

Chess Puzzles

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Introduction

For a given chess piece, what is the maximum number of that piece that can be placed on a regular chess board without any piece 'aiming' at any other piece?

Rook

The case of the Rook is quite simple. A Rook will aim at the entire row and column upon which it is on. Since there is only 8 of each, the maximum is clearly 8 Rooks. This can be achieved by placing rooks on one of the diagonals.

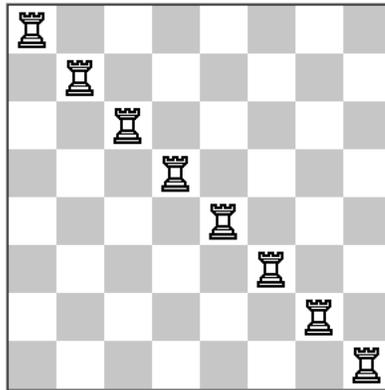


Figure 1: Solution for Rooks

Queen

A Queen will aim at an entire row and column just like a Rook, so should have a maximum of 8 placements. There are many possible solutions for the Queen.

The key is to use a 'stairs' like pattern.

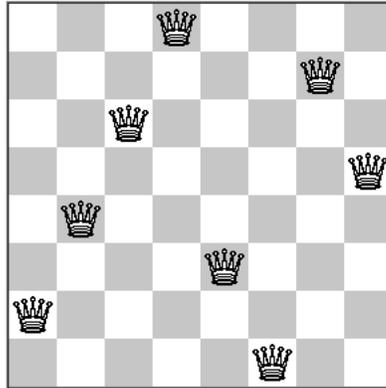


Figure 2: One such solution

Bishop

In order to find the solution of should think about how many distinct diagonal there are to occupy on a chessboard and where they terminate. You should arrive at an answer of 14.

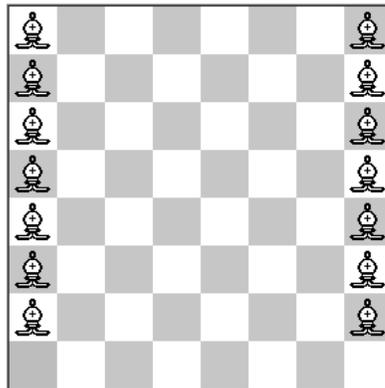


Figure 3: Bishops

Knight

In the case of Knights, one must realise that a knight changes colour when it moves. Using this we can see that a Knight on a black square aims solely at white squares. Thus Knights could be placed on every black square. Therefore you can place $\frac{64}{2} = 32$ Knights. How do we know this is the best we can do? Consider having a placement of more than 32 Knights. This would mean that all the squares of a certain colour were occupied. And that would imply that all the squares of the opposite colour were being aimed at. Contradiction!

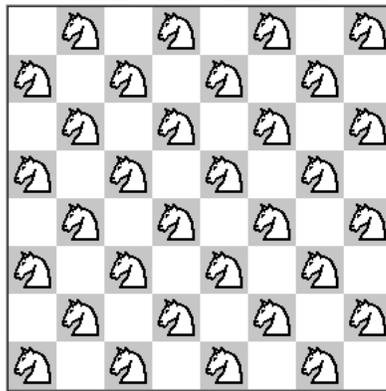


Figure 4: Knights

Kings

The easiest way to think about this one is to try to imagine superimposing a grid of kings onto the chess board and trying to see how many you can get to fit. This gives an answer of 16.

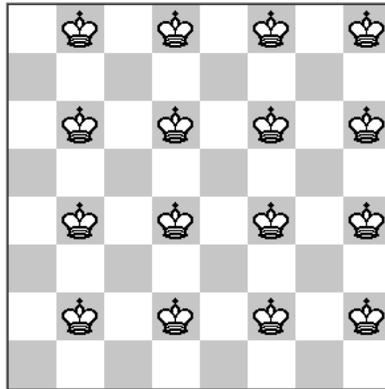


Figure 5: One solution

Questions

- What happens with larger chess boards?
- What happens for shapes other than squares?
- Consider pieces with different types of movement. Start with combinations of actual pieces e.g. a Rook and Knight