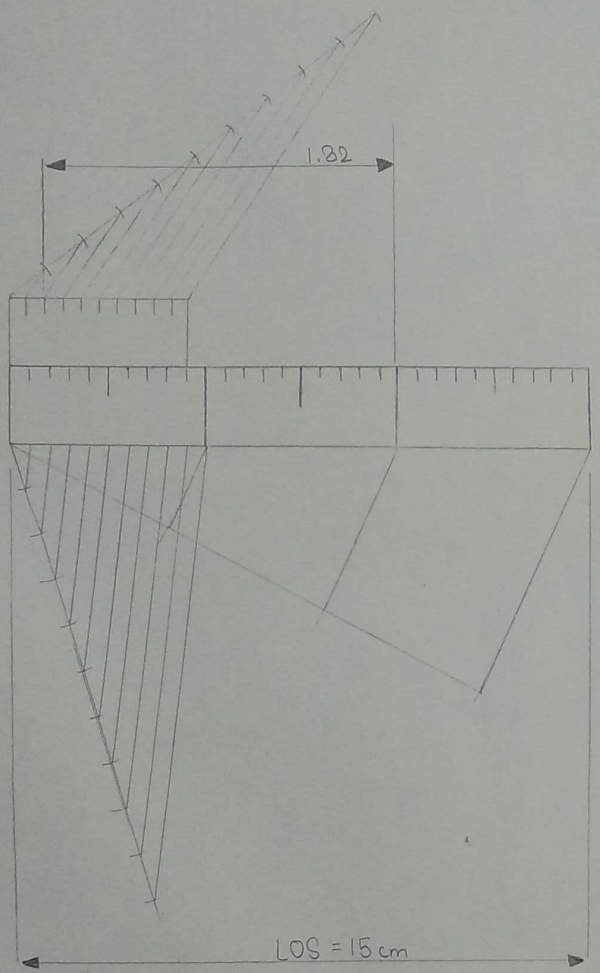
Q1



$RF = \frac{1}{20}$

$LOS = 3 \times 100 \times \frac{1}{20} = 15\ cm$

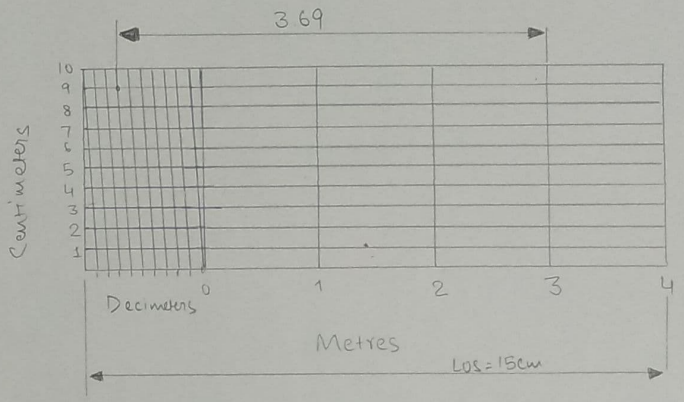
$MSD = \frac{1}{10} \times 1m = 1dm$

$10\ VSD = 9\ MSD \Rightarrow VSD = 0.9\ dm$

$LC = MSD - VSD = 0.1\ dm = 1cm$

Using forward vernier scale, length = $0.72(VSD) + 1.1(MSD)$

Q2.



Max length = 5m

$RF = \frac{3}{100}$

$LOS = 5 \times 100 \times \frac{3}{100} = 15cm$

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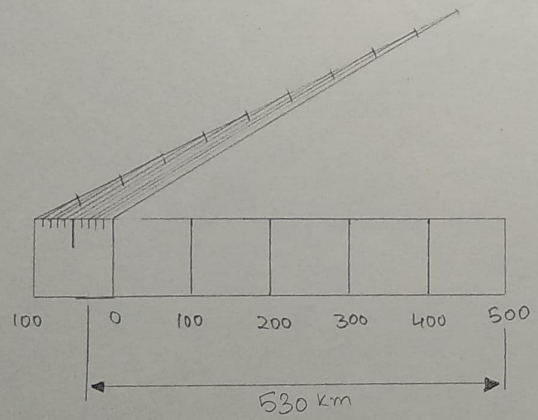
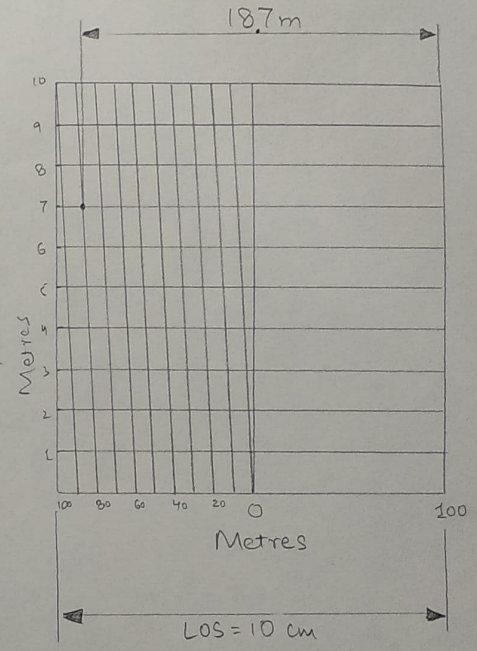
Q3 $RF = \frac{50\ mm}{250\ km} = \frac{50 \times 10^{-3}}{250 \times 10^{3}} = \frac{1}{5 \times 10^{6}}$

$LOS = \frac{1}{5 \times 10^{6}} \times 600 \times 10^{5}\ cm = 12\ cm$



Q4. $RF = \frac{22\ cm}{440\ m} = \frac{1}{2 \times 10^{3}}$

$LOS = \frac{200\ m}{2 \times 10^{3}} = 10\ cm$



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