There are many different squares that can be drawn on the following dot paper. A few examples are shown below.

- How many different squares can be drawn that have the same side length as the square shown in the leftmost image?
- How many different squares can be drawn that have the same side length as the square shown in the middle image?
- How many different squares can be drawn that have the same side length as the square shown in the rightmost image?
- What other side lengths are possible for squares drawn on this dot paper?

To make sure that we get a correct count, we need to organize our thinking. We will group the different possible squares based on their side lengths.

First, convince yourself that there are exactly nine different lengths that a line segment on this board could have. Examples of line segments with each of these lengths are shown below and labelled A - I.

Remember that all vertices of a square drawn must lie on dots. This means the images above show the only possible side lengths of a square on this board.

Now let’s count how many different squares of each side length can be drawn.
There are 9 squares with side lengths equal to the length of A.

There is 1 square with side lengths equal to the length of C.

There are 4 squares with side lengths equal to the length of B.

There are 4 squares with side lengths equal to the length of D.

There are 0 squares with side lengths equal to the length of E, F, H, or I.

No matter how you place these line segments on the grid, the squares formed must extend past the edges of the grid. Some examples are shown below.

There are 2 squares with side lengths equal to the length of G.

This means there are $9 + 1 + 4 + 4 + 2 = 20$ different squares that can be drawn on the dot paper.

Can you do a similar count to figure out how many different squares can be drawn on dot paper that is 5 dots by 5 dots (instead of 4 dots by 4 dots)?