Soil Mechanics

Homework 1

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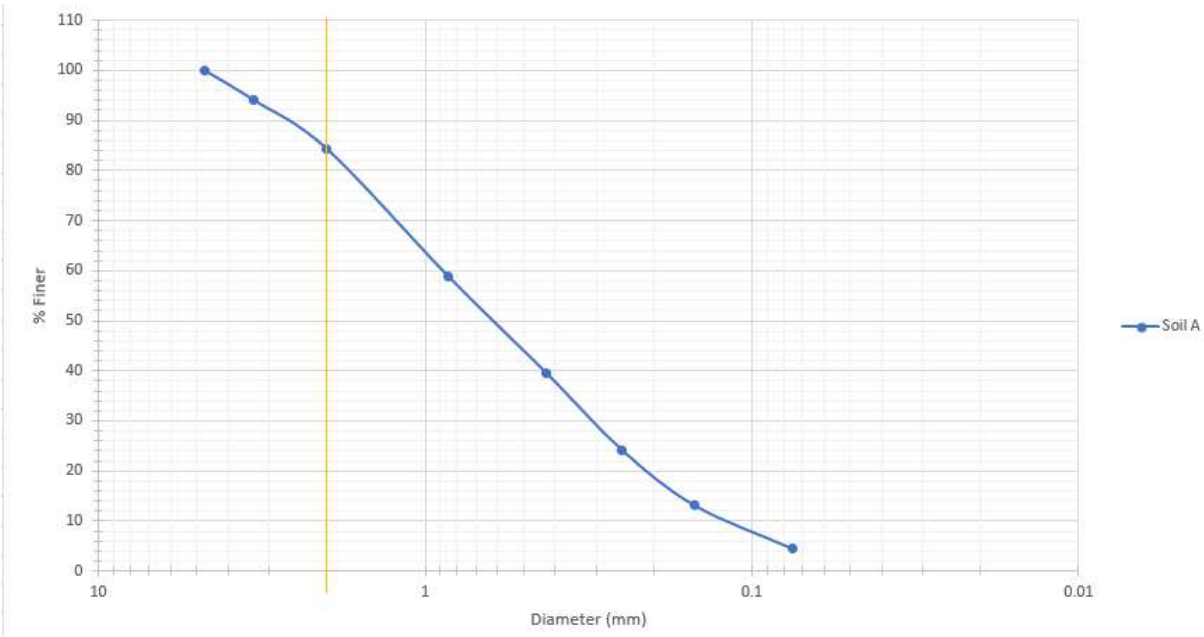
Problem 1 :

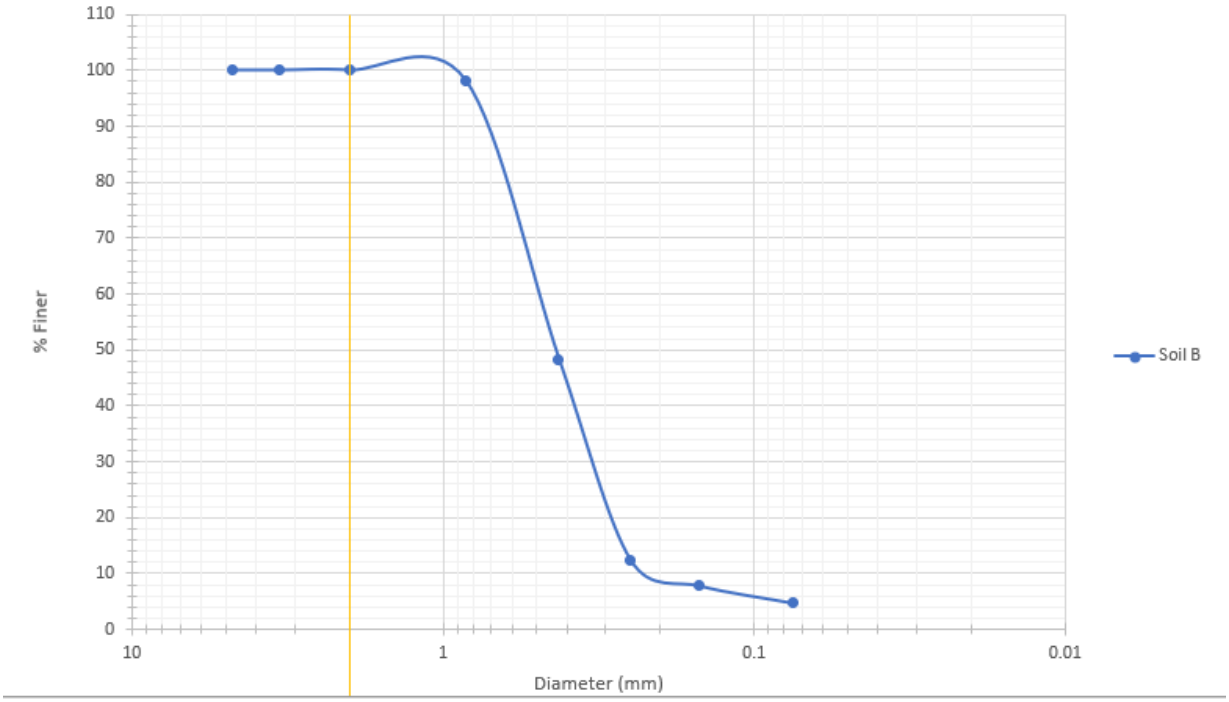
- Soil A :

Sieve (mm)	mass retained (g)	retained %	Cumulative % retained	Finer %
4.75	0	0	0	100
3.35	30	6	6	94
2	48.7	9.74	15.74	84.26
0.85	127.3	25.46	41.2	58.8
0.425	96.8	19.36	60.56	39.44
0.25	76.6	15.32	75.88	24.12
0.15	55.2	11.04	86.92	13.08
0.075	43.4	6.68	95.6	4.4
Pan	22	4.4	100	0
	Sum = 500 g			



- Soil B :

Sieve (mm)	mass retained (g)	retained %	Cumulative % retained	Finer %
4.75	0	0	0	100
3.35	0	0	0	100
2	0	0	0	100
0.85	9.1	1.82	1.82	98.18
0.425	249.4	49.88	51.7	48.3
0.25	179.8	35.96	87.66	12.34
0.15	22.7	4.54	92.2	7.8
0.075	15.5	3.1	95.3	4.7
Pan	23.5	4.7	100	0
	Sum = 500 g			



- **For Soil A :**

$D_{10} = 0.13$

$D_{30} = 0.31$

$D_{60} = 0.89$

$C_u = \frac{D60}{D10} = 6.84615385$

$C_c = \frac{(D30)^{\wedge}2}{D60 * D10} = 0.830596$

- **For Soil B :**

$D_{10} = 0.23$

$D_{30} = 0.33$

$D_{60} = 0.5$

$C_u = \frac{D60}{D10} = 2.173913$

$C_c = \frac{(D30)^{\wedge}2}{D60 * D10} = 0.946957$

- **Which soil is Coarser** ?

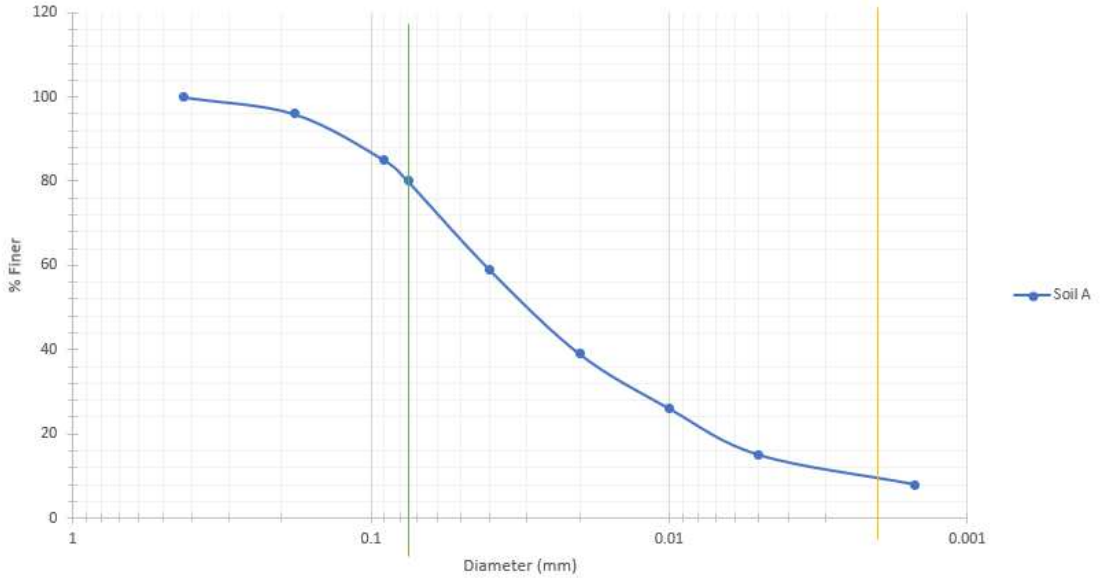
The percent of coarse in **soil A** = 100% - 4.4% = 95.6%

The percent of coarse in **soil B** = 100% - 4.7% = 95.3%

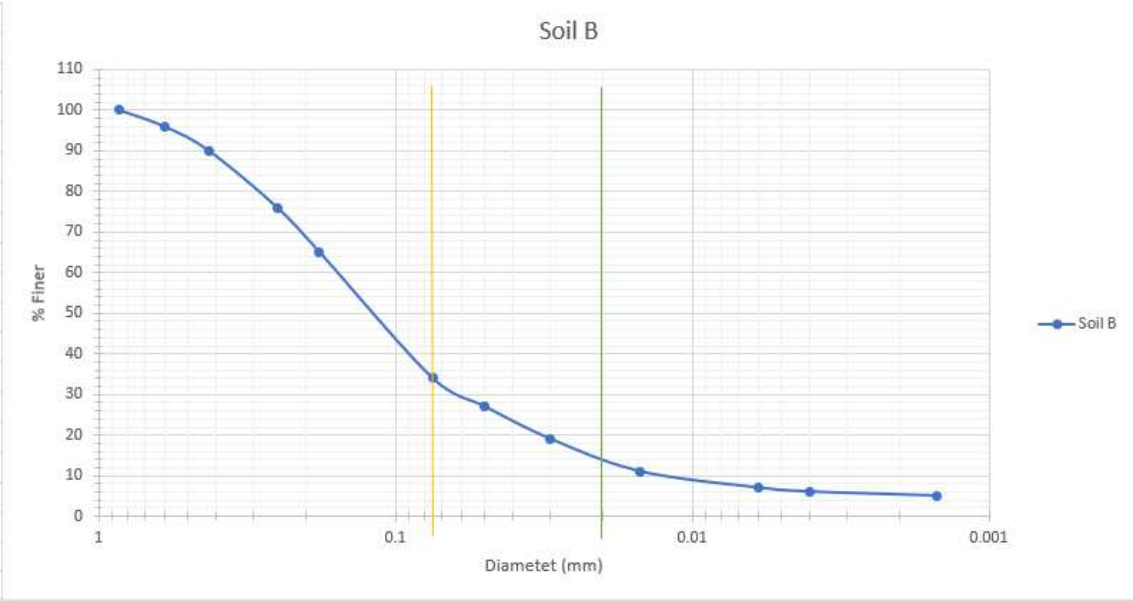
So the two samples have a very high percent of coarse , but **soil A** has a higher quantity of the coarse than **soil B**

Problem 2 :

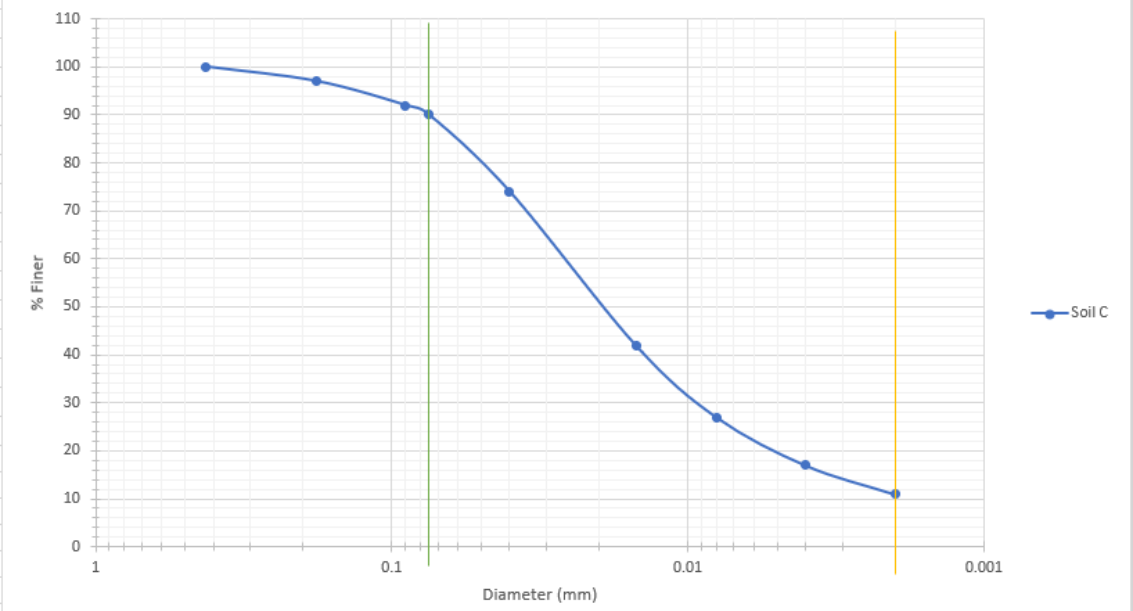
- **Soil A :**



- **Soil B :**



- **Soil C :**



- **According to the AASHTO System :**

	Gravel %	Sand%	Silt %	Clay %
Soil A	0	20%	41%	39%
Soil B	0	66%	20%	14%
Soil C	0	10%	79%	11%

- **According to the USCS System :**

	Gravel %	Sand %	Fines %
Soil A	0	20%	80%
Soil B	0	66%	34%
Soil C	0	10%	90%

- **For Soil A :**

$D_{10} = 0.0022$

$D_{30} = 0.013$

$D_{60} = 0.042$

$C_u = \frac{D60}{D10} = 19.09091$

$C_c = \frac{(D30)^{\wedge}2}{D60 * D10} = 1.829004$

- **For Soil B :**

$D_{10} = 0.013$

$D_{30} = 0.066$

$D_{60} = 0.16$

$C_u = \frac{D60}{D10} = 12.30769$

$C_c = \frac{(D30)^{\wedge}2}{D60 * D10} = 2.094231$

- **For Soil C :**

$D_{10} = 0.002$

$D_{30} = 0.0094$

$D_{60} = 0.027$

$C_u = \frac{D60}{D10} = 13.5$

$C_c = \frac{(D30)^{\wedge}2}{D60 * D10} = 1.636296$

- **why are the curves so different?**

The curves of soil A and soil C are approximately the same , but they are very different from the curve of soil B .

I think the reason is that soil A & C has higher percentage of fines than soil B . And soil B has higher percentage of coarse than soils A & C.

1. The curve is up in soils A & C in the fines zone . However , the curve is down in soil B in the same region .
2. The curve is up in soil B in the coarse zone . However , the curve is down in soils A & C in the same region .