An astronomer takes a photograph of a small spot in the sky like the one above, and counts 350 stars in this star field.

This field is the size of the full moon, and it takes 165,000 of these photographs to cover the entire sky.

If all the other fields have the same number of stars as the one counted, how many stars would the astronomer estimate that cover the entire sky?

Answer:

If X is the total number of stars over the entire sky, then :

$$\frac{350 \text{ stars}}{1 \text{ Field}} = \frac{X}{165{,}000 \text{ fields}}$$

350 stars x 165000 fields = X so X = 57,750,000 stars

Note to Teacher: If students used their own eyes to count stars, they would see fewer than 1000 across the entire sky because human eyes are not as sensitive as a camera or a telescope.

A single, short exposure of 10 seconds might only capture the light from a dozen stars, while a much longer exposure of 10 minutes or an hour might capture 100,000 stars or more.

The number of stars that you estimate across the sky depends on how many of the faintest stars you include in the count.