Water of Crystallisation

Many ionic compounds have associated with them water molecules e.g. Copper sulfate crystals have a formula CuSO₄.5H₂O
For every 1 mol of CuSO₄ there are 5 moles of water
This water can be removed by heating

Terminology:
- **Hydrated Salt**: a compound containing water of crystallisation
- **Anhydrous**: Without water
- **Dehydrate**: to remove water

Calculating water of crystallisation
1. Find molecular mass of the anhydrous salt and water
2. Calculate the number of moles of each
3. Calculate the simplest ratio of anhydrous salt to water (divide by smallest)
4. Convert this to whole numbers (like working out Empirical Formula)
5. Write the formula of the hydrated compound

Example
4.96g of hydrated sodium thiosulfate (Na₂S₂O₃.xH₂O) was dehydrated and formed 3.16g of anhydrous salt. Find x.
(Na=23, S=32, O=16, H₂O = 18 g mol⁻¹)

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<thead>
<tr>
<th></th>
<th>Na₂S₂O₃</th>
<th>H₂O</th>
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<tbody>
<tr>
<td>m</td>
<td>3.16g</td>
<td>4.96 – 3.16 = 1.80g</td>
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<tr>
<td>M</td>
<td>158 g mol⁻¹</td>
<td>18 g mol⁻¹</td>
</tr>
<tr>
<td>n</td>
<td>0.0200 mol</td>
<td>0.100 mol</td>
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<tr>
<td>Simplest ratio</td>
<td>1</td>
<td>5</td>
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<tr>
<td>Formula</td>
<td>Na₂S₂O₃. 5 H₂O</td>
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