#6.1 EDM (or theodolite) is a method of determinating the length between two points using electromagnetic waves. Total station is a device that shave similarities with a theodolite and can be used to measure distances as well as angles.

#6.2 Average pace for 200ft: $\frac{92+90+92+91+93+91}{5} = 91.5$

$\rightarrow \frac{91.5}{200}\frac{\text{paces}}{\text{ft}} = 0.4575\frac{\text{paces}}{\text{ft}}$

a) pace length: $\frac{85+86+86+84}{4} =$ **85.25 paces**

b) AB length: $85.25 \times \frac{1}{0.4575} =$ **186.34 ft**

#6.5 Stadia: distance obtained by sighting through telescope equipped with two or more horizontal cross wires at a knowing space

Odometers: converts the number of a revolution of a wheel of known circumference to distance, particularly for short and curved lines

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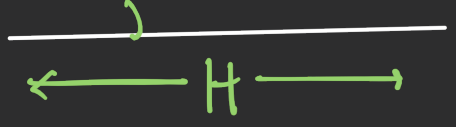
#6.7 a) AB = 104.98 ft ($= L$), slope angle = $2°13'46" = 2.229°$ ($= \alpha$)

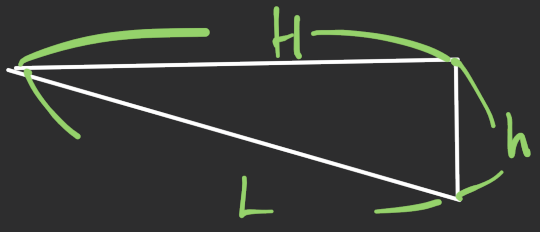
$H = L\cos\alpha$



$= 04,98 \cos$ 2.3 4

$= \boxed{104.979 \text{ ft}}$

b) $AB = 86.793\text{ m}$ (= L), elevation A to B $= -2.499\text{ m}$ (= h)



$$L^2 = H^2 + h^2 \longrightarrow H^2 = L^2 - h^2$$

$$\longrightarrow H = \sqrt{L^2 - h^2}$$

$$= \sqrt{86.793^2 - (-2.499)^2}$$

$$= \boxed{86.757\text{ m}}$$

#6.9 ① Tape must be straight and held at the same elevation.

② Bad communication will cause jerking and waste time.

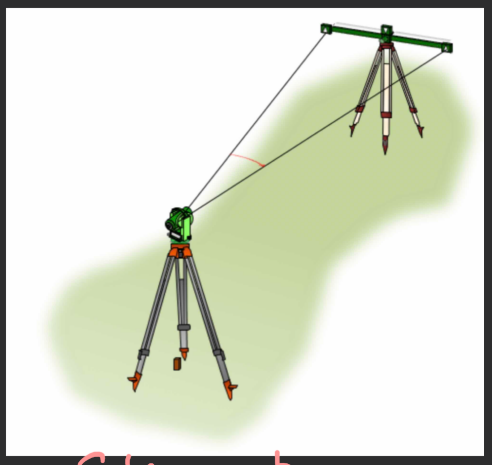
③ pulling tape tight enough from the each ends to avoid sagging

④ Record carefully

#6.10 There are two reasons :

1. the rear point is held steady on a fixed objects while the other end is plumbed.
2. If breaking point is necessary, the head taperperson can more conveniently use the hand level to proceed down hill a distance.

#6.15



Subtense Bar

Reflector target & surveyor's staff

Subtense bar is indirect distance-measuring equipment unlike reflector target & surveyor's staff.

It uses theodolite to read horizontal angle subtended by two targets where as the other two equipments are read with a single path / direction.

#6.20

$h_e = 5.53\text{ft}$

$h_r = 6.00\text{ft}$

$z = 93°20'06'' = 93.335°$

$L = 489.65\text{ft}$

$\alpha = 3.335°$

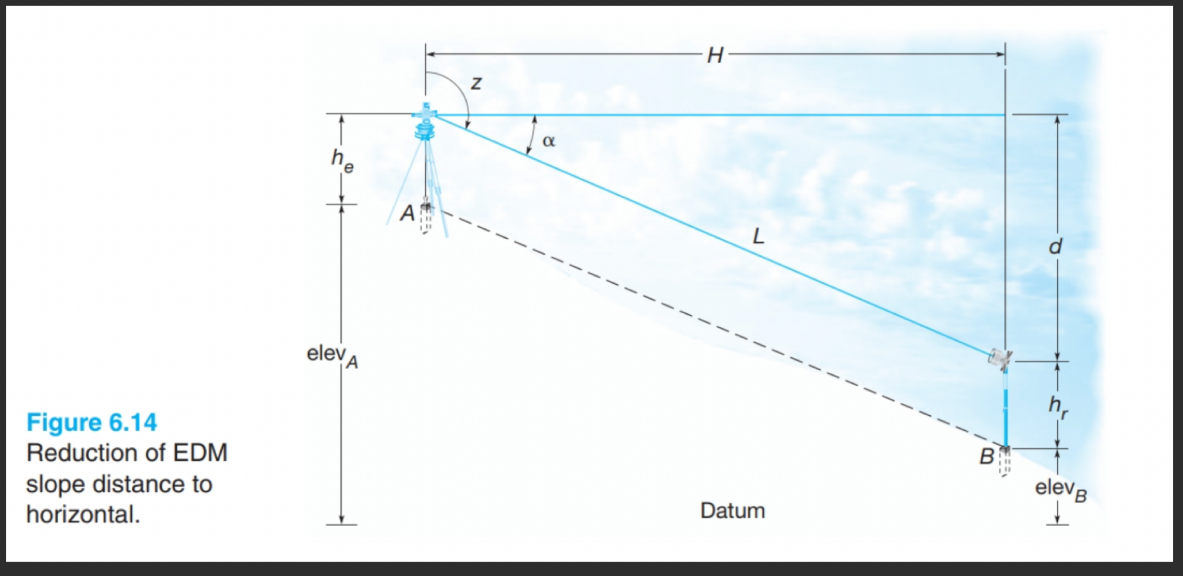


Figure 6.14 Reduction of EDM slope distance to horizontal.

Find AB

$H = L\cos\alpha = 489.65\cos 3.335° = 488.82\text{ft}$

$d = \sqrt{L^2 - H^2} = \sqrt{489.65^2 - 488.82^2} = 28.50\text{ft}$

$h_e + elev_A = d + h_r + elev_B$

$elev_A - elev_B = d + h_r - h_e = 28.50 + 6.00 - 5.53$

$elev_A - elev_B = Y = 28.97\text{ft}$

$AB = \sqrt{H^2 + Y^2} = \sqrt{488.82^2 + 28.97^2} = 489.68\text{ft}$