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16/ENG03/040
Civil Engineering.

1a) for the rise and fall method advatages

i) It is easy to spot errors
ii) It can get checks on re reduced level of the intermediate points
iii) This system is suitable where re are no intermediate points

(b)

Disadvantages of the rise and fall method

i) visualization is necessary regarding the measure of the ground
ii) It is laborious involving several calculations.

Advantages of the height of collimation

i) visualization is not necessary regarding the nature of the ground
ii) It is easy and quick to solve
iii) There are two checks on the accuracy of the calculations

Disadvantage of the height of collimation

i) Errors in the intermediate sight can not be detected
ii) There is no check on the rise of the intermediate sight.

BS	FS	IFS	H.I of C	R.L	Distance	
0.771			193.771	193	0	RL
0.802		1.52	193.053	192.251	10	CP
	2.311			190.742	20	
3.580		1.990	194.643	191.063	30	CP
	1.220			193.423	40	
	3.675			190.968	50	
2.408		4.020	193.031	190.623	60	CP
	0.339			192.692	70	
0.780		0.157	193.654	192.874	80	CP
	1.535			192.119	90	
	1.955			191.699	100	
	2.430			191.224	110	
	2.985			190.669	120	
1.155		3.480	191.327	190.174	130	CP
	1.960			189.369	140	
	2.365			188.964	150	
0.935		3.640	188.624	187.689	160	CP
	1.045			187.579	170	
	1.630			186.994	180	
		2.545		186.079	190	
Σ		Σ				
10.431		17.852				

Check o

H of C = RL + staff reading (B.S)

RL = H of C - staff reading

First reduced level = 110 + matric number

= 110 + 083

= 193

1) H of C = RL + BS

= 193 + 0.771

= 193.771

RL = H of C - staff reading

= 193.771 + 1.520 = 192.251

H of C = 192.251 + 0.802

= 193.053

RL = 193.053 - 2.311 = 190.742

RL = 193.053 - 1.990 = 191.063

H of C = 191.063 + 3.580

= 194.643

RL = 194.643 - 1.220 = 193.423

RL = 194.643 - 3.675 = 190.968

RL = 194.643 - 4.020 = 190.623

H of C = 190.623 + 2.408 = 193.031

RL = 193.031 - 0.339 = 192.692

RL = 193.031 - 0.157 = 192.874

H of C = 192.874 + 0.780 = 193.654

RL = 193.654 - 1.538 = 192.119

RL = 193.654 - 1.955 = 191.699

RL = 193.654 - 2.430 = 191.224

RL = 193.654 - 2.985 = 190.669

RL = 193.654 - 3.480 = 190.174

H of C = 190.174 + 1.155 = 191.329

RL = 191.329 - 1.960 = 189.369

RL = 191.829 - 2.865 = 188.964

RL = 191.829 - 3.640 = 187.689

H of C = 187.689 + 0.935 = 188.624

RL = 188.624 - 1.045 = 187.579

RL = 188.624 - 1.630 = 186.994

RL = 188.624 - 2.545 = 186.079.

2.A

Chainage (m)	0	30	60	90	120	150	180	210	240	270
Offset length (m)	0	2.65	3.80	3.75	4.63	3.60	5.00	5.80	6.10	5.85

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Using Mid-ordinate rule

$A = d\Sigma h$

$h_1 = \frac{0 + 2.65}{2} = 1.325$

$h_2 = \frac{2.65 + 3.80}{2} = 3.225$

$h_3 = \frac{3.80 + 3.75}{2} = 3.775$

$h_4 = \frac{3.75 + 4.65}{2} = 4.2$

$h_5 = \frac{4.65 + 3.60}{2} = 4.125$

$h_6 = \frac{3.60 + 5.00}{2} = 4.3$

$h_7 = \frac{5.00 + 5.80}{2} = 25.4$

$h_8 = \frac{5.80 + 6.10}{2} = 25.95$

$h_9 = \frac{6.10 + 5.05}{2}$

$= 5.975$

$\Sigma h = h_1 + h_2 + h_3 + h_4 + h_5 + h_6 + h_7 + h_8 + h_9$

$= 1.325 + 3.225 + 3.775 + 4.2 + 4.125 + 4.3 + 5.4 + 5.95$

$+ 4.125 + 4.3 + 5.4 + 5.95$

$\Sigma h = 38.275\ m$

$d = 30m$

$A = d\Sigma h$

$= 30 + 38.275$

$= 1148.25\ m^2$.

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Average ordinate rule.

$$A = \frac{nd\Sigma_0}{n+1}$$

$n = 10-1 = 9$

$d = 30$

$\Sigma_0 = 2.0 + 2.65 + 3.80 + 3.75 + 4.65 + 3.60 + 5.00 + 5.80 + 6.10 + 5.85$

$\Sigma_0 = 41.2m$

$A = \frac{9 \times 30 \times 41.2}{9+1} = 1112.4m^2$

Trapezoidal Rule.

$$A = d\left[\frac{O_1 + O_n}{2} + O_2 + O_3 + O_4 \; \ldots + O_{n-1}\right]$$

$d = 30$

$$A = 30\left[\frac{0 + 5.85}{2} + 2.65 + 3.80 + 3.75 + 4.65 + 5.60 + 5.00 + 5.80 + 6.10\right]$$

$A = 30\,[38.275]$

$A = 1148.25\,m^2$.

Simpson rule.

$$A = \frac{d}{3}\left[(O_1 + O_n) + 4(O_2 + O_4 + O_6 + O_{n-1}) + 2(O_3 + O_5 + O_7 + \ldots + O_{n-1})\right]$$

$d = 30$

Note: last offset was removed because number of offset was even

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$$A = \frac{30}{3}\left[(0+6.10) + 4(2.65+3.75+3.60+5.80) + 2(4.55+5.20+3.80)\right]$$

$$A = 30/3\ (96.2)$$

$$A = 962\ m^2.$$

Using trapezoidal rule to solve the last offset.

$$A = d\left[\frac{O_1+O_n}{2} + O_2 + O_3 + O_4 + \cdots + O_{n-1}\right]$$

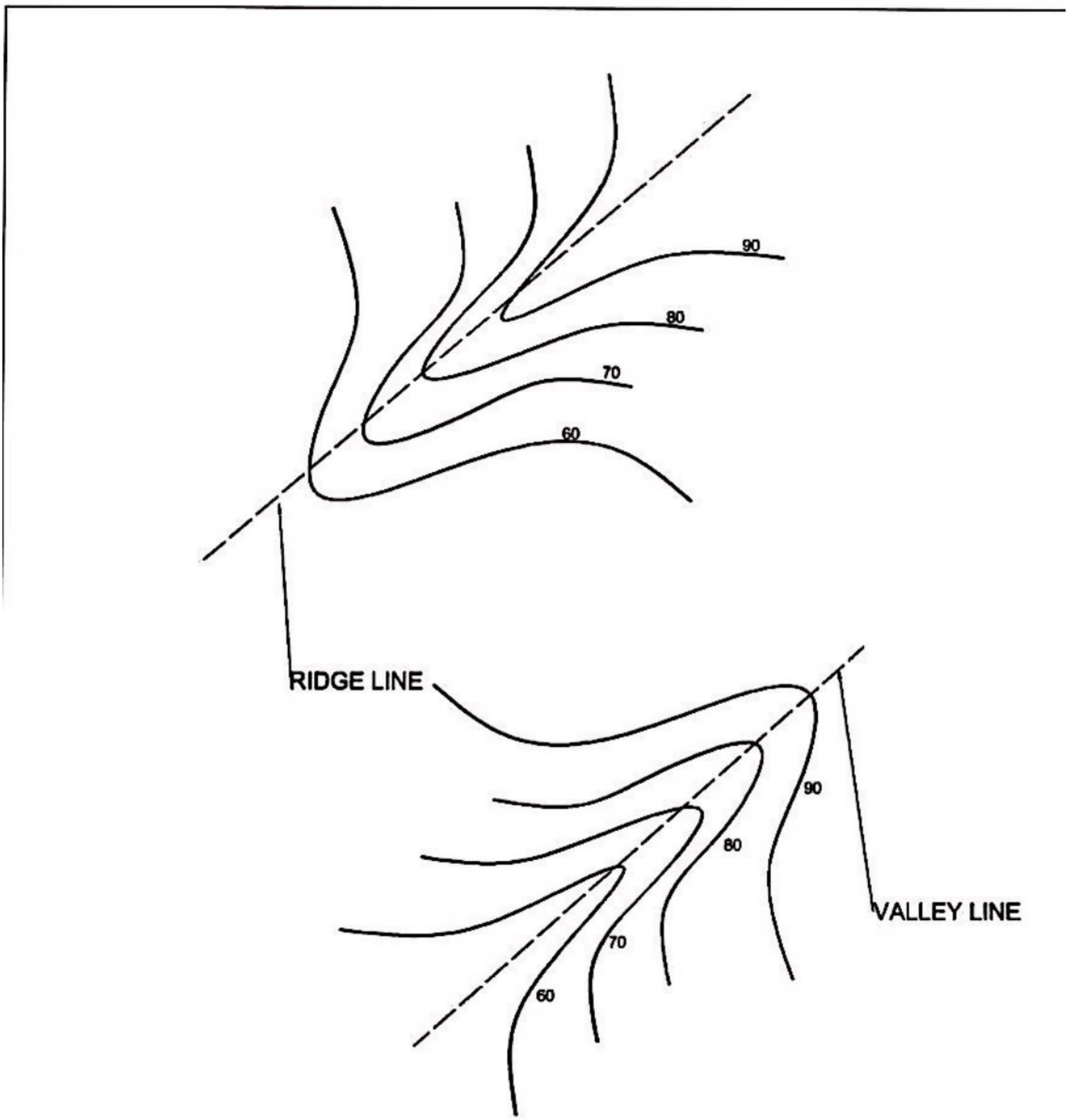
$$d = 30$$

$$A = 30\left[\frac{6.40+5.85}{2}\right]$$

$$A = 183.75\ m^3$$

Therefore $\Sigma A = 962 + 183.75$

$$= 1147.75\ m^2$$



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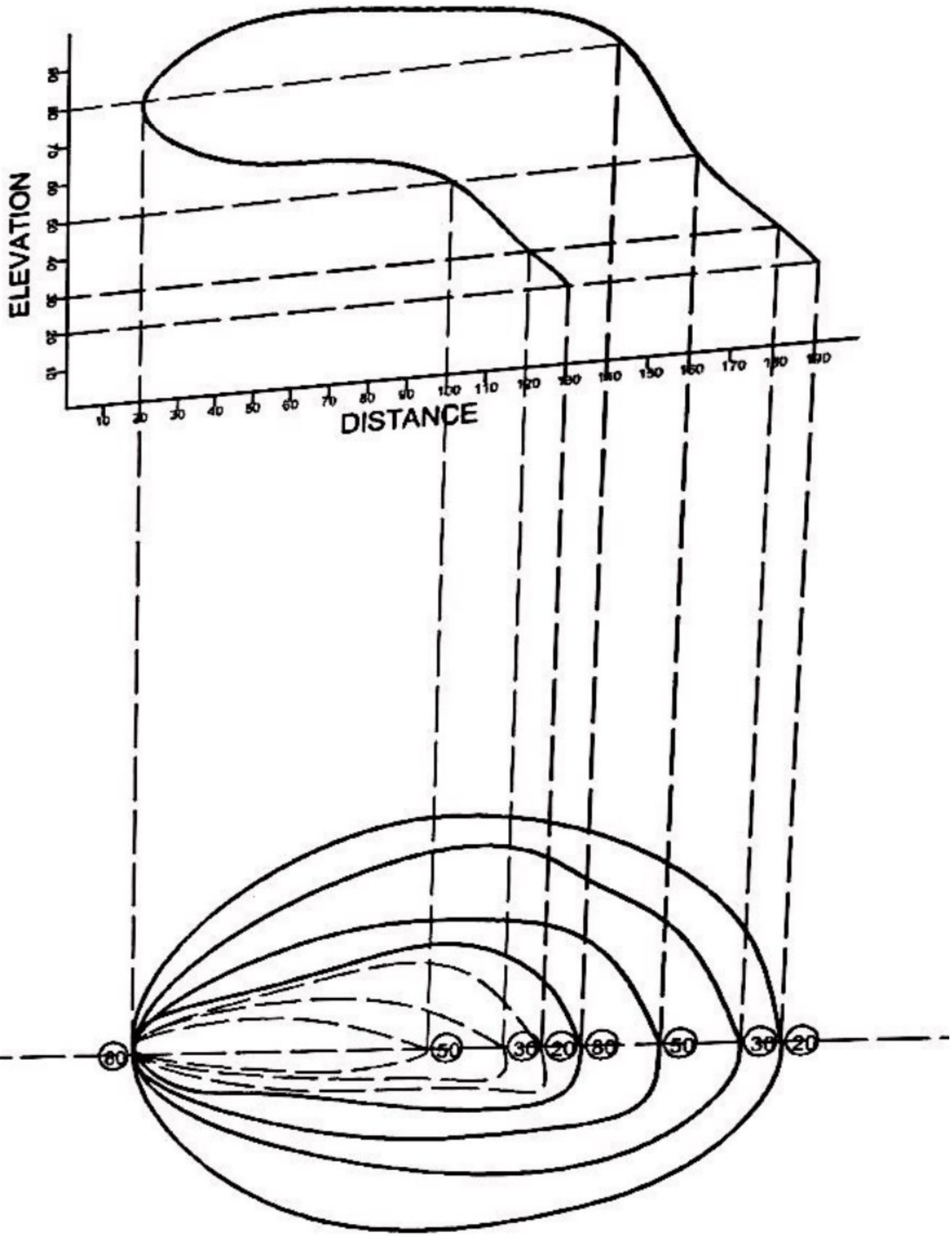

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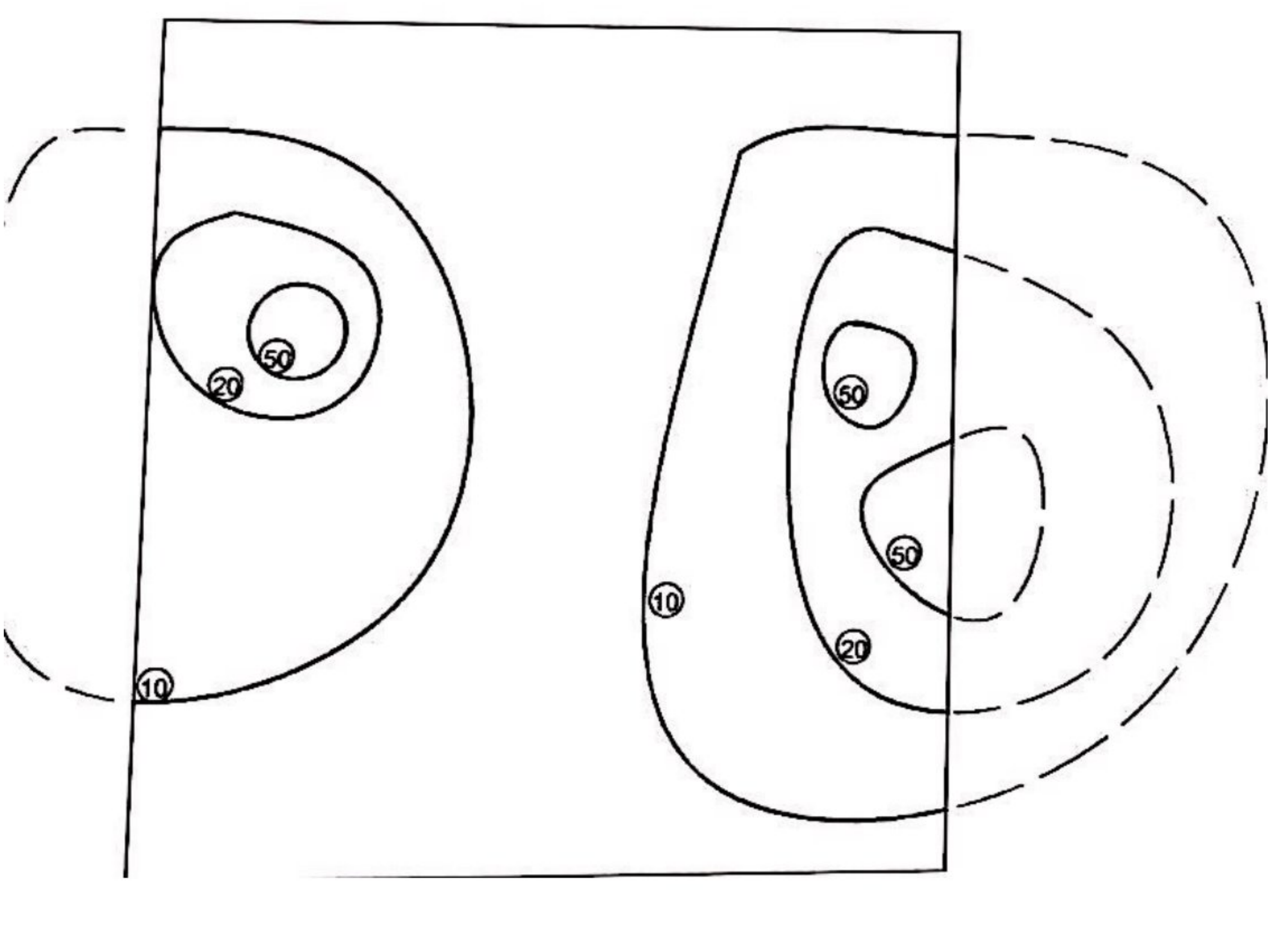

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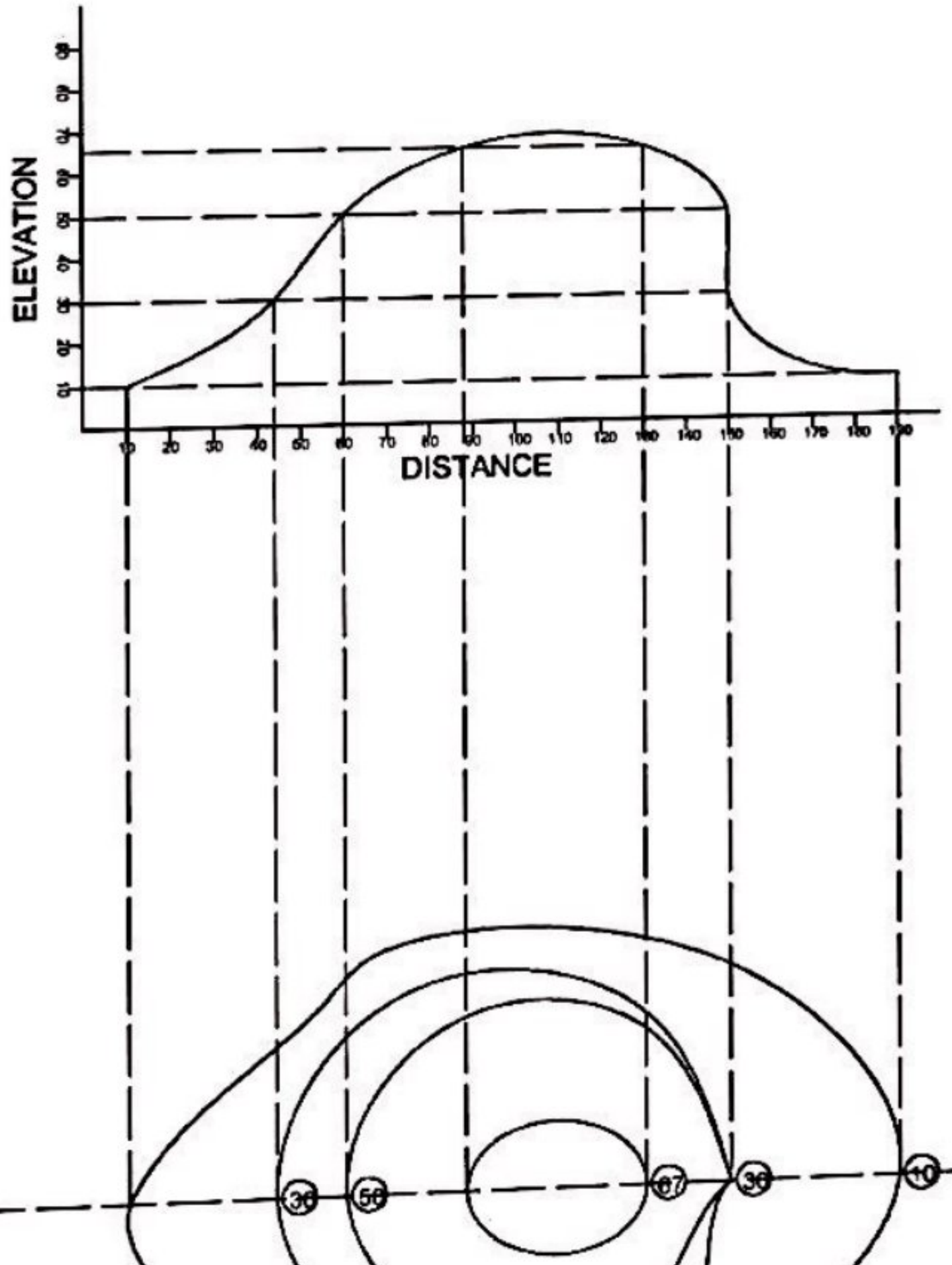

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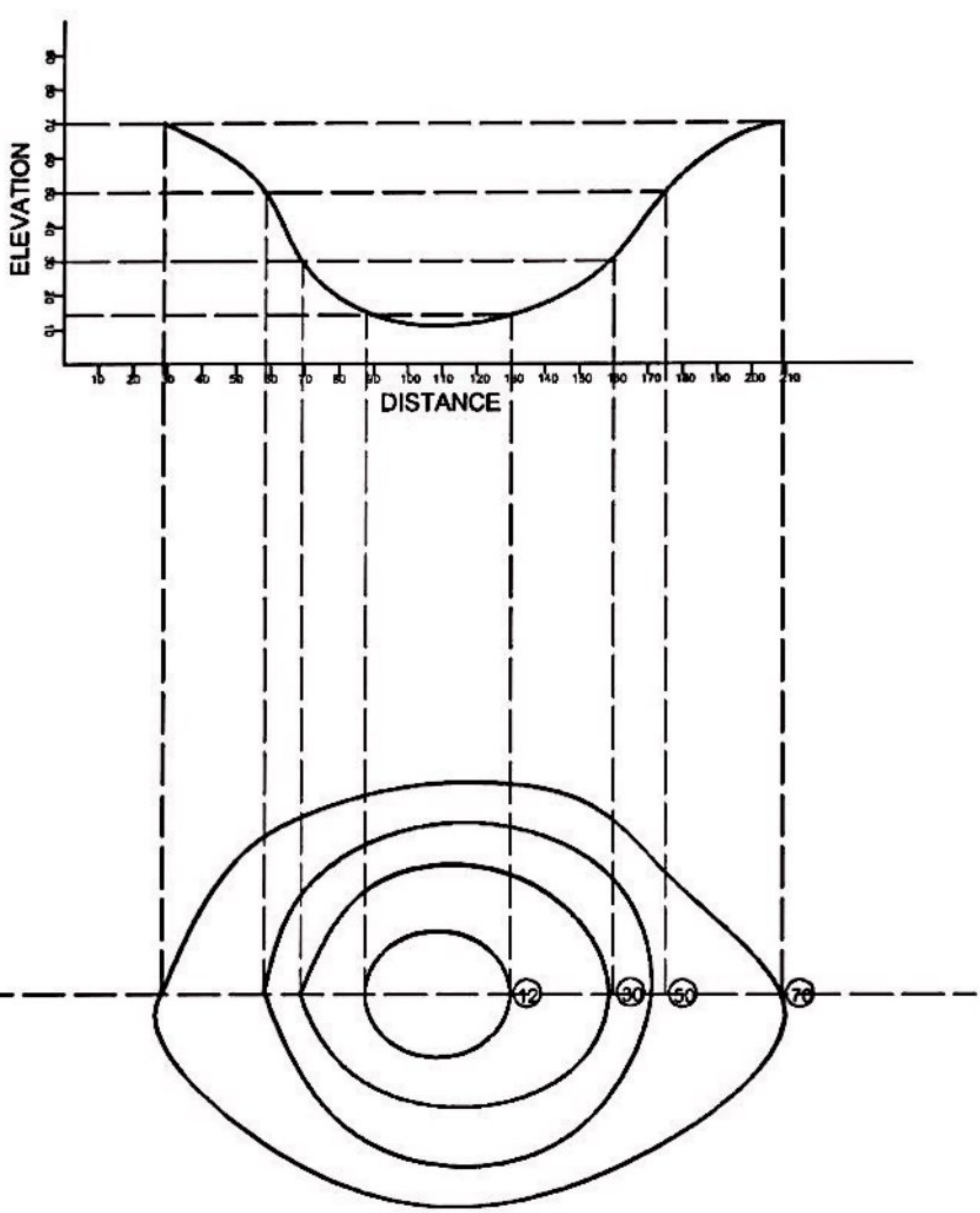

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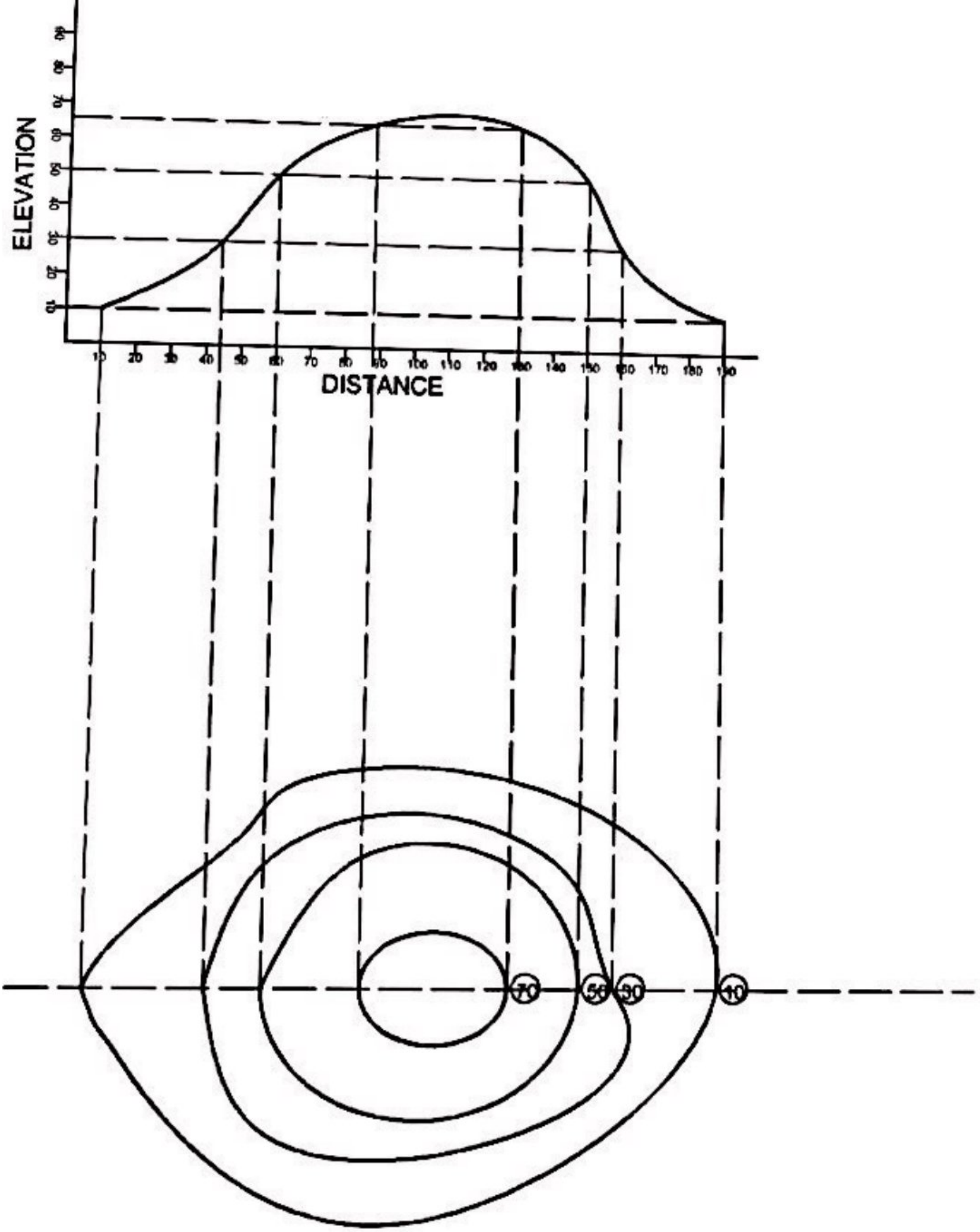

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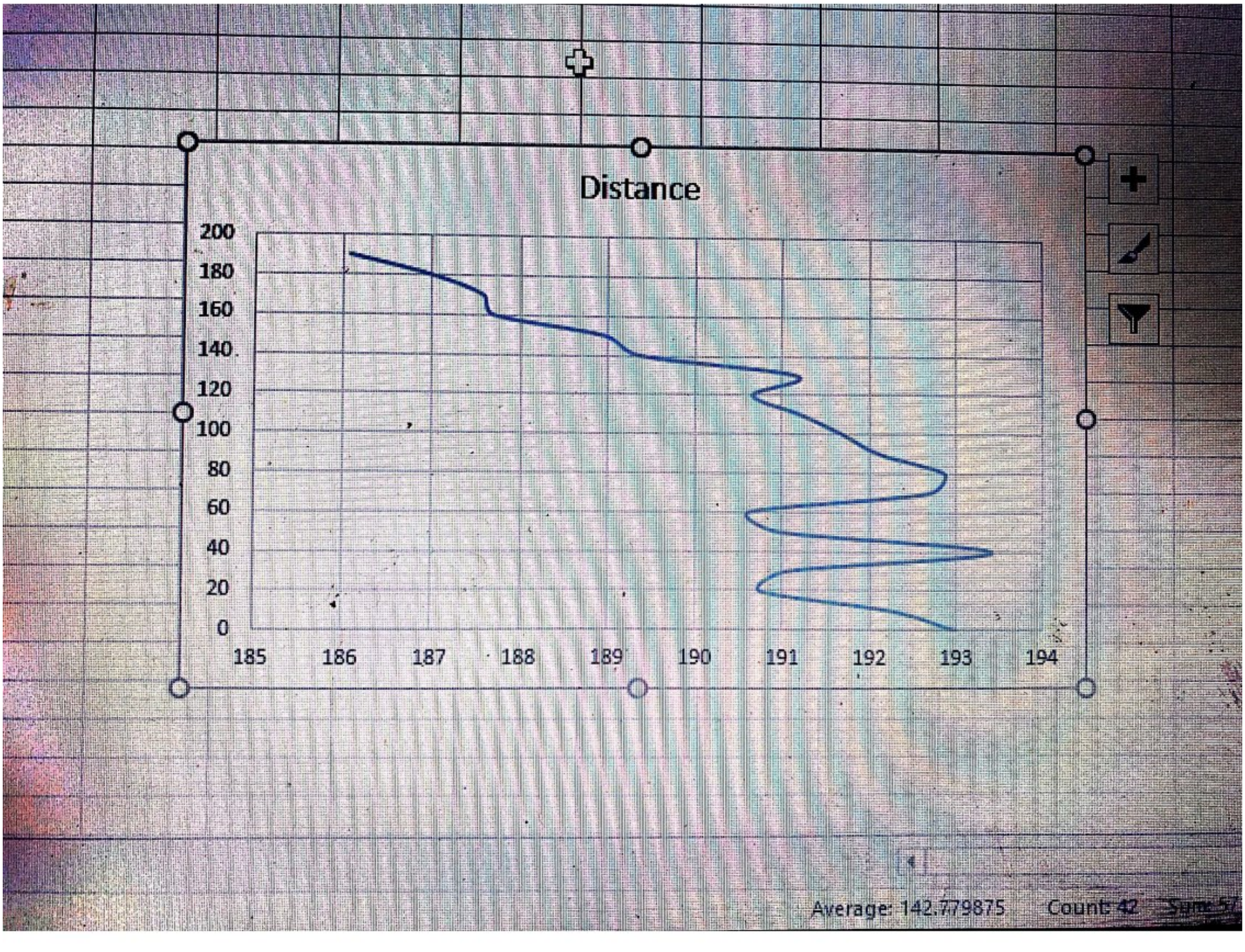

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