The Chess Test (Chesst)

Daya Nidhan Singh

2 Hours 30 Minutes

Name: _____ Date: _____

Instructions:

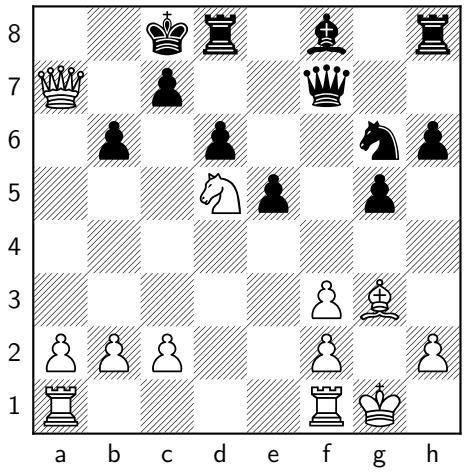
- This paper is a **non-chessboard paper**. You are **not** allowed to use an interactive chessboard, physical or digital, to assist in your answering.
- With this booklet, you will also be supplied a **spare booklet** for extra writing space, and empty chessboards that you can use to further justify your answers. Be clear as to which chessboards you refer to.
- This test contains 5 sections, each of which consisting of 9 questions. All questions in section 4 are worth 2 marks. In the other sections, the first three questions are worth 1 mark, the next three are worth 2 marks, and the final three are worth 3 marks.
- Where you have to specify a board layout, symmetric and rotationally symmetric layouts are considered identical.
- When writing on the boards, denote white pawns, knights, bishops, rooks, queens, and kings by the letters P,N,B,R,Q and K. To denote black pieces, add an apostrophe afterwards (i.e P',N',B',R',Q' and K').
- There is a **glossary** of relevant chess terms in the back. It is highly recommended that you read it before starting; some terms, such as 'pin', may be further specified to ensure clarity within the paper.
- In terms of material value, pawns, knights, bishops, rooks, queens, and kings are worth 1, 3, 3, 5, 9 and ∞ respectively

Information:

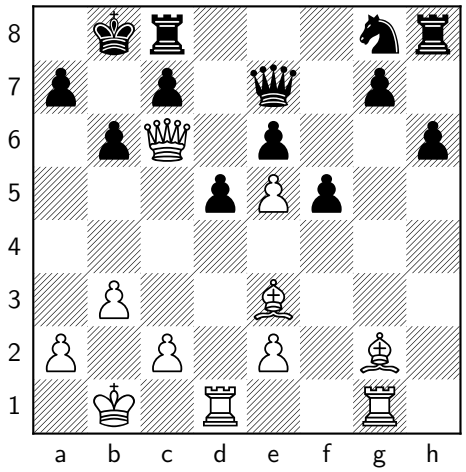
- This paper consists of 15 pages.
- The total mark for this paper is 90.

Section 1: Warm-Up Chess Problems

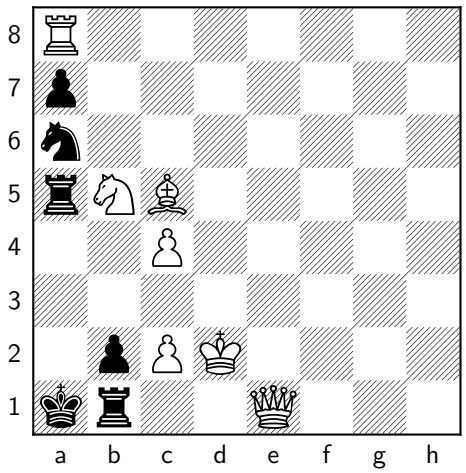
In this section, there are 9 'traditional' chess problems, all of which are white to move. Make sure to write down the entire line for all questions and explain your reasoning (if needed).



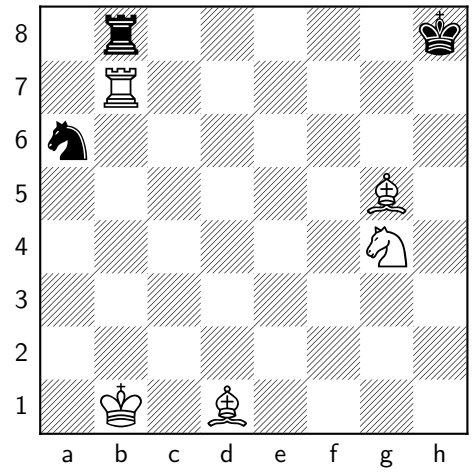
Best Move



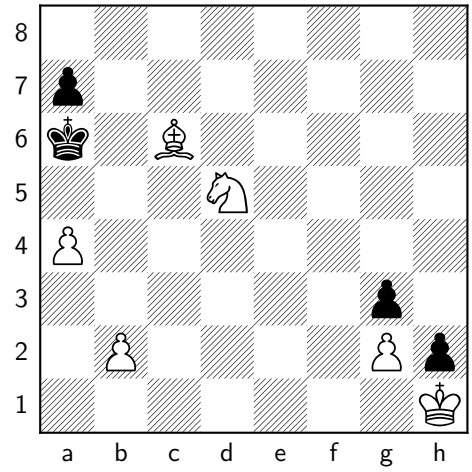
White to mate (no en passant)



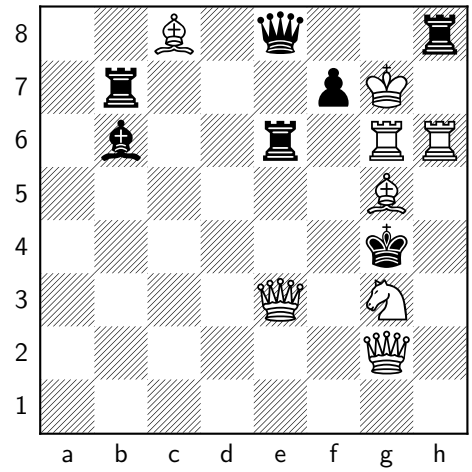
White to pin a black piece to the king in 3



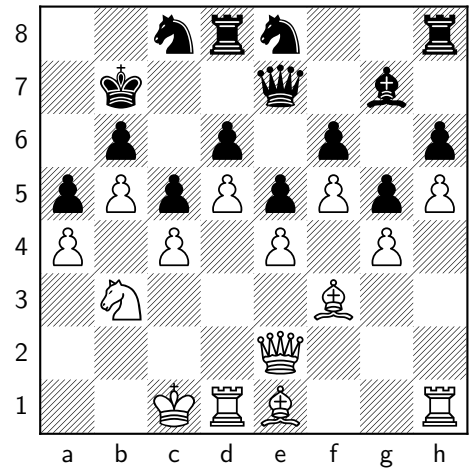
Mate in 7



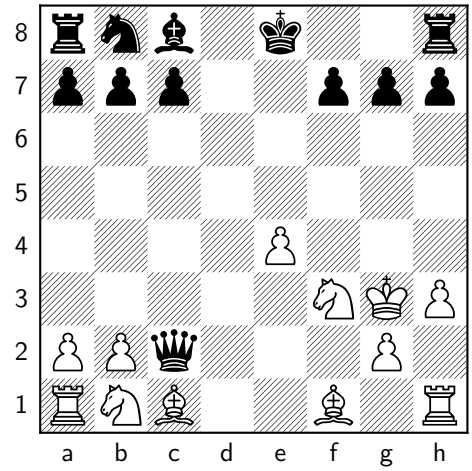
Mate in 3



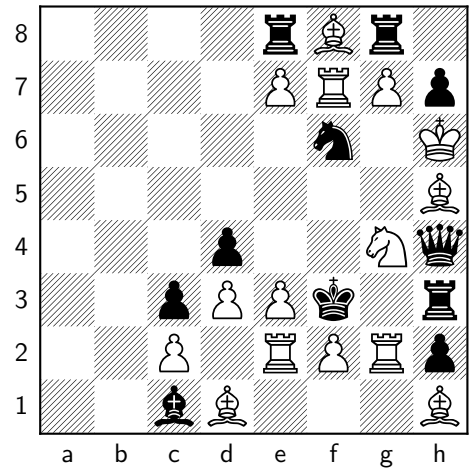
Selfmate in 2



Best move



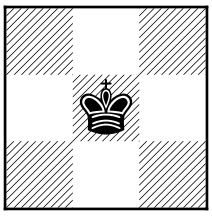
Best move



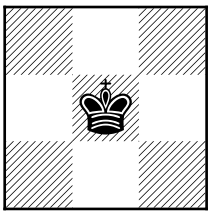
White to avoid checkmating black

Section 2: Close-proximity mates

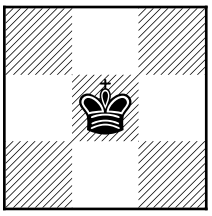
In this section, you must places pieces on these 3x3 boards (pawns can be on the edges and do not promote) such that the king is mated (not going to be mated, but already mated by white). Denote pawns, queens, knights, bishops and rooks with the letters P, Q, N, B and R respectively.



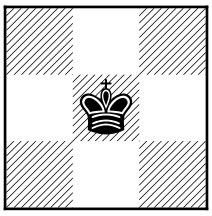
1 queen, 1 rook



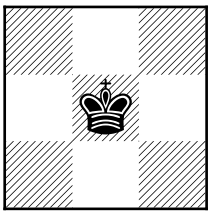
2 pawns, 2 rooks, 1 bishop



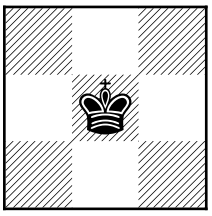
2 pawns, 3 knights, 1 bishop



2 pawns, 2 bishops, 1 rook

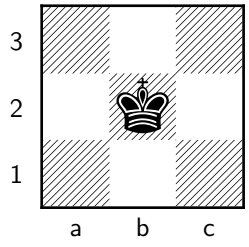


2 knights, 1 rook, 1 bishop, 1 pawn

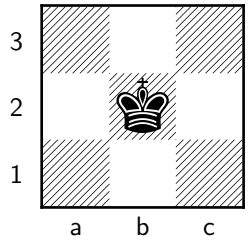


2 knights, 2 bishops, 1 pawn

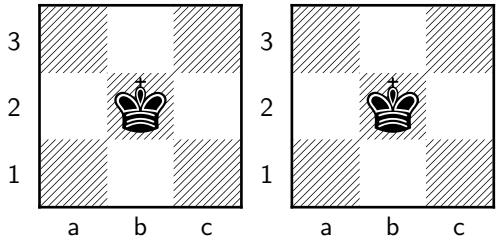
For the last three questions, justify why you have used the specified piece a minimum number of times.



1 pawn, minimal knights



1 bishop, 1 rook, minimal knights



Two solutions with 1 pawn, 1 knight, minimal bishops

Section 3: Limits of the Game

Below are 9 questions about the limits of what can be performed on a chess board, both in game and out. Assume the latter if unspecified. Note that you can use the blank chessboards in the other booklet, and label and refer to them to explain your answers.

a) If a king is immobile (that is it has no squares to go to), and on the next move, it is double checked, is it always mated? Why?

b) If a pawn moves two squares up and reaches a square horizontally adjacent to one of your pawns, and it is not pinned, is it always legal to perform en passant? Why?

c) Does there exist a board layout whereby all but one choice of promotion immediately stalemates your opponent (such as, a queen leads to a checkmate, but any other piece means the game is stalemated)? If so, how is it possible?

d) In a single move, what is the highest (positive) change in material difference (e.g pawn takes pawn leads to a *relative* increase in 1 point)? What is the move?

e) In a game, are all castling mate in 1s unnecessary when the mated king isn't on the bottom rank? That is, if the opponent's king isnt on the bottom rank, is there a setup where the only possible mate in 1 is through castling?

f) How many pieces can be attacked after just one move (that weren't attacked prior to the move)? Explain your answer?

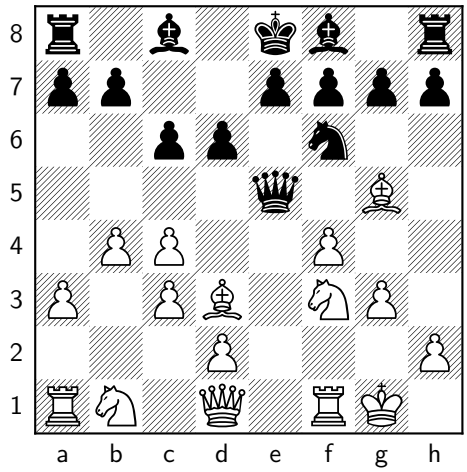
g) In a game, what is the smallest material (assuming the king is infinite) value required to checkmate a king? What is this position?

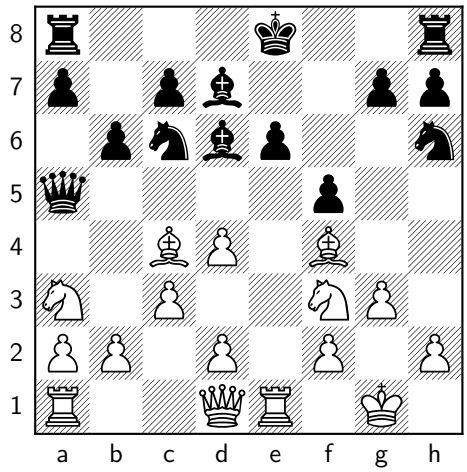
h) What is the smallest number of captures required to promote all pawns in a game? You may assume the kings do not accidentally get mated.

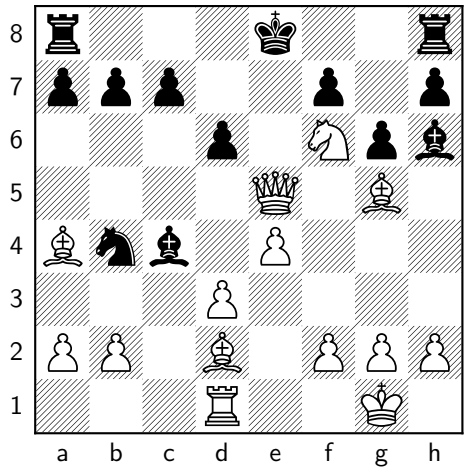
i) What is the largest number of checks (not necessarily possible in a game) that can be made on a king that is not a checkmate? How many such positions are there that do not use queens (consider positions in which rook(s) is/are moved along the same rank/file and/or bishop(s) along the same diagonal to be the same). You may assume that the king is in the same position on the board, and that rotationally symmetric solutions are distinct (but as usual, vertically symmetric solutions are not). All pieces must be checking pieces.

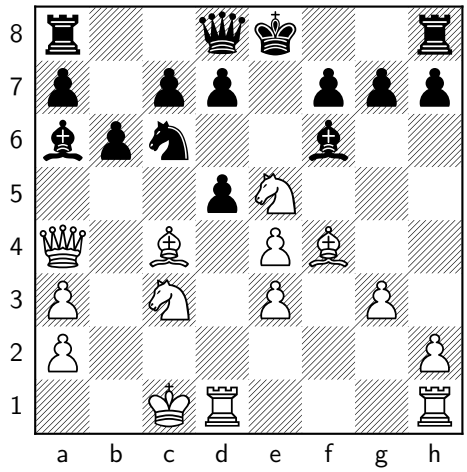
Section 4: Impossible Boards

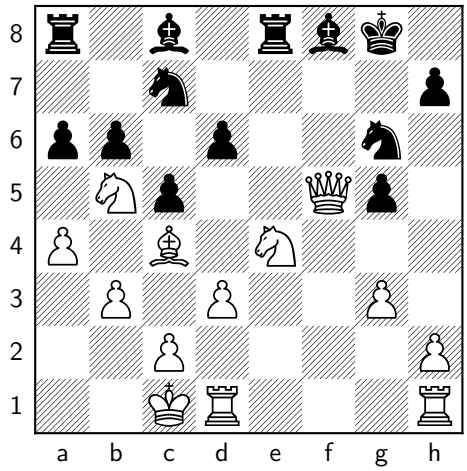
In this section, there are 9 positions; some of these positions impossible to reach in a standard chess game. Identify which of these are impossible, and explain why. Unlike the other sections, all questions are worth 2 marks here.

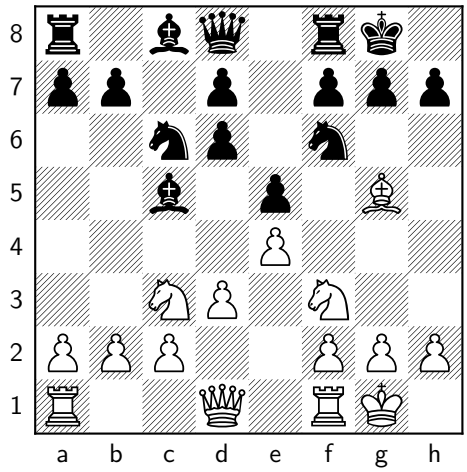


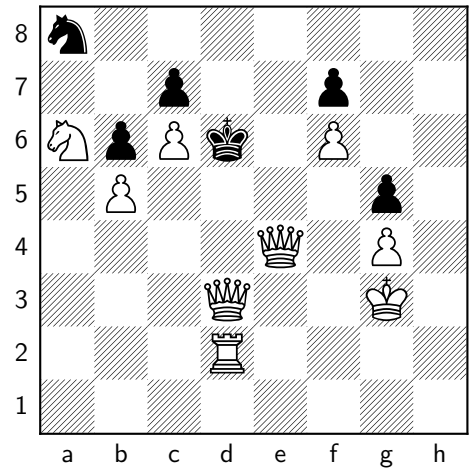


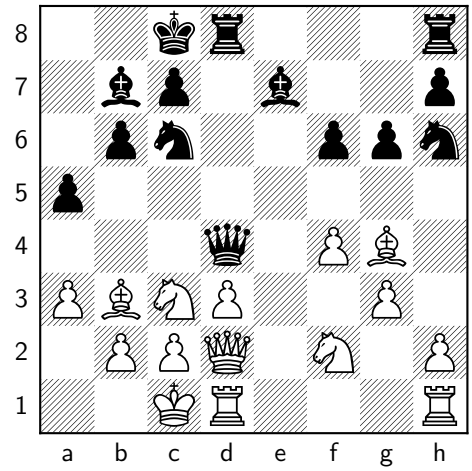


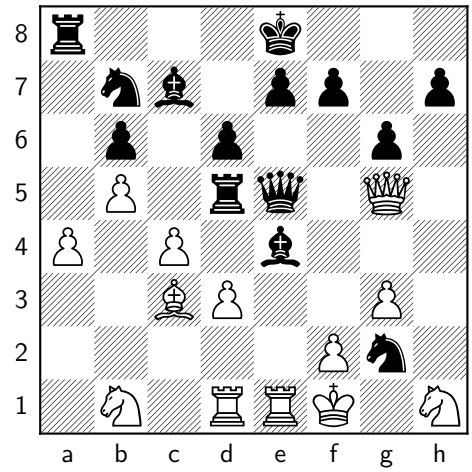








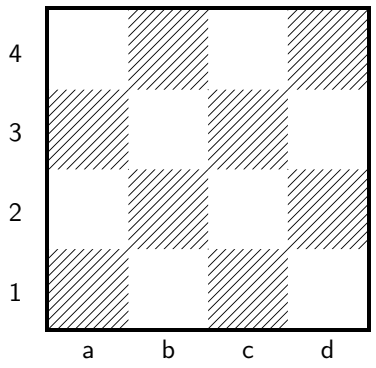




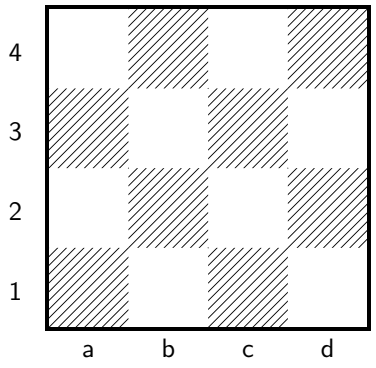
Section 5: 4 by 4 clue boards

In this section you are tasked to compose positions on these 4 by 4 boards. Each of these positions have restrictions you need to satisfy. Note that you are not allowed a pawn on the first or last rank, and that they can promote should they reach the latter. Denote white rooks, pawns, kings, bishops, queens and knights with the letters r, p, k, b, q and n. The same applies for black pieces; denote the difference with an apostrophe (i.e r', p', k', b', q' and n')

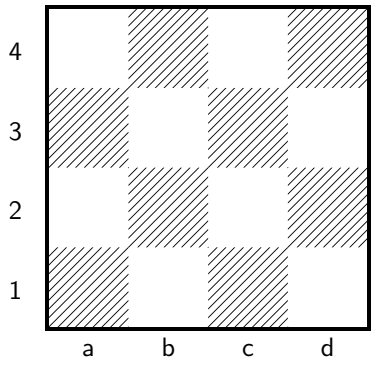
- This board contains, and only contains, a black bishop, and a white pawn, knight, queen and king.
- The knight is covering the white king, and is on the bottom rank.
- The king is in the process of being skewered (you may assume in this case that the king can still capture the skewering piece) to capture the queen.
- Only one square is undefended by white.



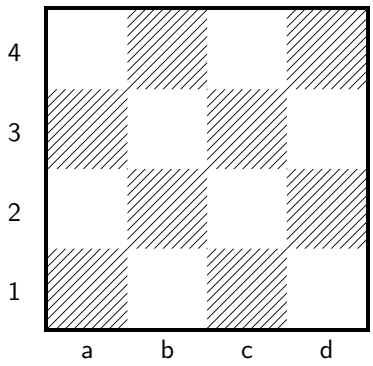
- This board contains, and only contains, a black queen and king, and a white pawn and king.
- Both kings only defend one square in common
- White is stalemated



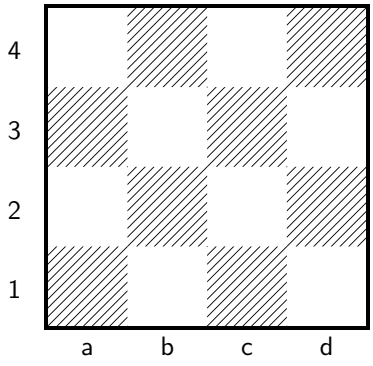
- This board contains, and only contains, 3 pawns and 1 bishop of any colours, and a king of each colour
- Both colours are stalemated



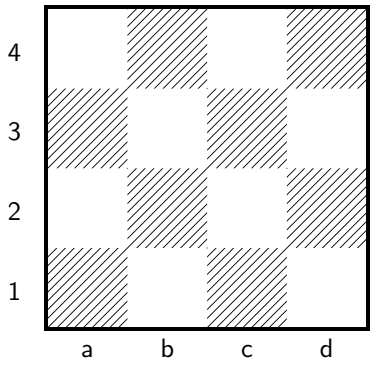
- This board contains, and only contains, a knight of each colour, a white bishop and a black rook
- The knights are on squares a minimum of 5 (knight) moves from each other
- The white bishop attacks two pieces
- the black rook is attacked *by* two pieces.



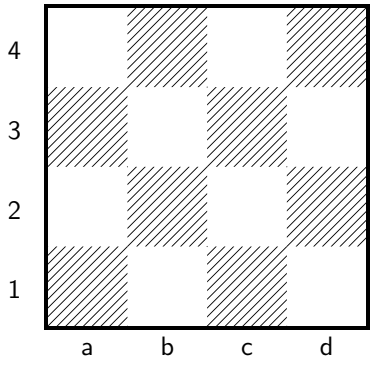
- This board contains, and only contains, a rook, knight, queen, and bishop, all of which attacking each other in a cycle (i.e A attacks B attacks C attacks D attacks A).
- All edges of the board have an occupied square
- No piece can see more than any other (including pieces of their own colour)



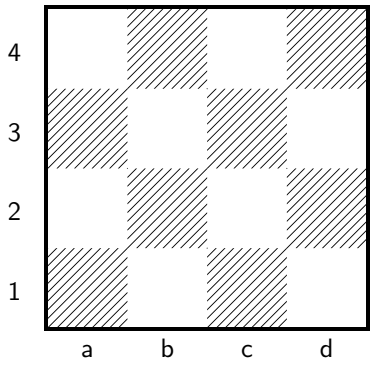
- This board contains, and only contains, a white pawn, bishop, knight, rook and queen
- No piece is in the others' lines of sight.



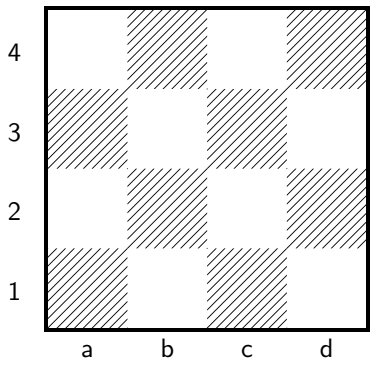
- This board contains, and only contains, a white rook, 3 pawns, and 2 knights, and a black king
- All squares except that of the black king is defended by a white piece



- This board contains, and only contains, a rook, bishop, knight, pawn, queen and king of each colour
- The board is vertically symmetric. however the mirror image of one half has the reverse colours (e.g white knight on a1 means a black knight on d1)
- The white king is checkmated (the black king is not) and is not in a corner square.



- This board contains, and only contains, a white pawn and knight, and a king of each colour.
- The black king is to be mated in (a minimum of) 6 (with white to move first)



Glossary

If you are unfamiliar with chess terminology, or would like clarification on terms, below is a glossary of terms:

Check: A Check is where a king is in a square which a piece of a different colour **sees**. A player cannot put themselves in check

Checkmate: When a King is checkmated, it is in **check** with the added fact that no move can take the king out of check

Forcing: A move is forced if it is the only legal move possible.

Line: A line is a sequence of moves that can occur. Lines often branch from what's known as the 'main line', which is the most likely sequence of moves to be taken.

Move: A move is where both black and white move a piece. Often ommitted when saying 'mate in 3 moves' or similar.

Pin: This is where a piece is in the way of an attack on a piece (usually the king or of something of higher value to itself) of the same colour. Specifically, if the piece is unable to move out of the line of attack, regardless if the attack was present, it does not constitute a pin. This means that if a piece is unable to move out of the pinning diagonal, file or rank, with or without a pinning piece (e.g through obstructing pieces of the same colour), then it cannot be pinned.

Reveal A reveal, or 'revealed attack', is where a piece moves out of the way so that another piece can **see** another.

Seen/Sight: If a piece 'sees' another, or a piece is in its 'sight', it means that the *seen* piece can be captured by that piece.

Selfmate: A player selfmates themselves by **forcing** the other to checkmate them.

Skewer: A skewer is an attack whereby a piece is compelled to move (such as a king under **check**), **revealing** an attack on another piece

Stalemate: When a player has no legal move to make, they are in stalemate