Conversion of Scale

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**Map Scale**: It is the ratio of Map distance to Ground distance.

\[
\text{Map Scale} = \frac{\text{Map distance}}{\text{Ground distance}}
\]

Following table shows some useful conversions which are regularly used in practices of conversion of scale. There are two types of scale systems in the syllabus, Metric and British system.

<table>
<thead>
<tr>
<th>Metric System</th>
<th>British System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Km = 100000 Centimeter</td>
<td>1 Mile = 63360 Inches</td>
</tr>
<tr>
<td>1 Km = 1000 Meter</td>
<td>1 Furlong = 7920 Inches</td>
</tr>
<tr>
<td>1 Meter = 100 Centimeter</td>
<td>1 Yard = 36 Inches</td>
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<tr>
<td></td>
<td>1 Foot = 12 Inches</td>
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</tbody>
</table>
1. **Verbal Scale (VS):** This is a simplest form of scale which is express verbally with a proper unit system. It is easy to understand and simple to express.

   *Example:* $1 \text{ cm} = 10 \text{ Km}$ or $1 \text{ Inch} = 5 \text{ Miles}$

   **Disadvantage:** To understand this type of scale one must aware about that particular scale system.

2. **Representative Fraction (RF):** This is also called numerical scale, which is expressed by numbers only. Here we can apply any scale system. In this scale both the side unit should be same.

   *Example:* $1:100000$ it can expressed verbally like, $1 \text{ cm} = 100000 \text{ cm}$.

   **Disadvantage:** Both verbal and Numerical scale does not stand against reduction and enlargement of map.
Conversion of Scale

1. Verbal Scale (VS) to Representative Fraction (RF)

   Example: 1 cm = 5 Km

Procedure:
As we have to convert this VS into RF and rule RF says that both the side unit should be same. Therefore either we have to convert cm into km or km into cm. In this case km into cm is right choice. But remember while expressing RF numerator (map unit) is always 1.

For Metric System
   1 cm = 5 Km
   1 Km = 100000 cm (Put the value of cm in 1 Km)
\[ \therefore 1 \text{ cm} = 5 \times 100000 \text{ cm} \] (Here we got same units at both the sides.)
\[ \therefore 1 \text{ cm} = 500000 \text{ cm} \] (Same units will considered as cancelled.)
\[ \therefore 1 : 500000 \] (Finally RF would be expressed in this way)
For British system

2 inches = 5 miles
1 mile = 63360 inches (Put the value of inches in 1 mile)
∴ 1 inch = (5 * 63360) / 2 inches

(As per rule numerator should be 1 so here in this case we have to divide the formula by 2. And here we got same units at both the sides.)

∴ 1 inch = 316800 / 2 inches (Same units will considered as cancelled.)
∴ 1 : 158400 (Finally RF would be expressed in this way)
Conversion of Scale

2. Representative Fraction (RF) to Verbal Scale (VS)

Example: 1 : 1000000

Procedure:
As we have to convert this RF into VS and according to rule of VS map unit and ground unit are always different. We can convert RF in any system like; Metric or British.

For Metric system

1 : 1000000
1 cm = 1000000 cm (can be expressed like this)
1 Km = 100000 cm (Put the value of cm in 1 Km)
∴ 1 cm = 1000000/100000 Km (Here we got different units)
∴ 1 cm = 10 Km
For British system

1 : 1000000

1 inch = 1000000 inches (can be expressed like this)

1 mile = 63360 inches (Put the value of inches in 1 mile)

\[ \therefore 1 \text{ inch} = \frac{1000000}{63360} \text{ miles} \]  (Here we got different units)

\[ \therefore 1 \text{ inch} = 105.78 \text{ miles} \]