2.Rise and Fall:

$$\Delta H = \text{previous reading} - \text{following reading}$$

If ΔH is (+) then called Rise (R)
If ΔH is (-) then called fall (F)

$$\Delta H = \text{second elevation} - \text{frist elevation}$$

$$\text{Elev. of station} = \text{Last elev.} \quad \pm (\text{R or F})$$

$$\sum \text{Rises} - \sum \text{Falls} = \text{elev. of last point- elev. of first point}$$
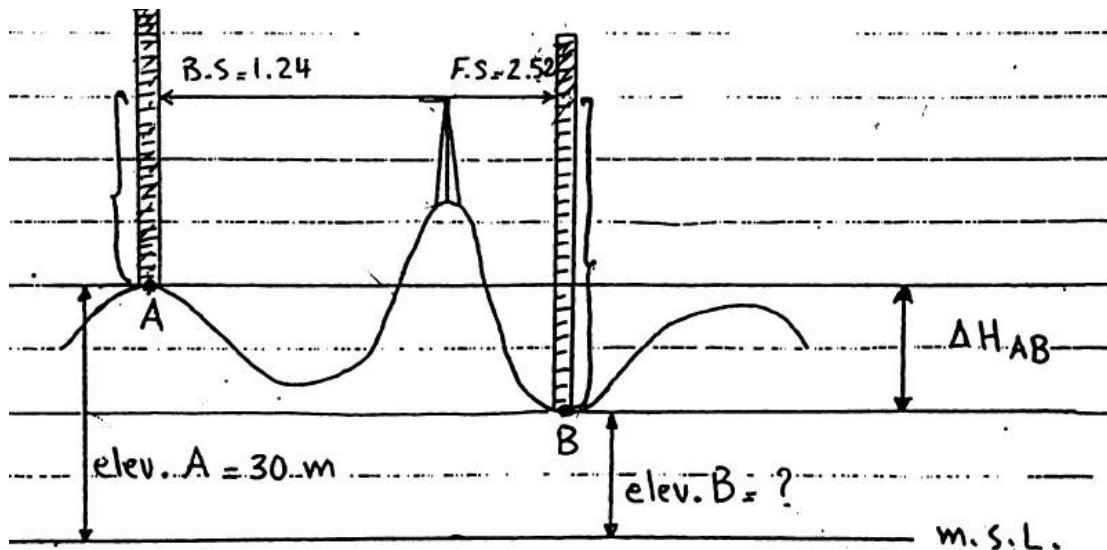
$$\Delta H = B.S - F.S$$

$$\Delta H = 1.24 - 2.52$$

$$= -1.28 \text{ fall (F)}$$
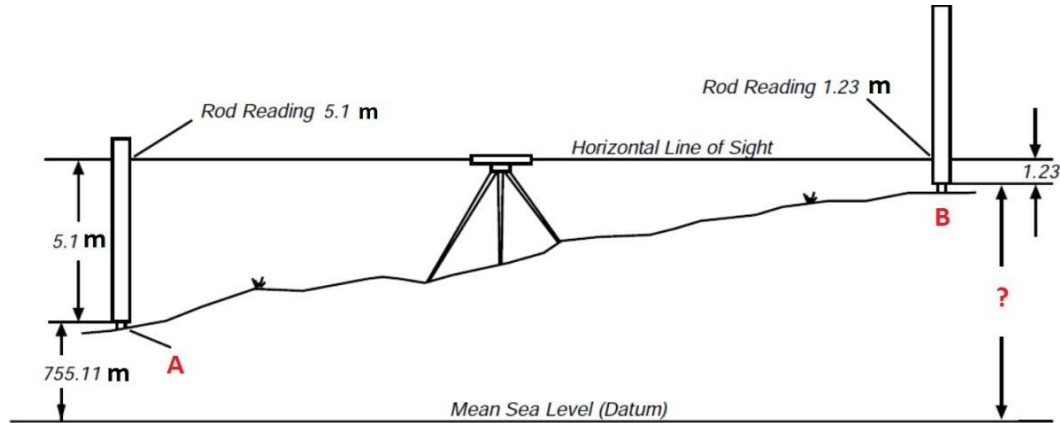
$$\Delta H = \text{elev. B} - \text{elev. A}$$

$$-1.28 = \text{elev. B} - 30$$

$$\text{elev. B} = 30 - 1.28$$

$$= 28.72 \text{ m}$$

Example

For a given figure below, find the elevation of point B.

Sol:

Height of Instrument Method	Rise and Fall Method
H.I = elev. (A) + BS	ΔH = BS – FS
= 755.11+5.1 = 760.21 m	= 5.1 – 1.23 = 3.87 m (R)
Elev. (B) = H.I – FS	Elev. (B) = Elev. (A) + R
= 760.21 – 1.23 = 758.98 m	= 755.11 + 3.87= 758.98 m

Example

For the given figure below, if the elevation of BM-A is 2053.18 foot, find the elevation of BM using both height of instrument and rise and fall methods and check the results (All dimensions are in foot).

2
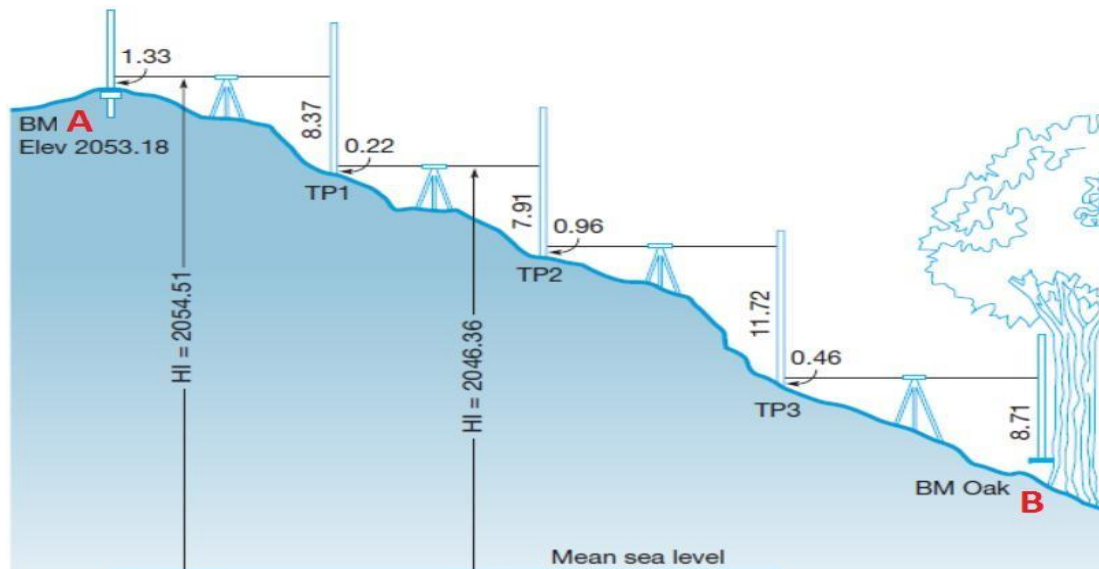
Sol:

1. **Height of Instrument Method:**

Station	BS	FS	HI	Elevation	Remarks
A	1.33		2054.51	2053.18	BM
B	0.22	8.37	2046.36	2046.14	TP1
C	0.96	7.91	2039.41	2038.45	TP2
D	0.46	11.72	2028.15	2027.69	TP3
E		8.71		2019.44	BM
Sum	2.97	36.71			

$$\sum BS - \sum FS = \text{Last Elev.} - \text{First Elev.} = -33.74 \text{ m}$$
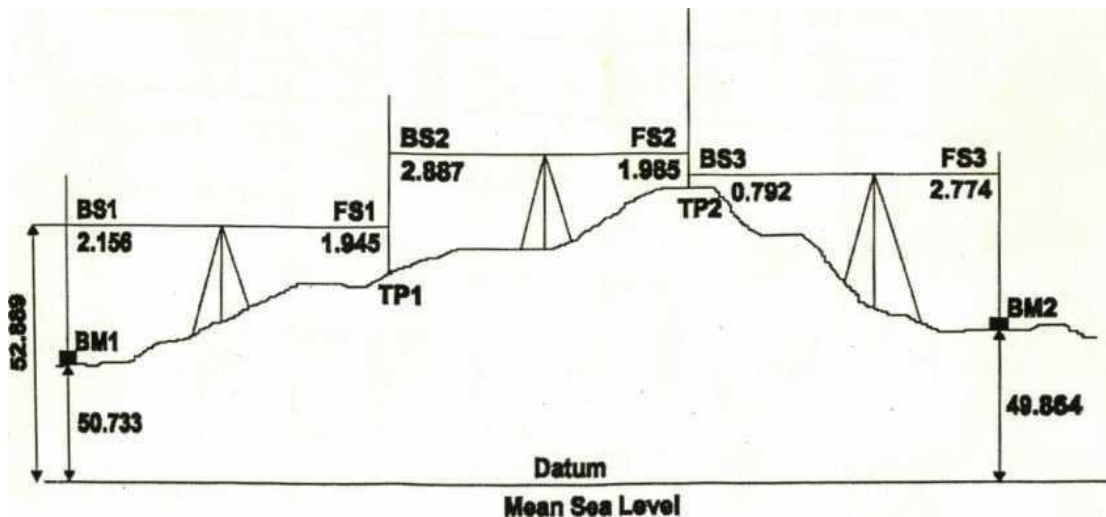
2. **Rise and Fall Method:**

Station	BS	FS	R	F	Elevation	Remarks
A	1.33			7.04	2053.18	BM
B	0.22	8.37		7.69	2046.14	TP1
C	0.96	7.91		10.76	2038.45	TP2
D	0.46	11.72		8.25	2027.69	TP3
		8.71		0	2019.44	BM
Sum	2.97	36.71		33.74		

$$\sum BS - \sum FS = \sum R - \sum F = \text{Last Elev.} - \text{First Elev.} = -33.74 \text{ m}$$

Example

In a construction of housing complex project, the following set of reading was obtained: 2.156, 1.945, 2.887, 1.985, 0.792, and 2.774. The first reading was taken on a bench mark of 50.733 m elevation and the instrument was shifted after each two readings, compute the elevation of last reading which is nearby the project and fixed as BM using both HI and R&F methods and check the results.

Solution: Draw the sketch as follows:

3

1. Height of Instrument Method:

Station	BS	FS	HI	Elevation	Remarks
A	2.156		52.889	50.733	BM
B	2.887	1.945	53.831	50.944	TP1
C	0.792	1.985	52.638	51.846	TP2
D		2.774		49.864	BM
Sum	5.835	6.704			

∑BS - ∑FS = Last Elev. – First Elev. = - 0.869m

2. Rise and Fall Method:

Station	BS	FS	R	F	Elevation	Remarks
A	2.156		0.211		50.733	BM
B	2.887	1.945	0.902		50.944	TP1
C	0.792	1.985		1.982	51.846	TP2
D		2.774			49.864	BM
Sum	5.835	6.704	1.113	1.982		

∑BS - ∑FS = ∑R - ∑F = Last Elev. – First Elev. = - 0.869m

4

Example

find the elevation of all point if the elevation of Last point is 30.57 m.

Point	B.S	F.S	elevation	notes
A	1.24			B.M
B	3.25	2.52		
C	2.52	1.42		
D	1.24	0.26		
E		3.48	30.57	

Point	B.S	F.S	Rise	Fall	elevation	notes
A	1.24				30	B.M
B	3.25	2.52		1.28	28.72	
C	2.52	1.42	1.83		30.55	
D	1.24	0.26	2.26		32.81	
E		3.48		2.24	30.57	

$$\sum R - \sum F = \text{Last El8ev.} - \text{First Elev.}$$

$$4.09 - 3.52 = 30.57 - 30$$

$$0.57 = 0.57$$