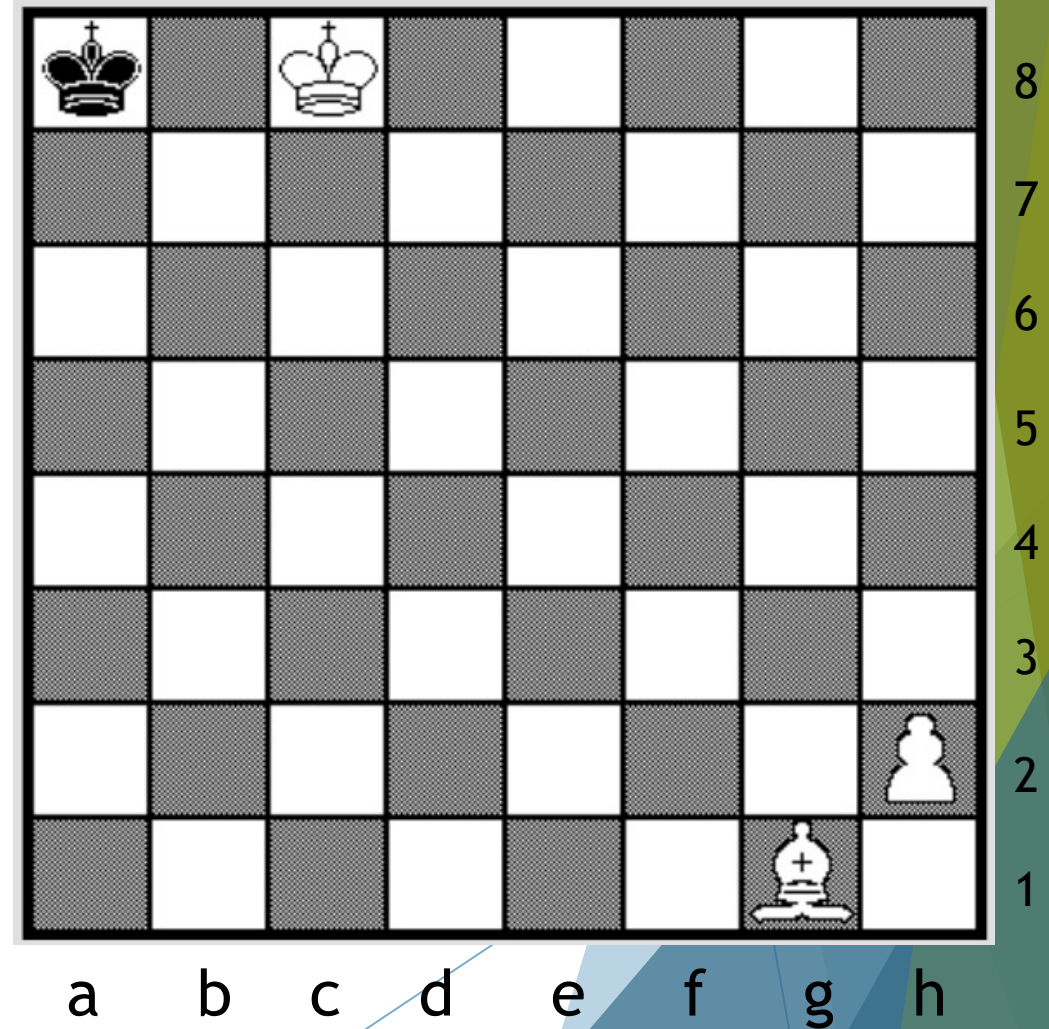
Retrograde Analysis: Example 1

- ▶ Black moved last
- ▶ What was White's prior move?
- ▶ Assume White starts at bottom



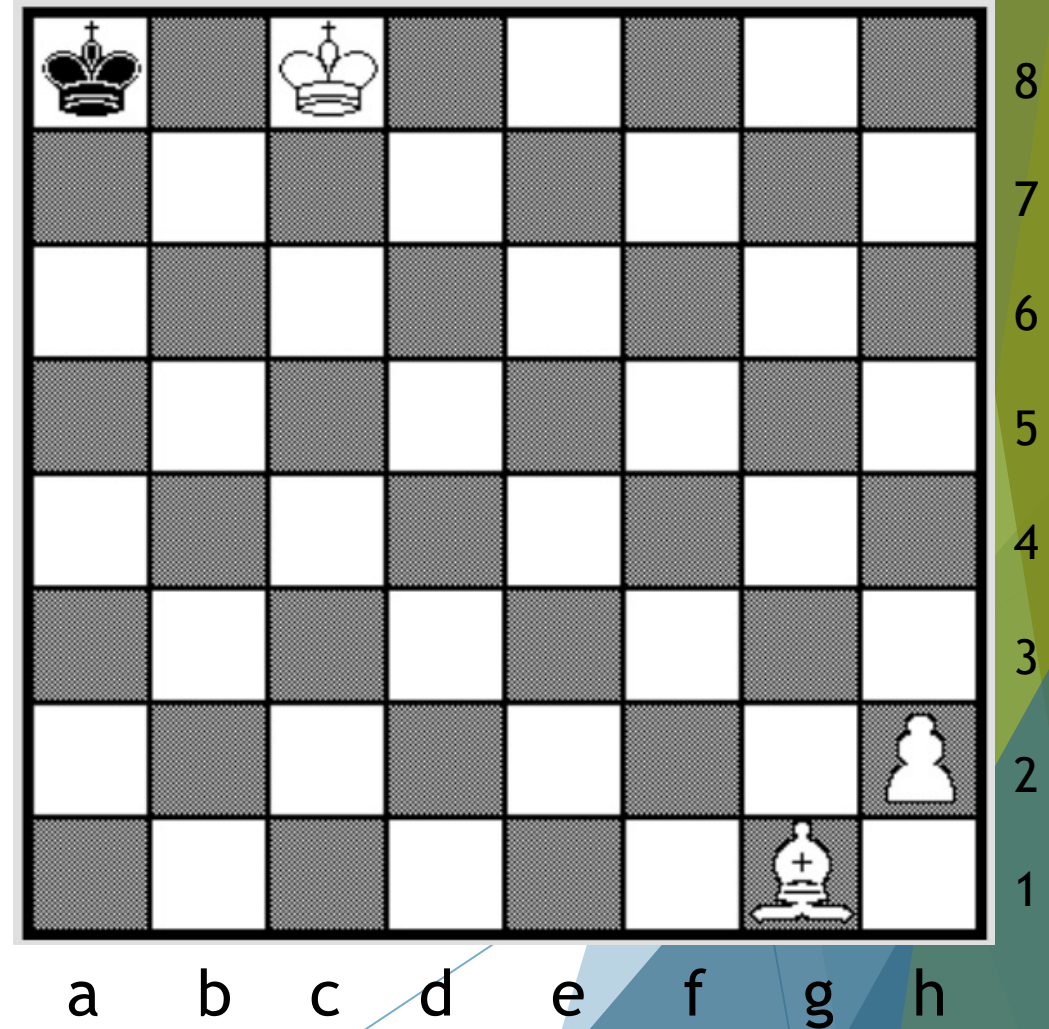
Retrograde Analysis: Example 1

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- ▶ If Black moved last, it's the King



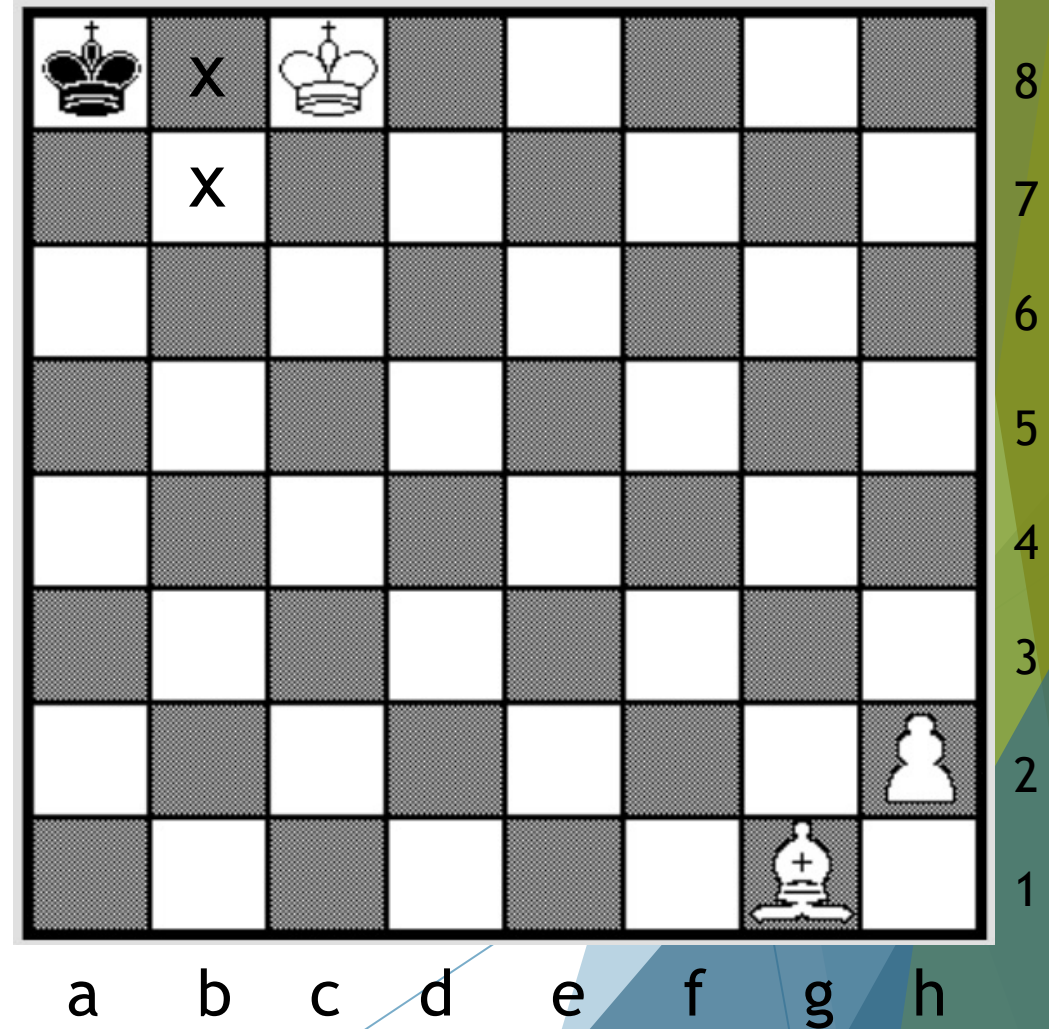
Retrograde Analysis: Example 1

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 - ▶ Where from - a7, b7, or b8?



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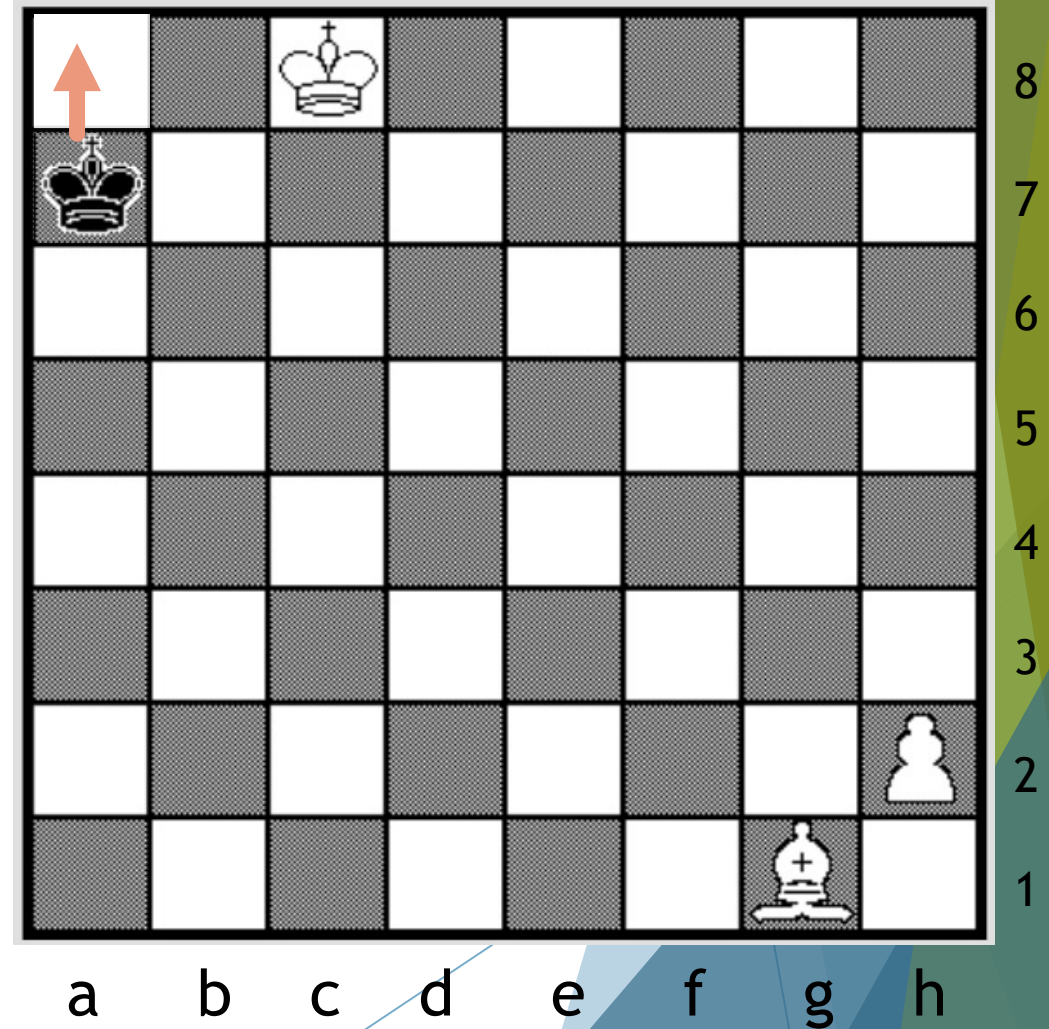
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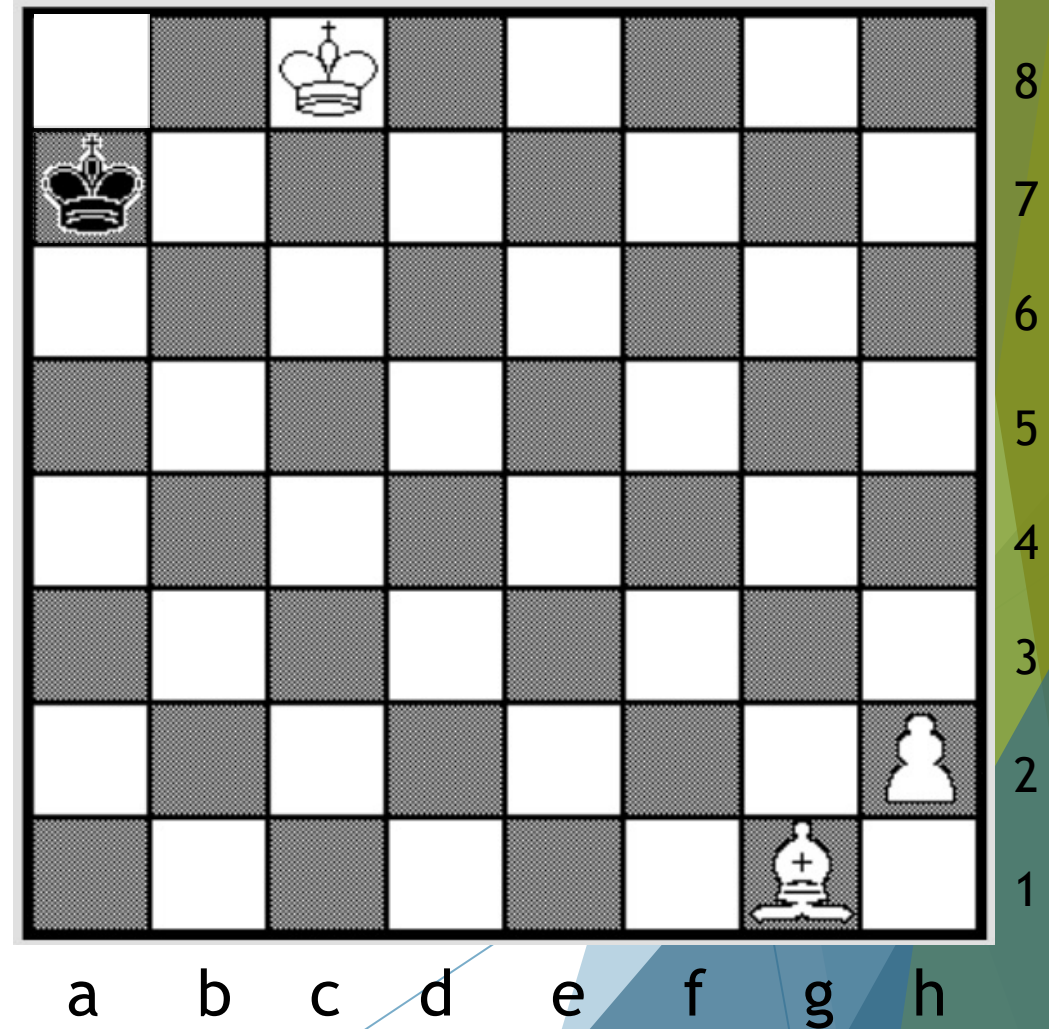
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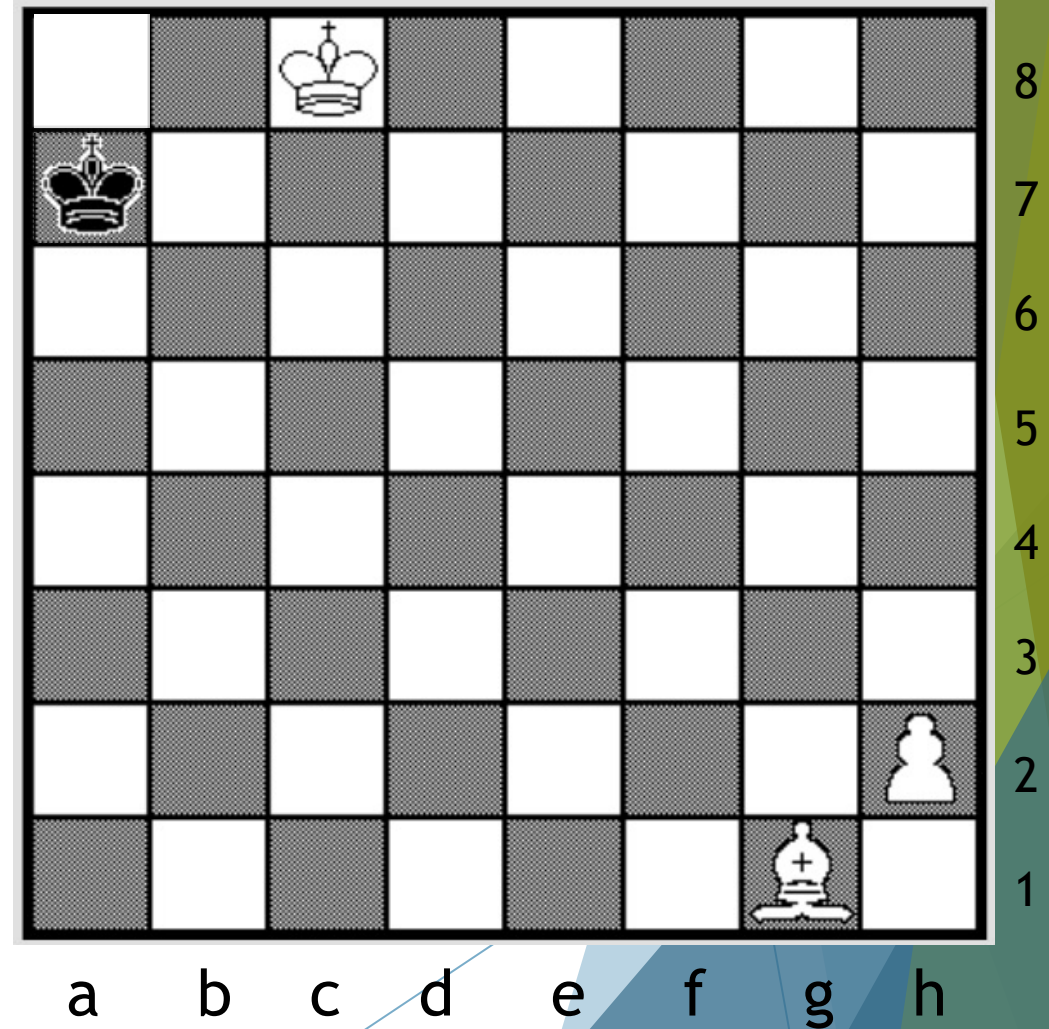
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 - ▶ How did Bishop get there for check?!!
 - ▶ Pawn hasn't moved yet



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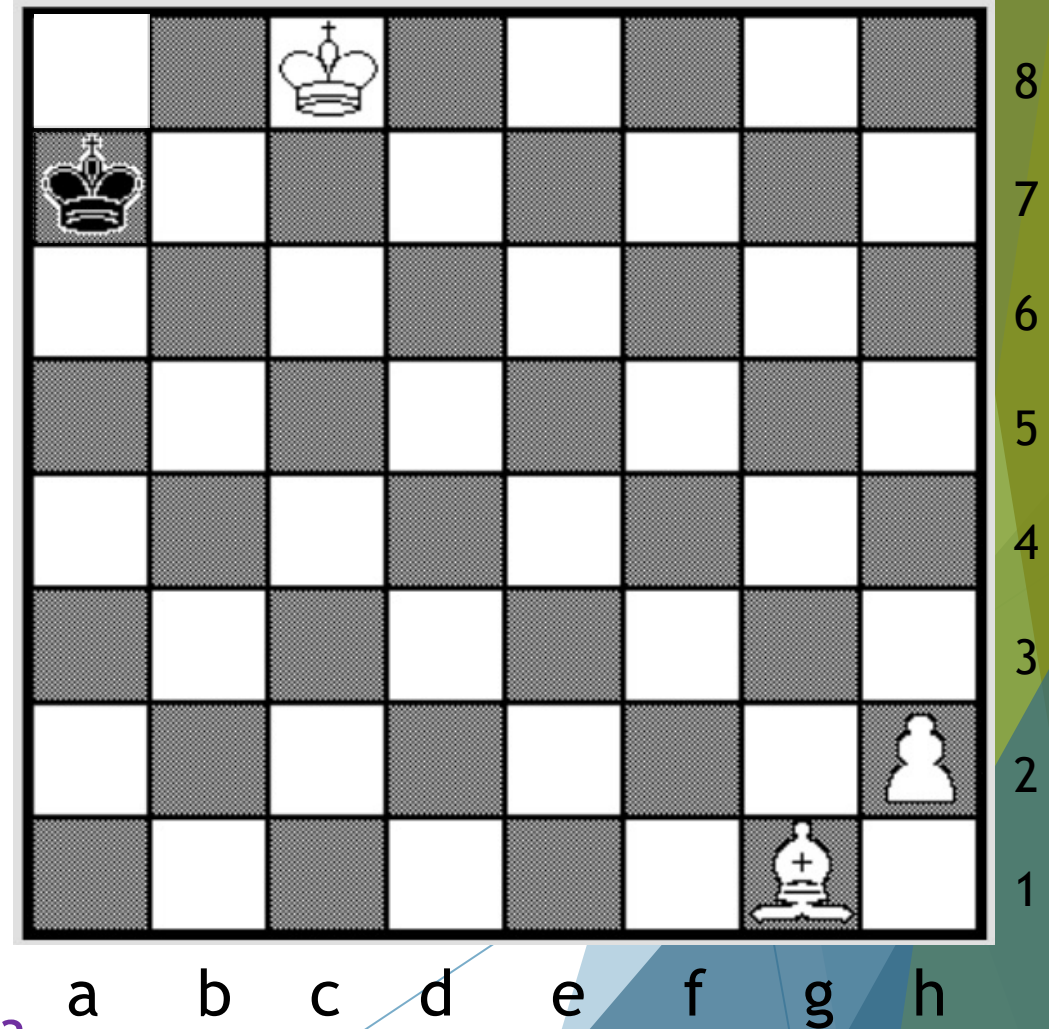
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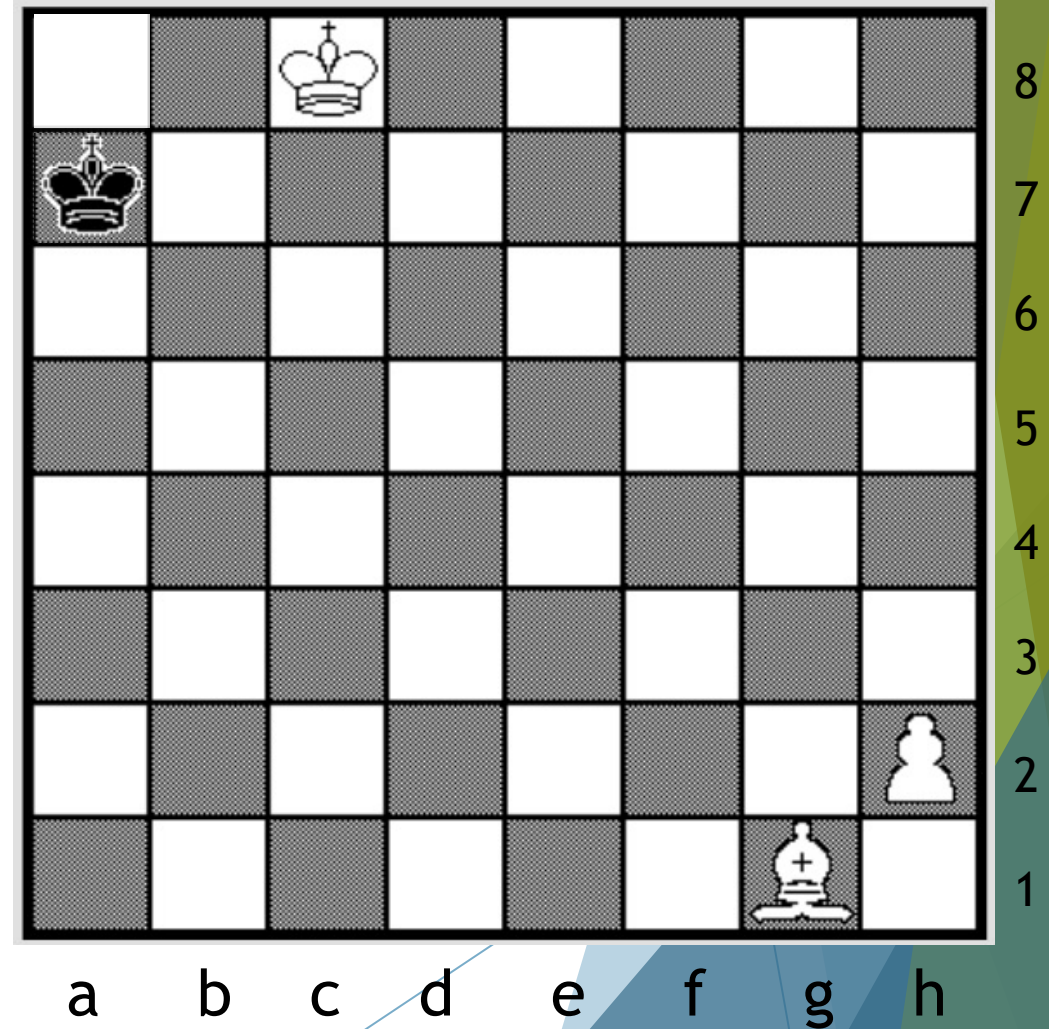
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 - ▶ Does the Bishop need to get there?
 - ▶ Or could another piece uncover check?



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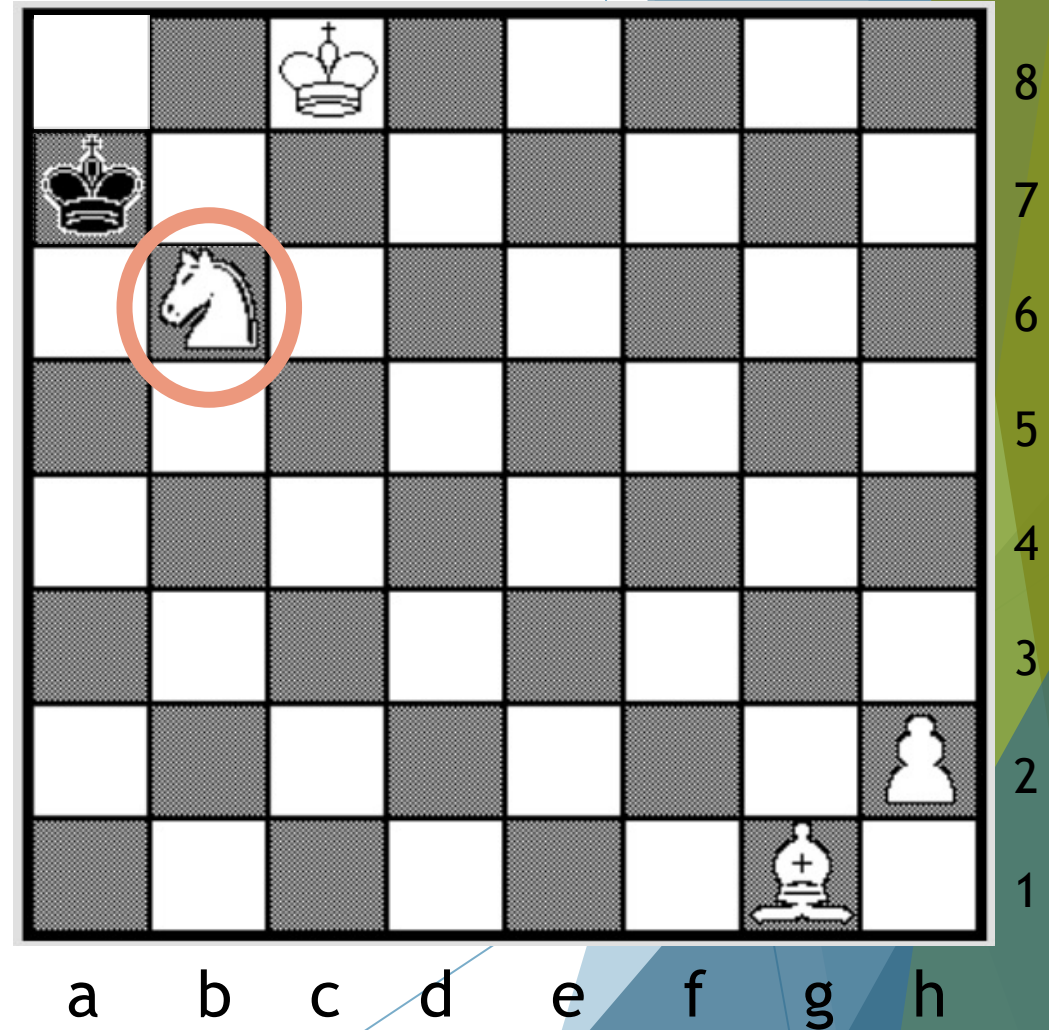
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 - ▶ And not be on the board now!



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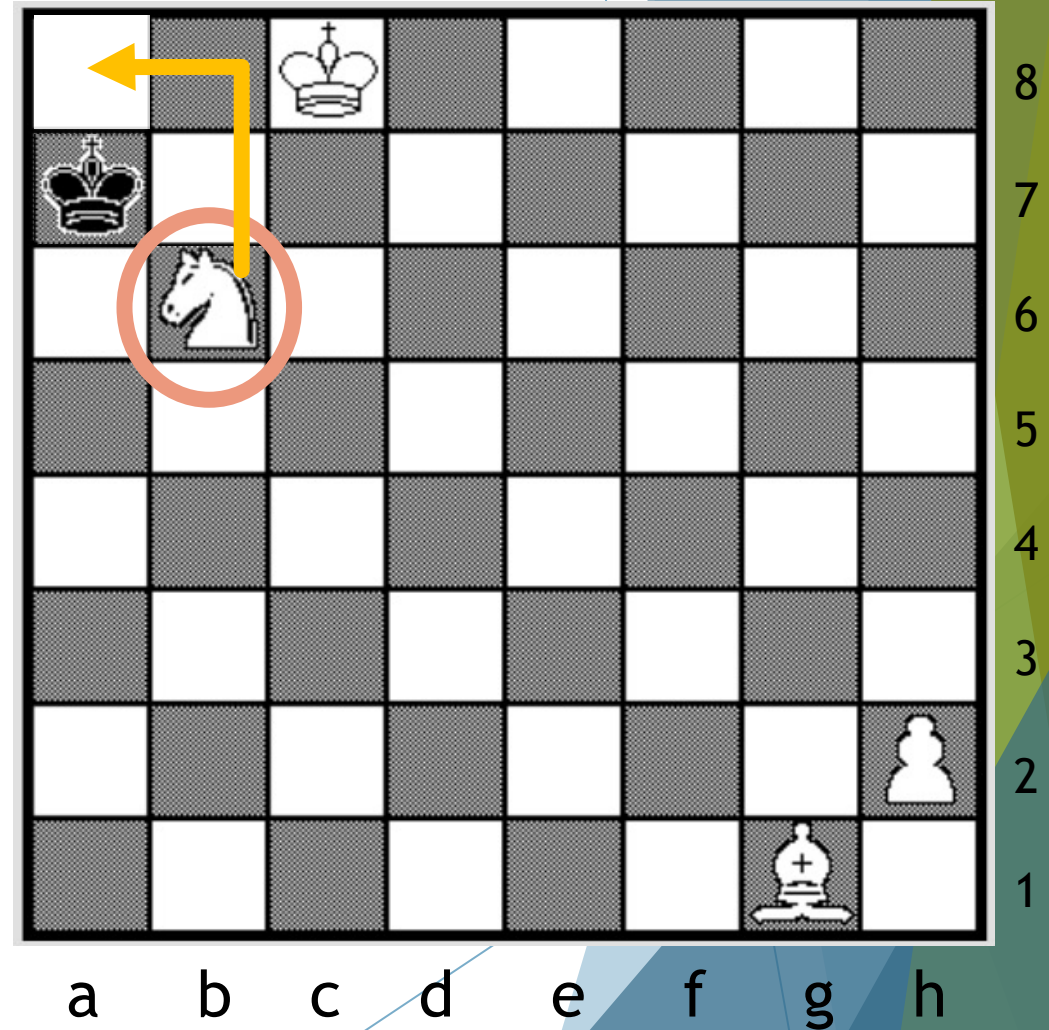
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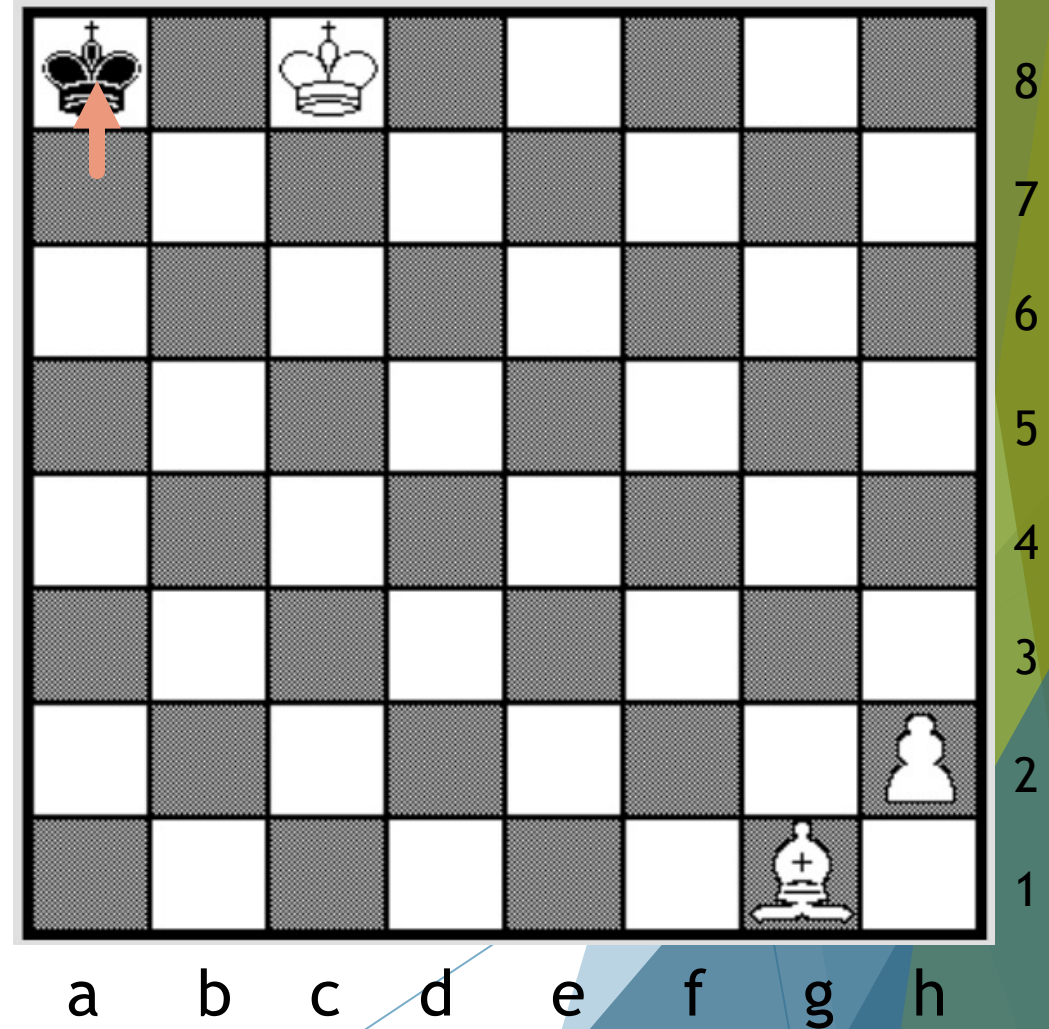
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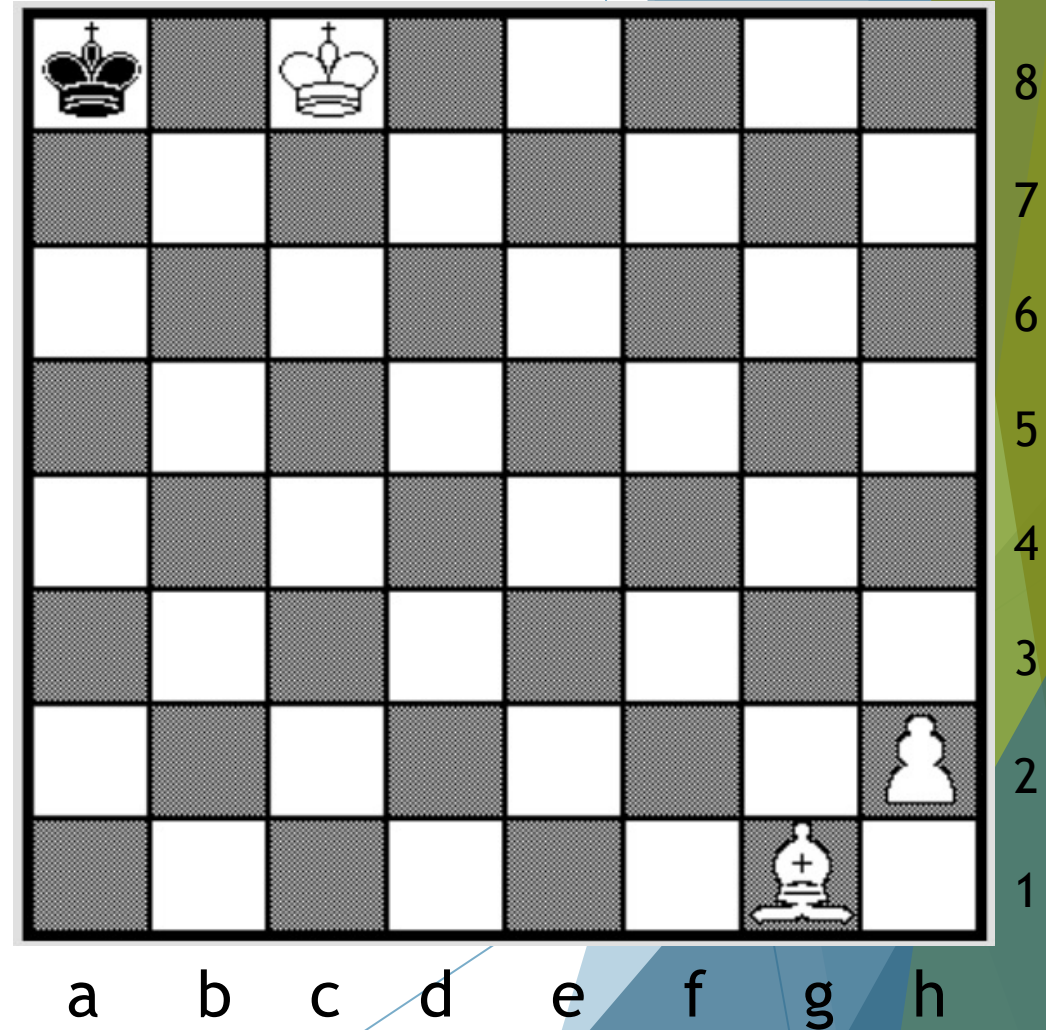
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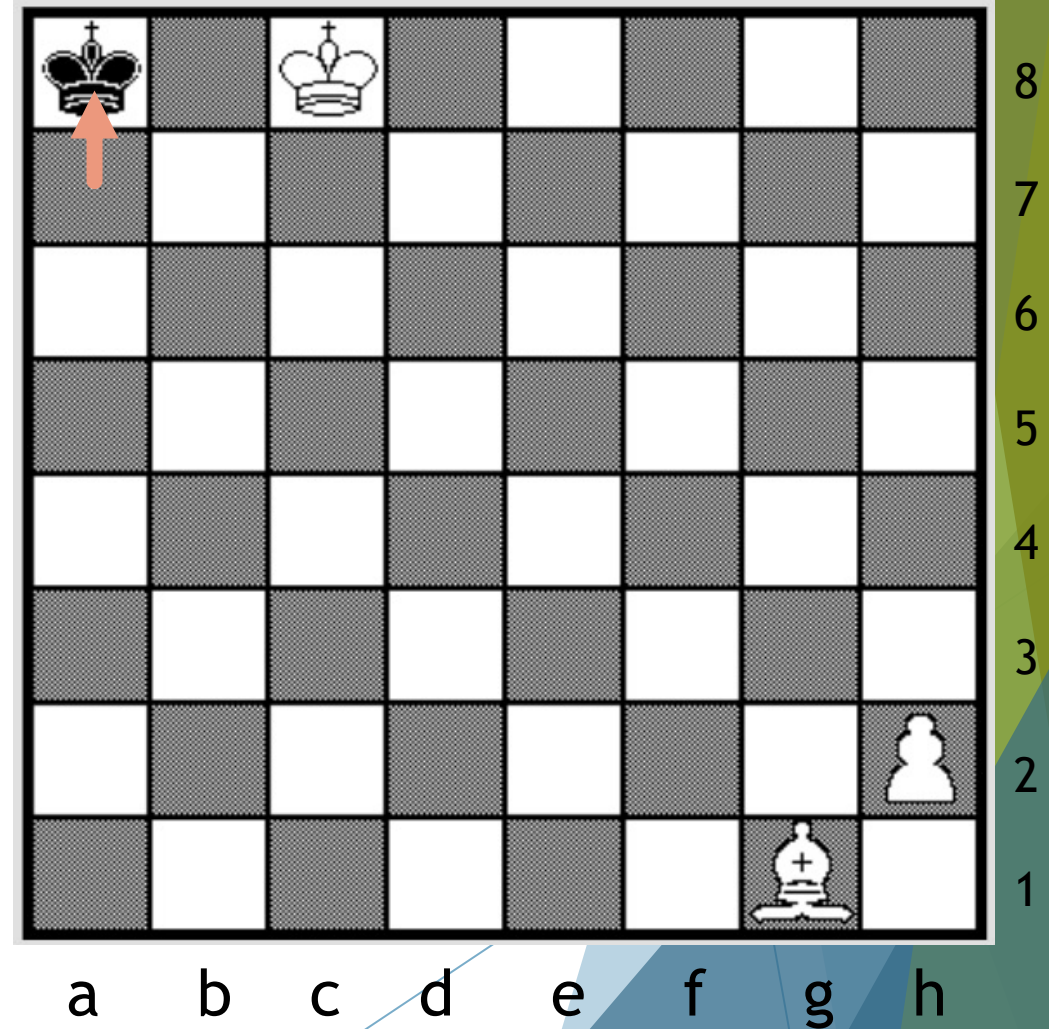
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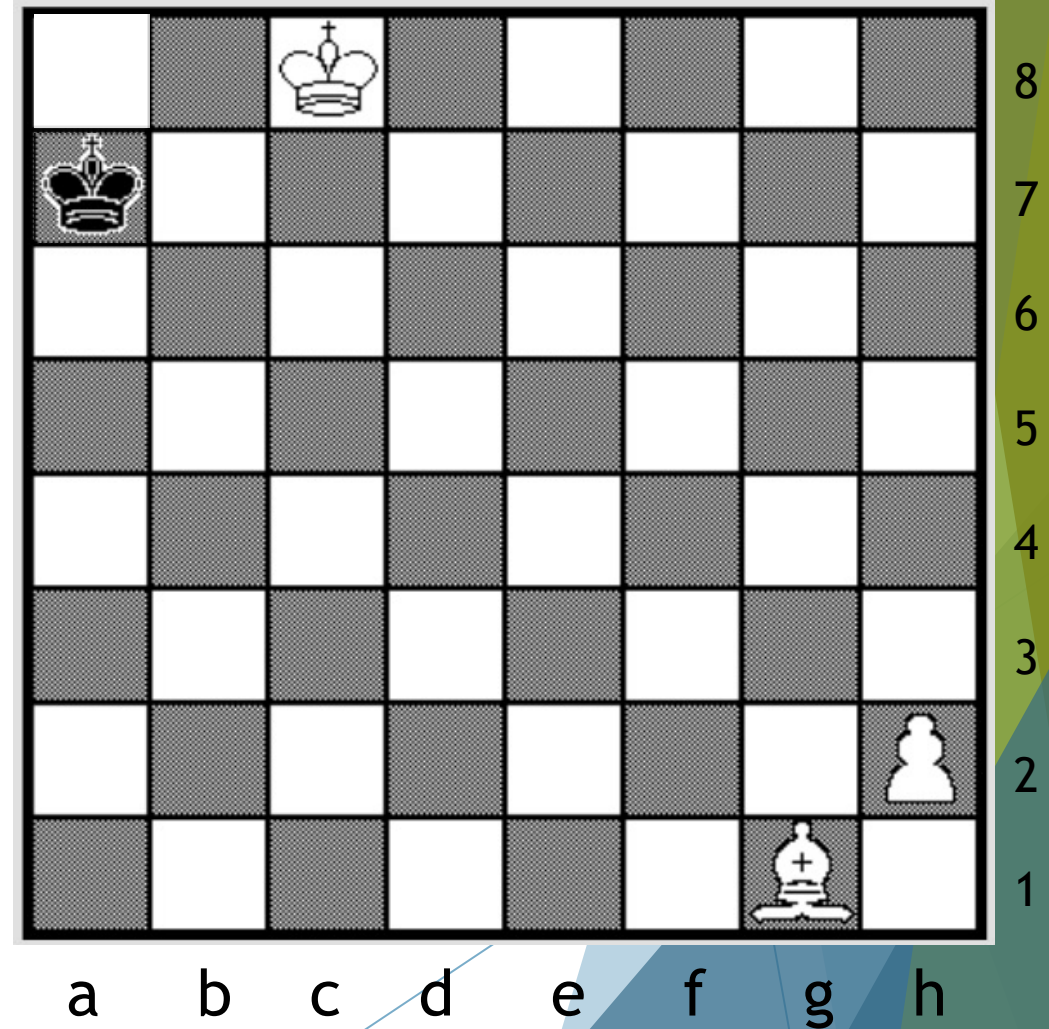
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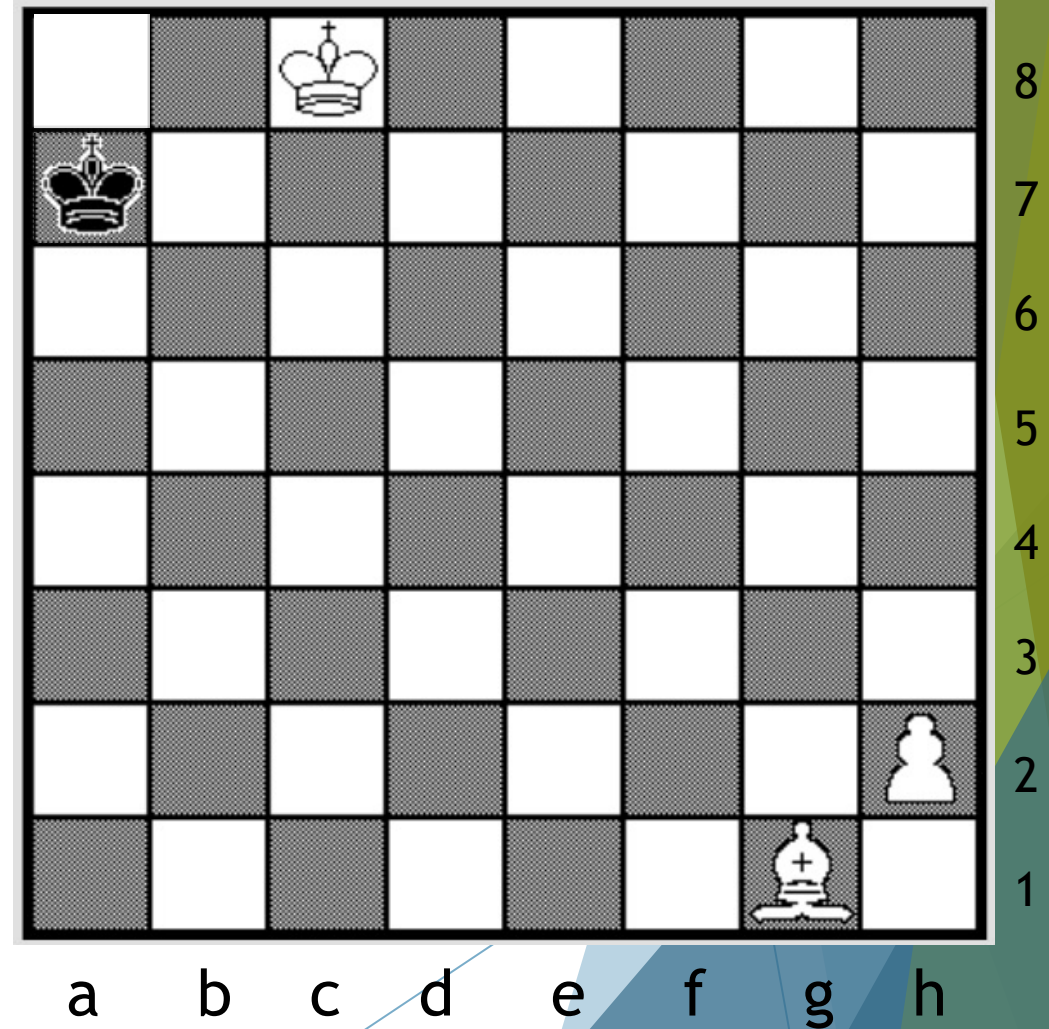
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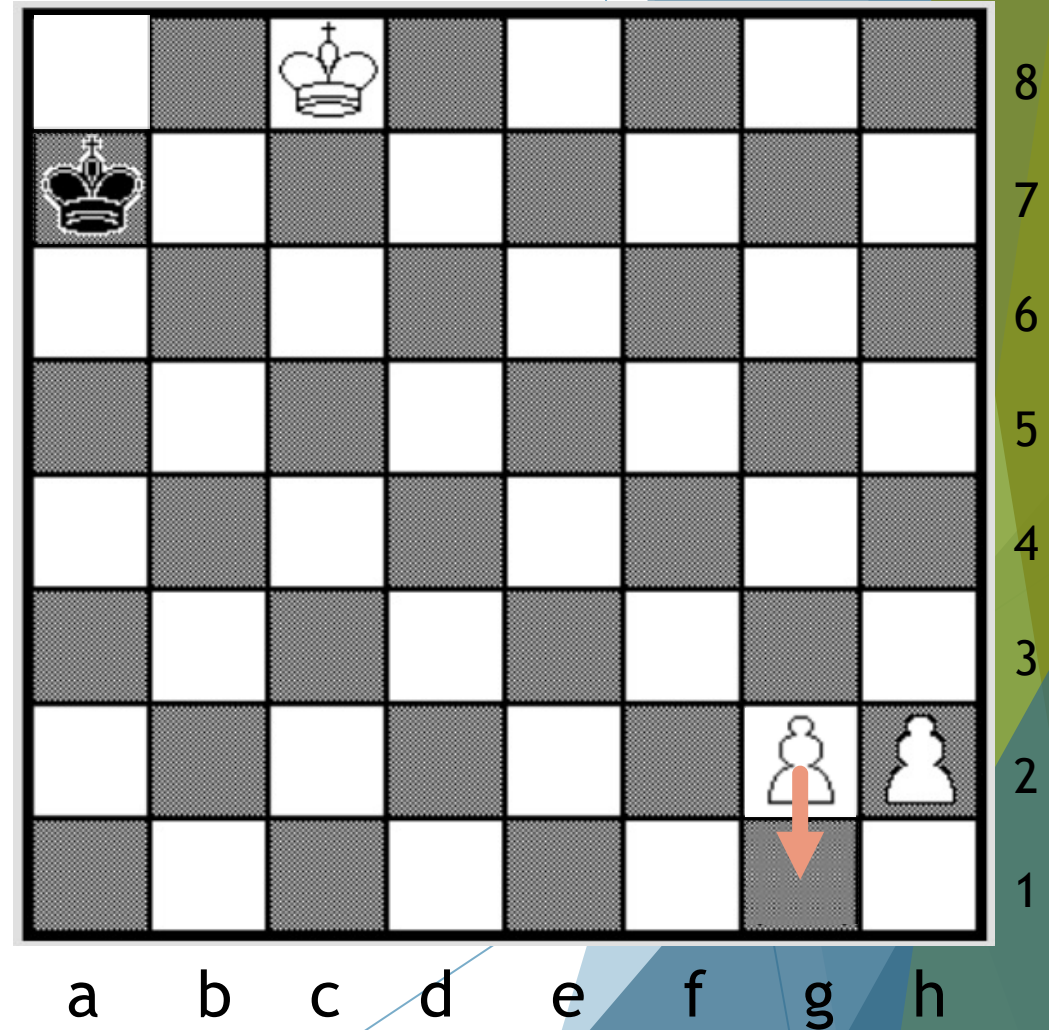
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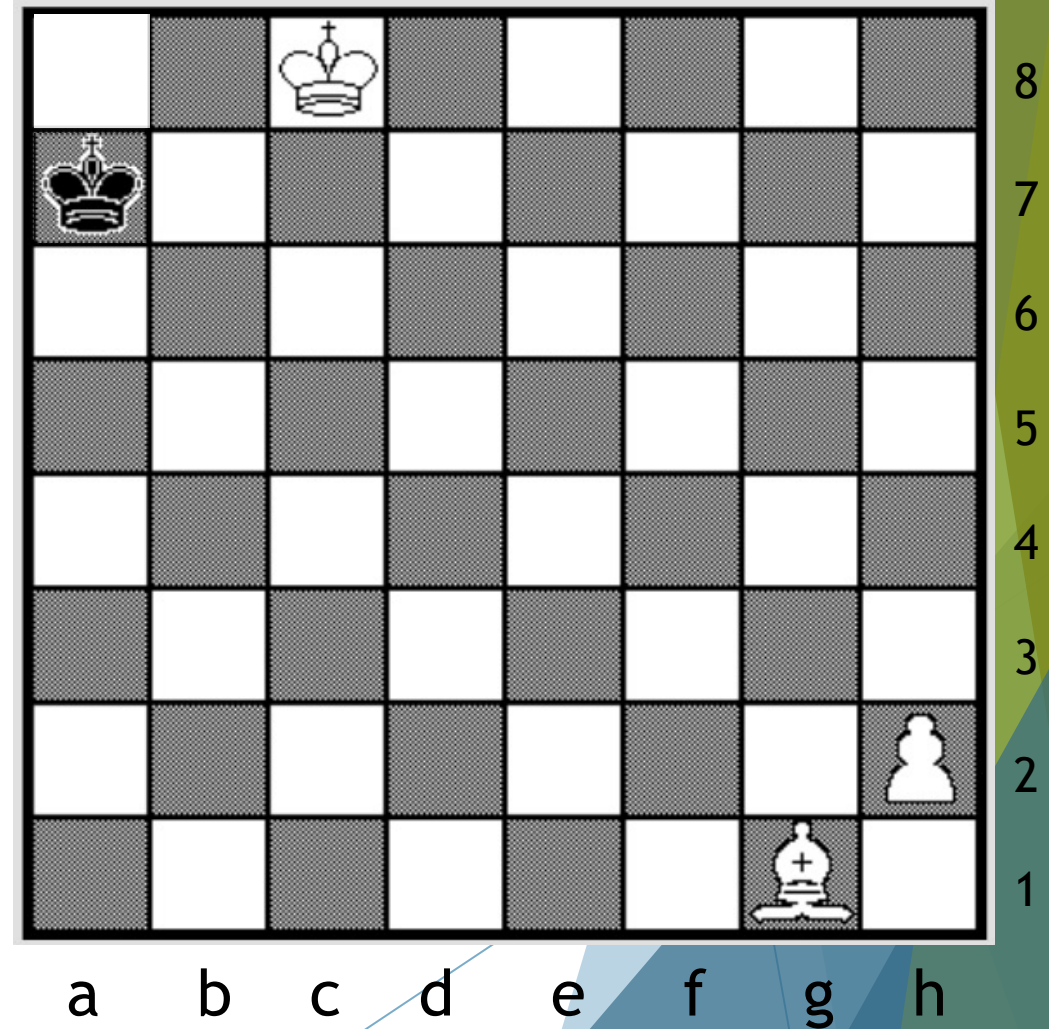
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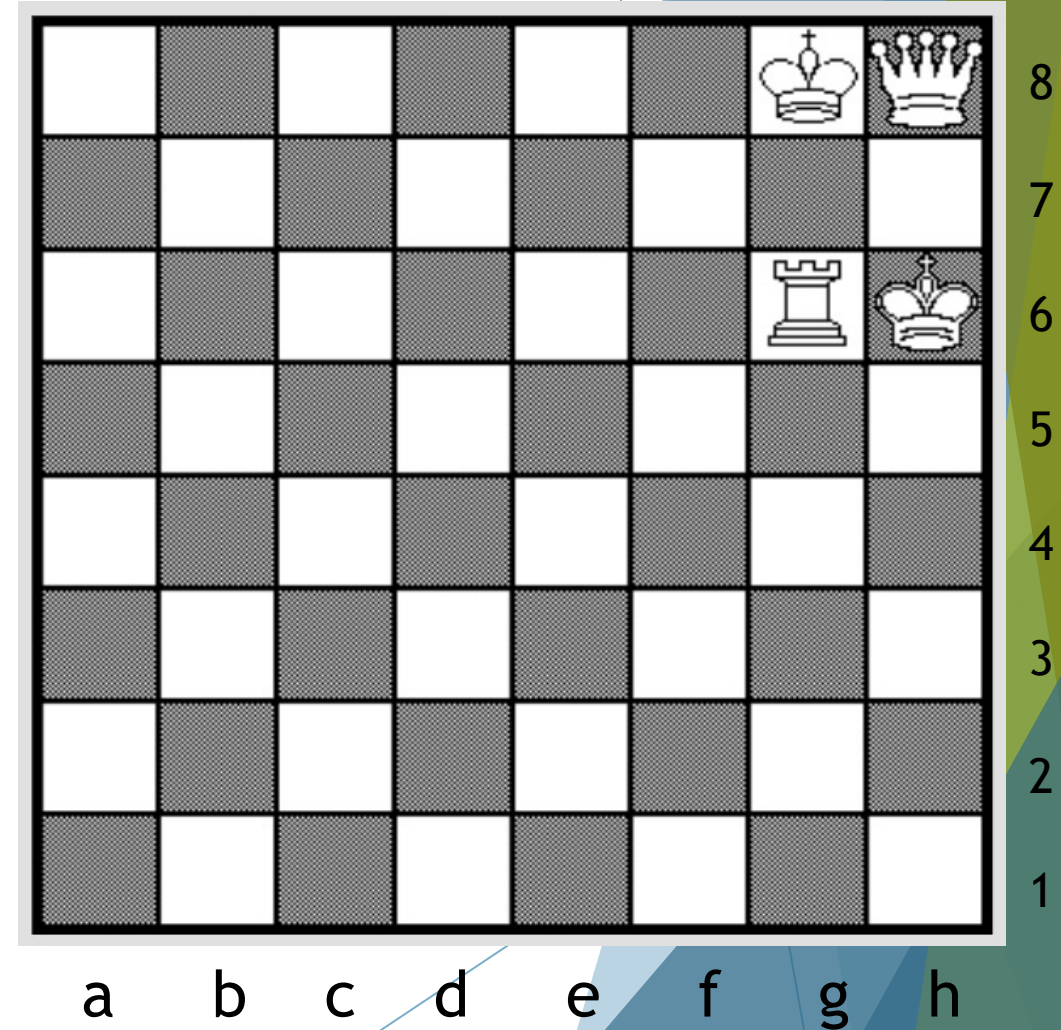
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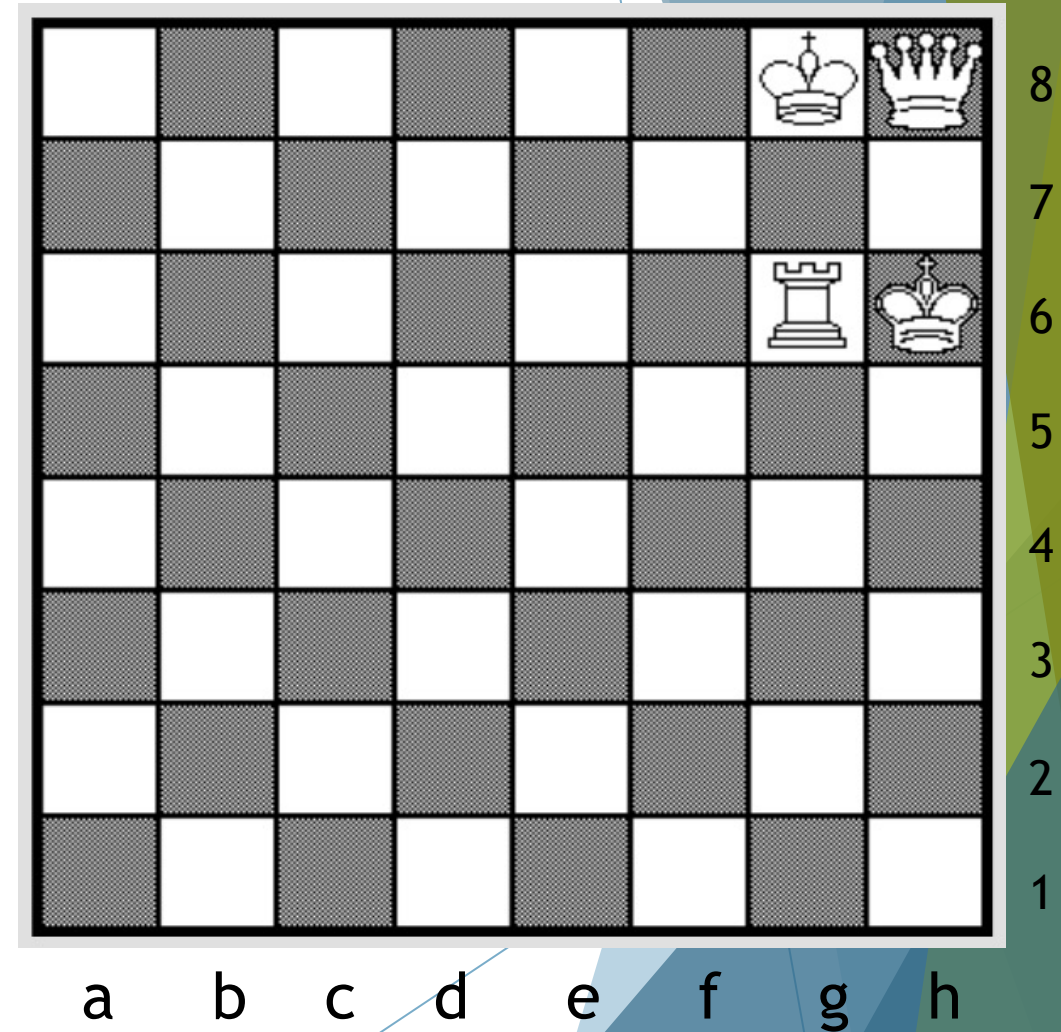
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► What color are the pieces?



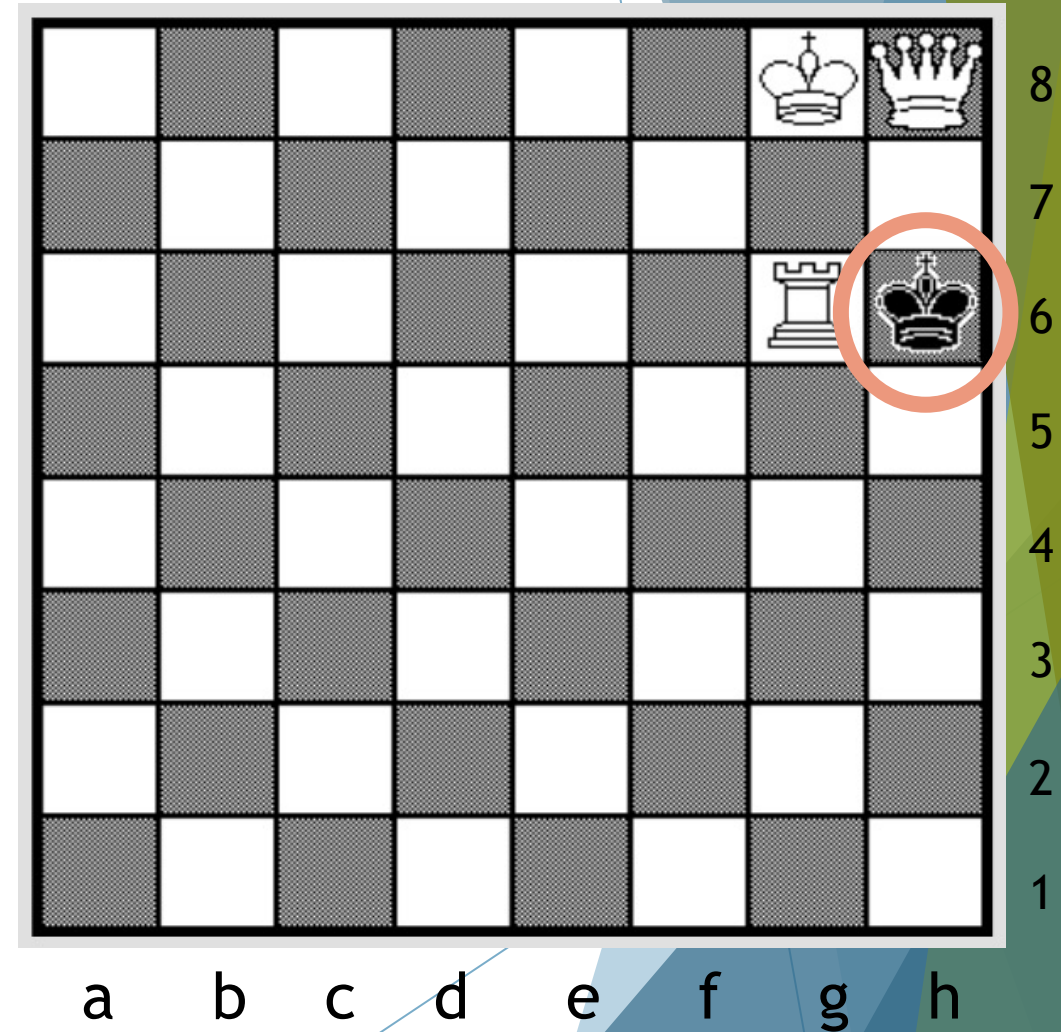
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- ▶ What color are the pieces?
- ▶ Two Kings can't be of same color
 - ▶ Assign King at h6 to be Black



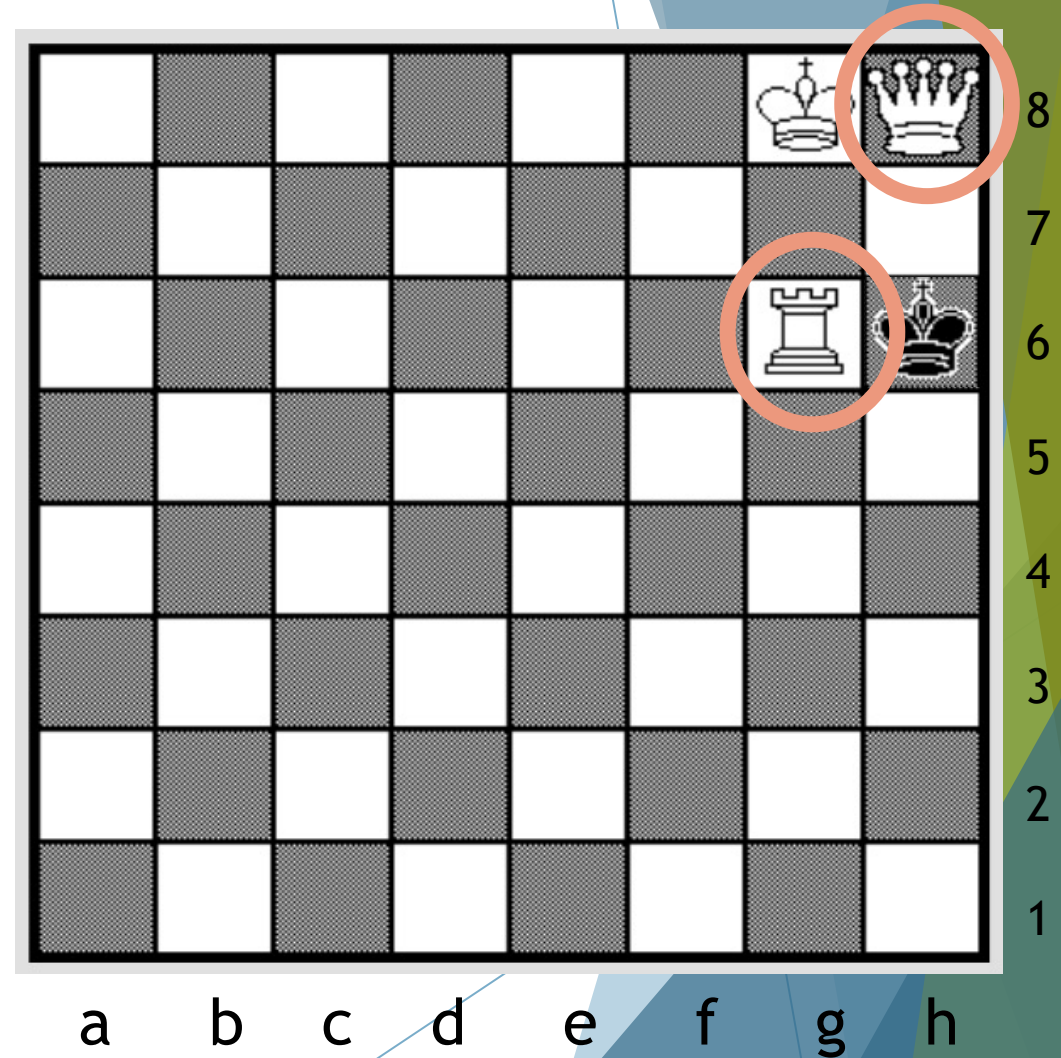
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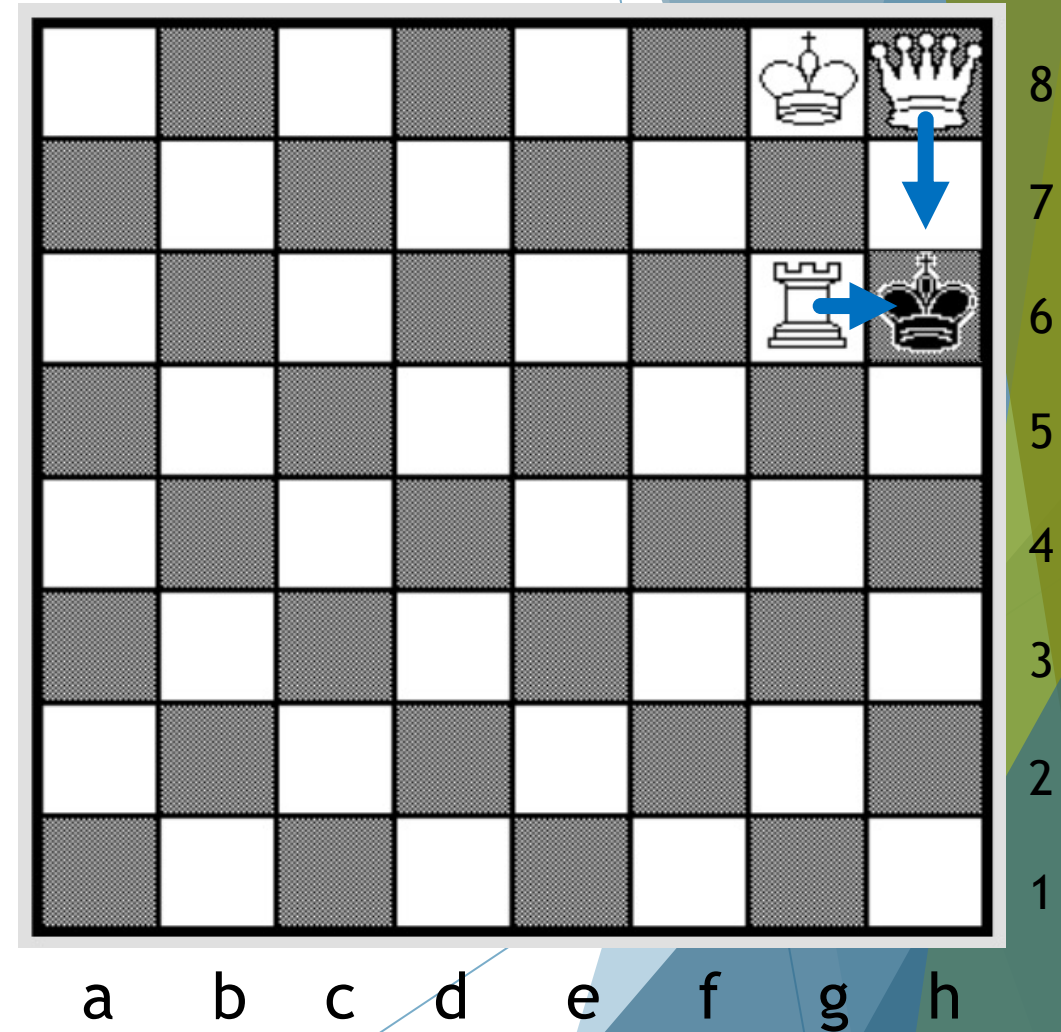
Retrograde Analysis: Example 2

- ▶ What color are the pieces?
- ▶ Two Kings can't be of same color
 - ▶ Assign King at h6 to be Black
- ▶ Rook & Queen can't be diff colors
 - ▶ Since both Kings can't be at check
 - ▶ Let's choose Rook & Queen as **White**



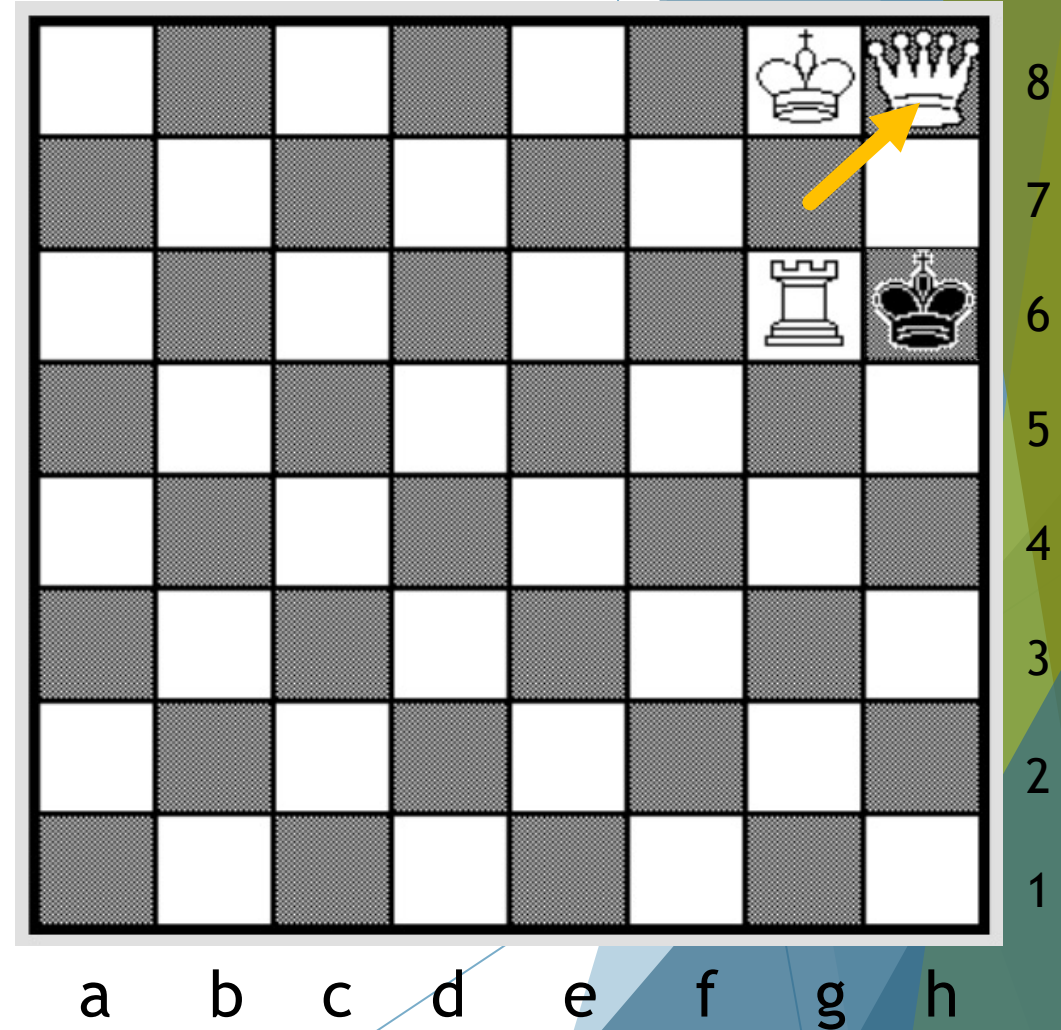
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 - ▶ Let's choose Rook & Queen as **White**
- ▶ Can this state occur?
 - ▶ Black King has a double check
 - ▶ **This is impossible!**



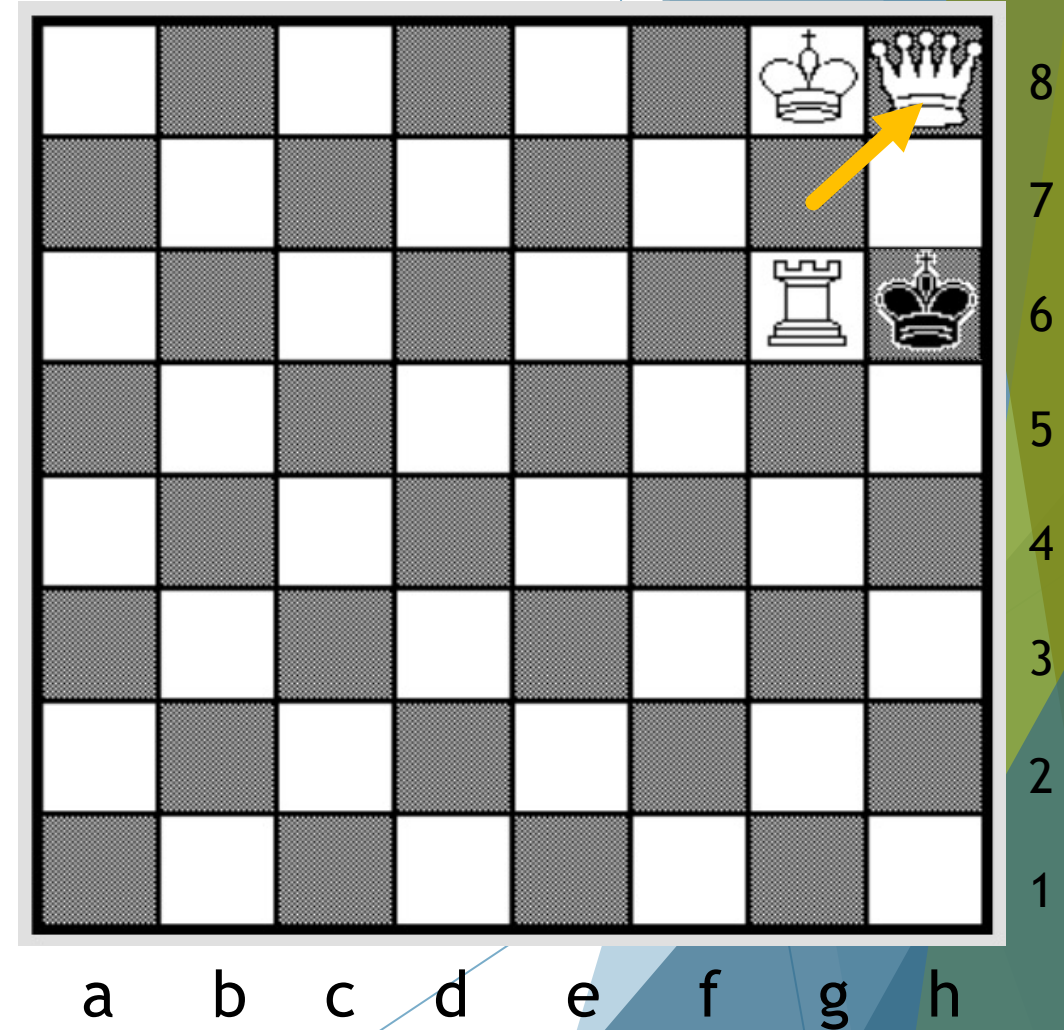
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 - ▶ How about pawn promoted g7 to h8?



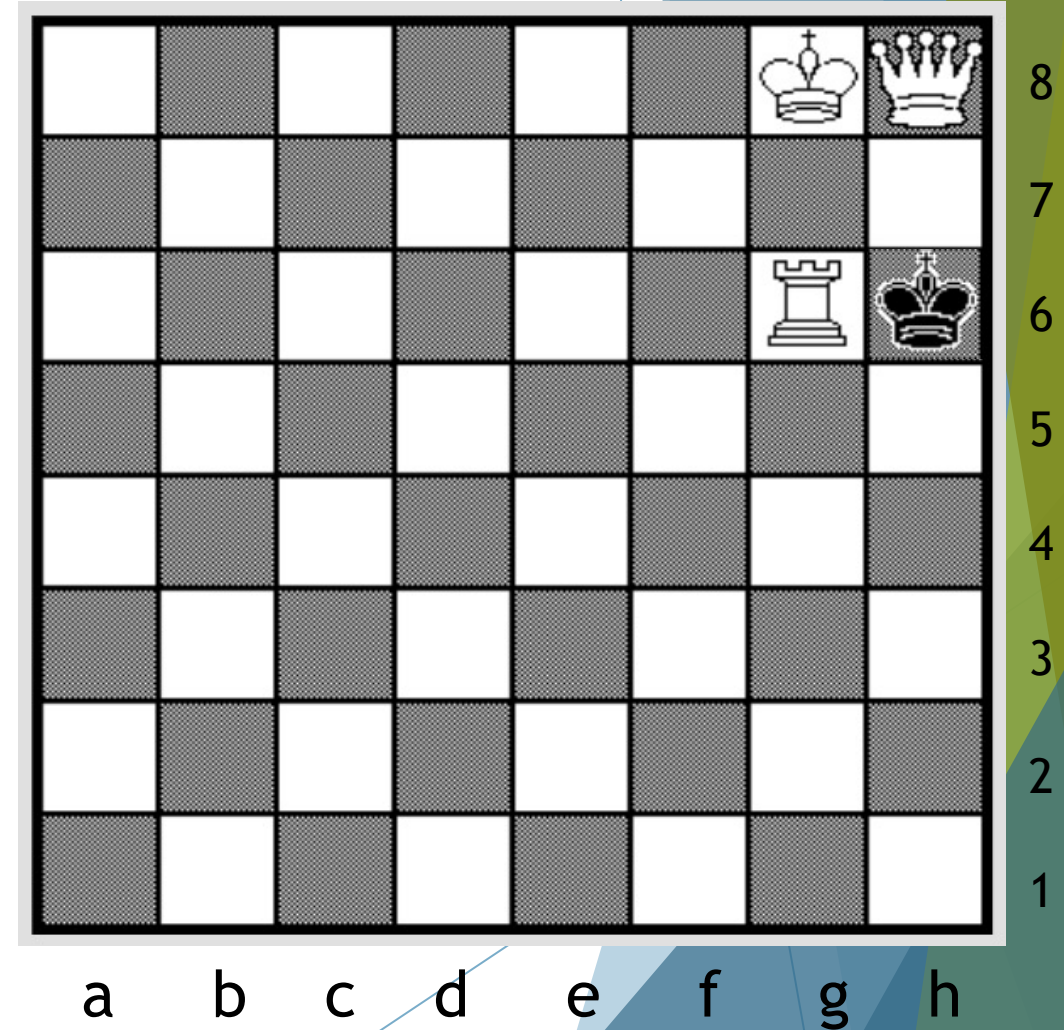
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 - ▶ Black King has a double check
 - ▶ **This is impossible!**
 - ▶ How about pawn promoted g7 to h8?
 - ▶ Check by Rook on Black King still there!



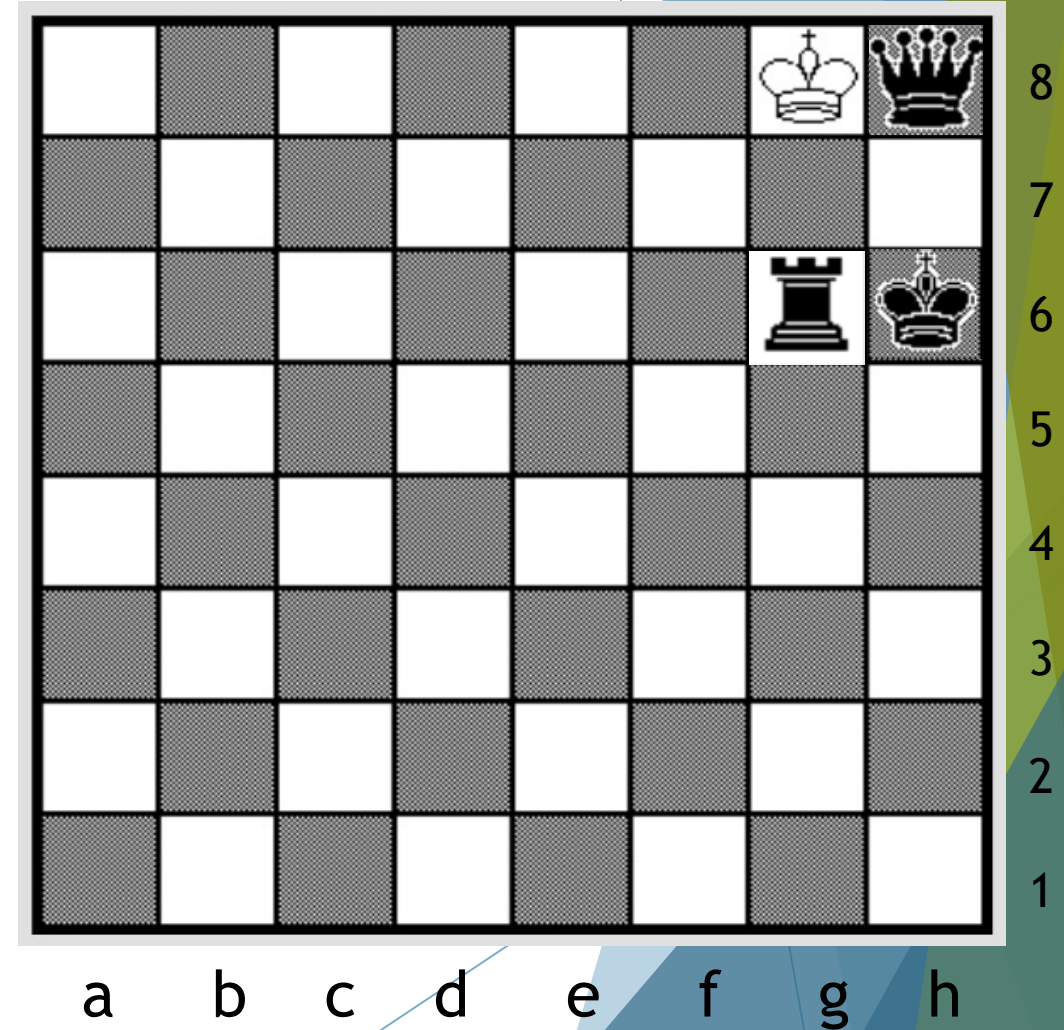
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 - ▶ Let's choose Rook & Queen as **White**
- ▶ Can this state occur?
 - ▶ Black King has a double check
 - ▶ This is impossible!
 - ▶ **Let's try again!**



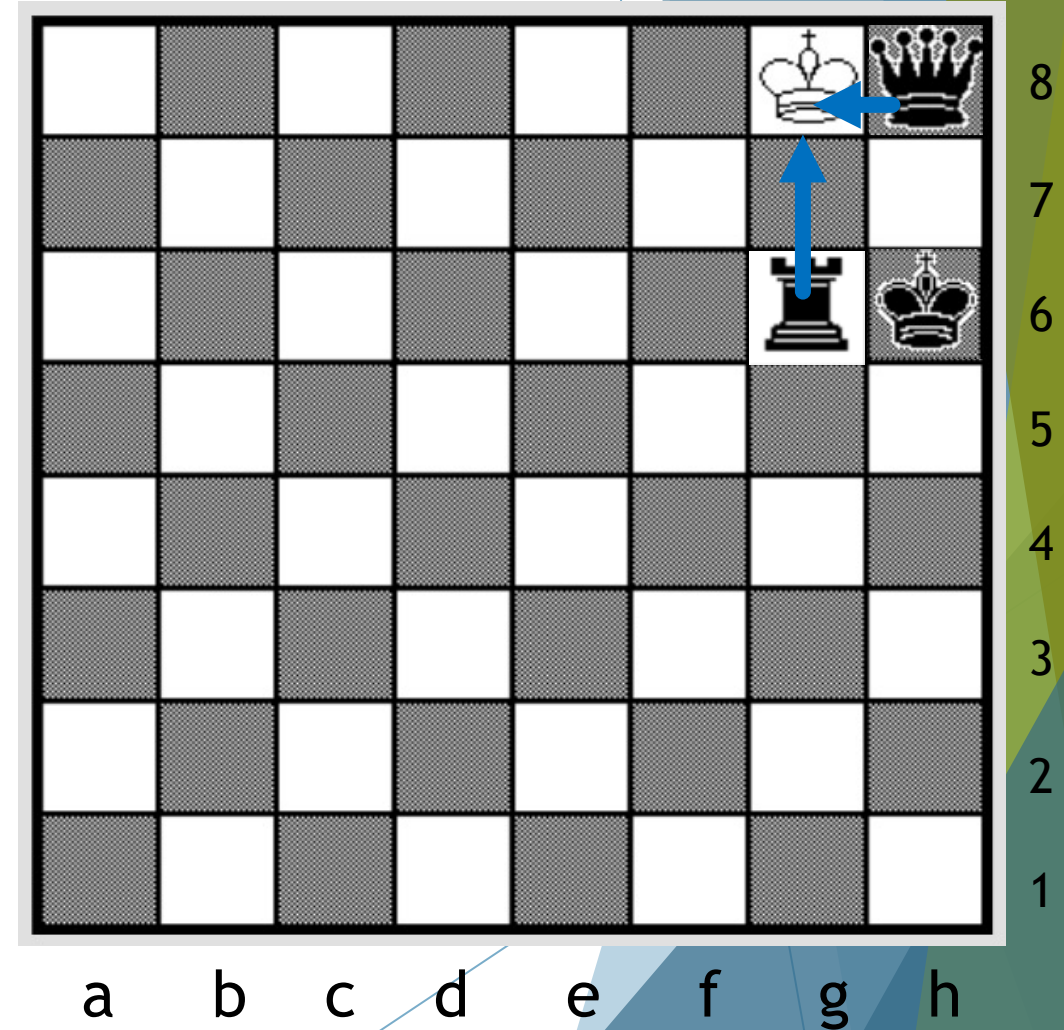
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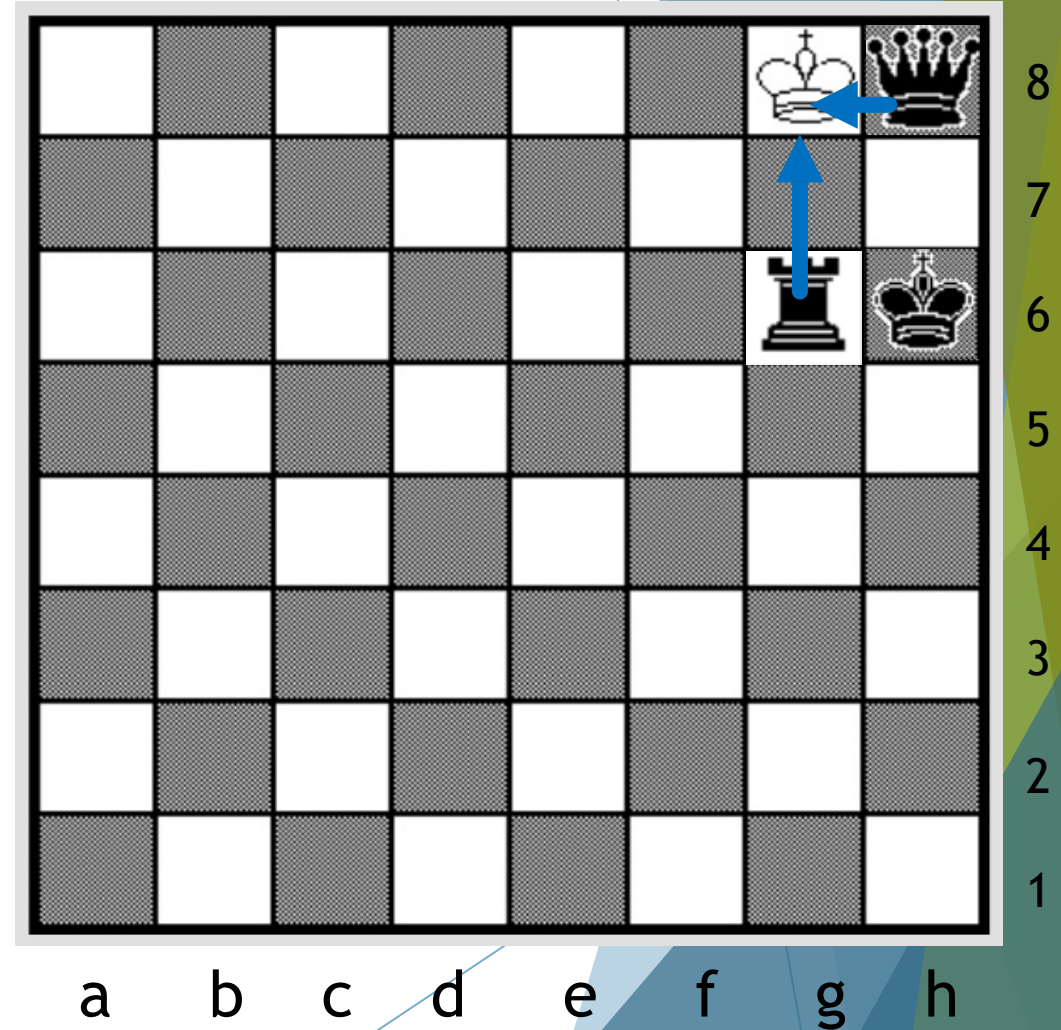
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 - ▶ Let's choose Rook & Queen as **Black**
- ▶ Can this state occur?
 - ▶ Now, **White King** has a double check



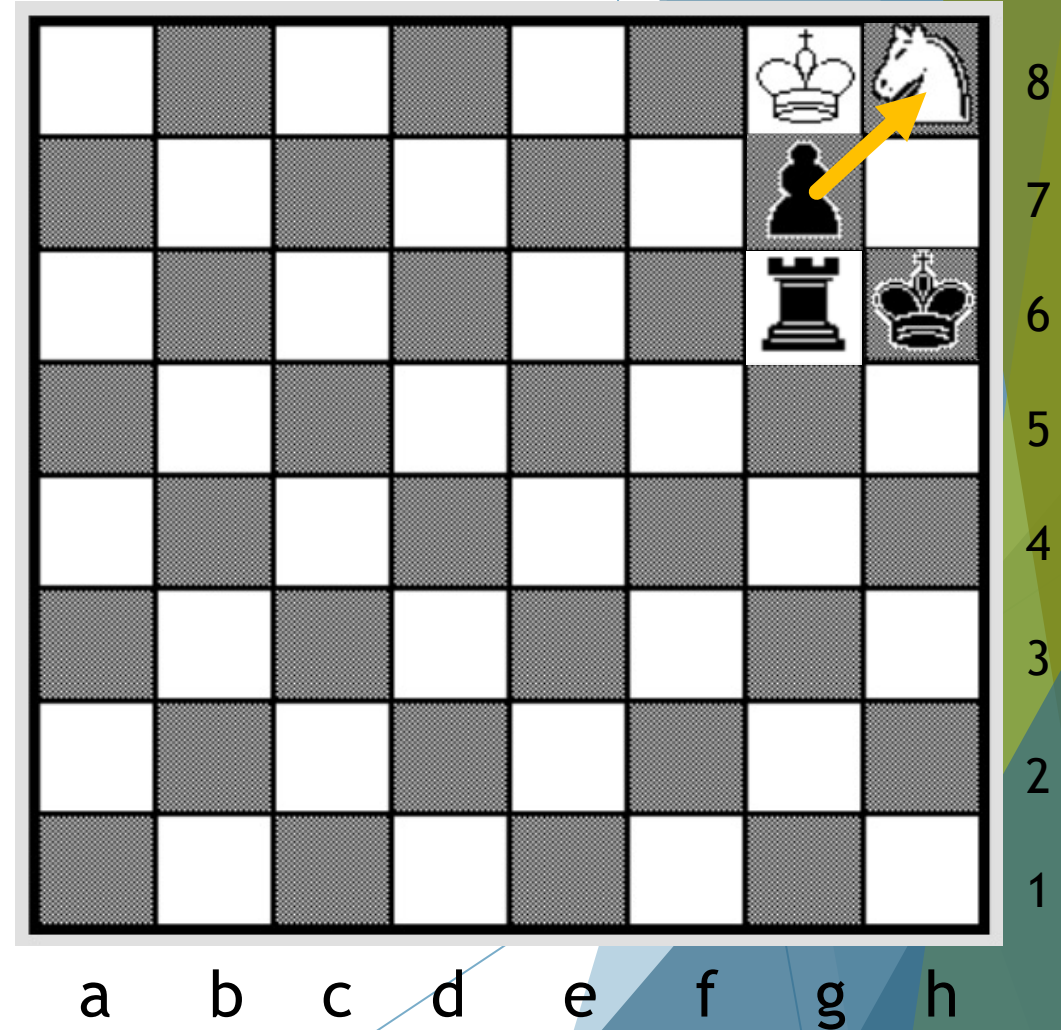
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- ▶ Can this state occur?
 - ▶ Now, White King has a double check
 - ▶ Is this possible?



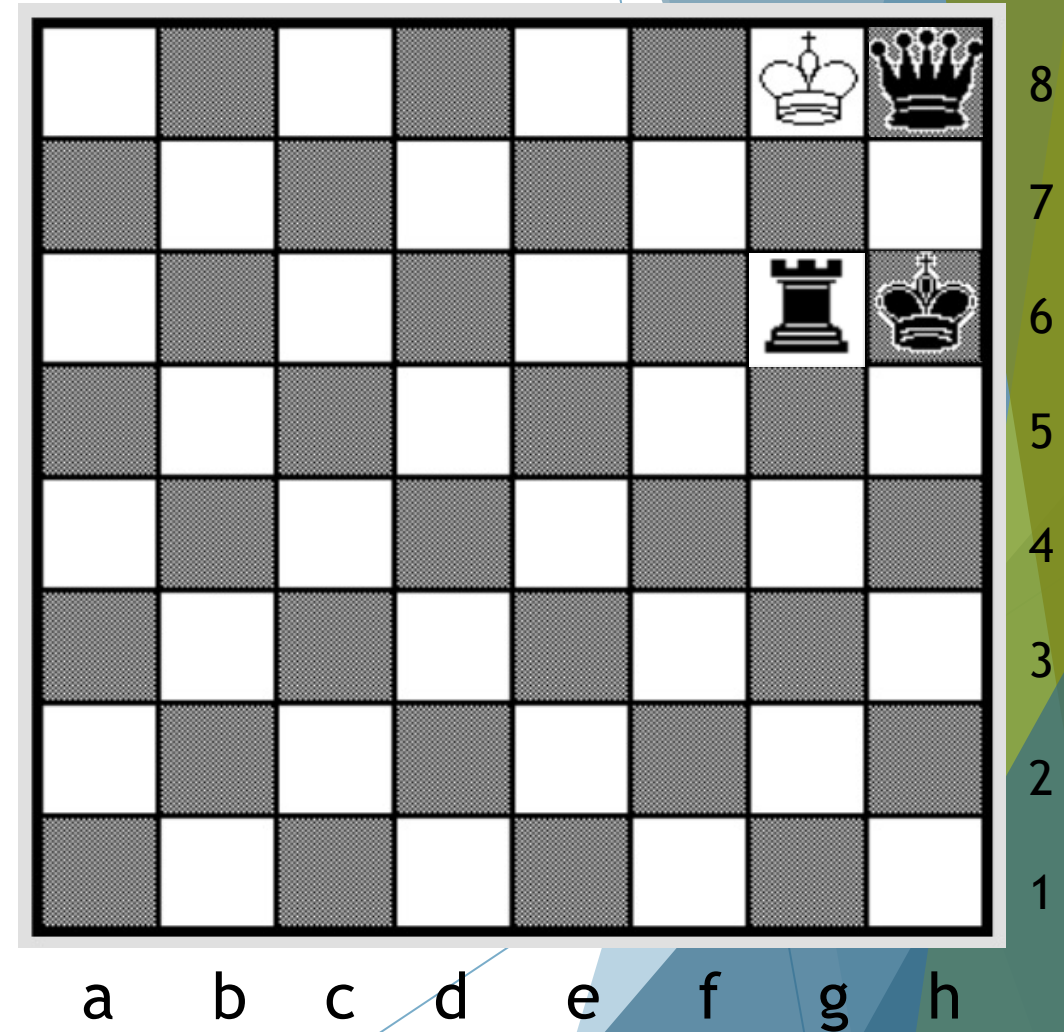
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 - ▶ Now, White King has a double check
 - ▶ Is this possible?
 - ▶ Yes, Pawn from g7 captures h8



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 - ▶ Now, White King has a double check
 - ▶ Is this possible?
 - ▶ Yes, Pawn from g7 captures h8
 - ▶ Pawn uncovers Rook check & promoted to Queen at h8



Thank you!

The background features abstract, overlapping geometric shapes in various shades of blue and green, primarily concentrated on the right side of the frame. The shapes are semi-transparent, creating a layered effect. The overall aesthetic is clean and modern.