A This is an interesting application of size analysis data. Although many of your assumptions and conclusions need verification, this report could form a base for future work.

(97)

ENVIRONMENTAL ANALYSIS

OF

GRAIN SIZE DISTRIBUTION

Richard C. Barth
22692
GLY-503
Sedimentation I
Quarter I, 1968

AERIAL PHOTOGRAPHS

BIG PASS--SARASOTA, FLORIDA

Obtained from Sarasota Herald-Tribune
Mr. Ken Torrington---photographer


Big Pass - Sarasota, Fla. November 1963

Big Pass – Sarasota, Fla. October 1968

TABLE OF CONTENTS

STATEMENT OF OBJECTIVES

It is the objective of this report to analyze the distribution of grain size in respect to environmental conditions. What relationships exist between current flow path and grain size and or grain composition in a selective environment? Is it possible to plot the flow path of tidal waters reaching from the Gulf of Mexico into bay waters and back on the basis of grain size distribution within the pass? To what degree has the emplacement of Arvida Corp. landfill affected the flow path and erosional facilities of Big Pass in Sarasota, Fla.? These and related questions I hope to answer within the context of this project. My discussion and conclusions will be brief but not so much as to neglect pertinent observations of detail.

Treatment of Sample:

Methodology of sample treatment is assumed to be of utmost importance in the collection of representative sediments. With this in mind the student should act conservatively in the manner in which samples are collected and labeled. Procedure of sample collection and labeling are as follows: A study of two ariel photographs of the area in question was made as well as coastal maps and local erosion conditions. From this study areas of representative sampling were deduced according to relevance to this report. The total number of samples was assumed in relation to time requirements and therefore limited in quantity, though generally the larger the number of samples taken from a specific area the greater the student's knowledge of conditions is.

The method of obtaining samples, though seemingly barbaric, was in my opinion more efficient than convenience methods of dredging or the grab-sampling technique. All samples were obtained by diving to the bottom of the pass in the area noted and through tthe use of a 16 oz. coffee can and cap I was able to contain all sediments including whatever fine-grained materials without the risk of

losing them on the way back to the surface. All samples were drained of excess water with precautions taken to avoid the loss of fine-grained materials and immediately transferred to a watertight plastic bag for further analysis. Position of the sample was noted as well as date, depth to bottom, field number and ascension number.

Preparation of Sample for Analysis:

In the lab all samples were washed with water to remove salts and any organic material present. The samples were then dried and disaggregated with caution displayed to protect the relatively unstable pieces of carbonate material all in the form of shell fragments. The carbonates were not dissolved in hydrochloric acid as I felt that their abundance or lack of was conducive to environmental analysis, assuming the problem coherent in this project. The samples were weighed after put through the Jone's Sample Splitter to avoid any selective errors, and sieved using the Ro-Tap for a period of ten minutes. Sieve sizes are as follows:

U.S. Standard Sieve No.
10
18
35
60
120
230
Pan

The resulting size fractions were weighed and all data was entered on the data sheets included in this report. Calculations of weight retained, weight %, and cumulative weight % were made and entered on the data sheets(calculations available upon request). Histograms of weight % and cumulative weight % were made in conjunction with a log probability curve for each sample and are included in this report.

DATA SHEETS

Environmental Analysis of
Grain Size Distrubution of
Big Pass bottom samples

Sarasota, Florida

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 1 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 60.50 grams

Summary of Preliminary Treatment Sample washed - dried - disaggregated

U.S. Std Sieve No	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	0.16	60.50
18	2.0-1.0	(2000-1000)	0.67	60.50
35	1.0-0.5	(1000-500)	0.77	60.50
60	0.5-.25	(500-250)	1.59	60.50
120	.25-.125	(250-125)	40.24	60.50
230	.125-.062	(125-62)	16.39	60.50
Pan	<0.062	(<62)	0.57	60.50

Grade Size Retained ϕ	Weight %	Cumulative Wt %	Remarks
-1.0	0.267	0.27	
0.0	1.01	1.28	Mostly Carbonate material
1.0	1.27	2.55	
2.0	2.64	5.19	Predominately Quartz
3.0	70.00	75.19	
4.0	27.00	102.19	
>4.0	0.94	103.13	little clay-silt

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 2 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla

Original bulk weight 59.56 grams

Summary of Preliminary Treatment Washed - dried - disaggregated

U.S. Std Sieve no	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	0	59.56
18	2.0-1.0	(2000-1000)	3.14	59.56
35	1.0-0.5	(1000-500)	.66	59.56
60	0.5-.25	(500-250)	1.06	59.56
120	.25-.125	(250-125)	50.62	59.56
230	.125-.062	(125-62)	6.50	59.56
Pan	<0.062	(<62)	.09	59.56

Grade Size Retained ø	Weight %	Cumulative Wt%	Remarks
-1.0	0	0	
0.0	5.27	5.27	
1.0	1.12	6.39	
2.0	1.78	8.17	
3.0	92.01	100.18	
4.0	1.09	101.27	
4.0	0.15	101.42	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 3 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota

Original bulk weight 62.32 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve No	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	0	62.32
18	2.0-1.0	(2000-1000)	2.73	62.32
35	1.0-0.5	(1000-500)	.56	62.32
60	0.5-.25	(500-250)	1.29	62.32
120	.25-.125	(250-125)	52.63	62.32
230	.125-.062	(125-62)	7.34	62.32
Pan	<0.062	(<62)	.13	62.32

Grade Size Retained ϕ	Weight %	Cumulative Wt %	Remarks
-1.0	0	0	
0.0	4.40	4.40	
1.0	.90	5.30	
2.0	2.07	7.37	
3.0	84.50	91.87	
4.0	1.18	93.05	
>4.0	2.09	95.14	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 4 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla

Original bulk weight 15.94 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve No	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	.09	15.94
18	2.0-1.0	(2000-1000)	.06	15.94
35	1.0-0.5	(1000-500)	.08	15.94
60	0.5-.25	(500-250)	.25	15.94
120	.25-.125	(250-125)	10.99	15.94
230	.125-.062	(125-62)	4.24	15.94
Pan	<0.062	(<62)	.35	15.94

Grade Size Retained ϕ	Weight %	Cumulative Wt %	Remarks
-1.0	0.57	0.57	
0.0	0.38	0.95	
1.0	0.50	1.45	
2.0	1.57	3.02	
3.0	68.70	71.72	
4.0	18.20	89.92	
74.0	.24	90.16	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 5 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla

Original bulk weight 69.35 grams

Summary of Preliminary Treatment Washed - dried - disaggregated

U.S. Std Sieve No	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	16.54	69.35
18	2.0-1.0	(2000-1000)	6.48	69.35
35	1.0-0.5	(1000-500)	5.40 ~~5.06~~	69.35
60	0.5-.25	(500-250)	3.44 ~~4.51~~	69.35
120	.25-.125	(250-125)	31.13	69.35
230	.125-.062	(125-62)	7.78	69.35
Pan	<0.062	(<62)	.26	69.35

Grade Size Retained ø	Weight %	Cumulative Wt %	Remarks
-1.0	29.40	29.40	
0.0	9.30 ~~9.43~~	38.70	
1.0	7.80	46.50	
2.0	4.96 ~~4.98~~	54.46	
3.0	44.90	99.36	
4.0	1.12	100.48	
74.0	.38	100.86	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 6 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 41.66 grams

Summary of Preliminary Treatment Washed - dried - disaggregated

U.S. Std Sieve no	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	0.53	41.66
18	2.0-1.0	(2000-1000)	0.48	41.66
35	1.0-0.5	(1000-500)	1.03	41.66
60	0.5-.25	(500-250)	4.51	41.66
120	.25-.125	(250-125)	32.52	41.66
230	.125-.062	(125-62)	0.56	41.66
Pan	<0.062	(<62)	0.02	41.66

Grade Size Retained ø	Weight %	Cumulative Wt%	Remarks
-1.0	1.27	1.27	
0.0	1.15	2.42	
1.0	2.21	4.63	
2.0	10.88	15.51	
3.0	82.70	98.21	
4.0	1.34	99.55	
4.0	.05	99.60	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 7 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 51.16 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve no	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	13.94	51.16
18	2.0-1.0	(2000-1000)	8.11	51.16
35	1.0-0.5	(1000-500)	5.27	51.16
60	0.5-.25	(500-250)	3.48	51.16
120	.25-.125	(250-125)	17.74	51.16
230	.125-.062	(125-62)	2.34	51.16
Pan	<0.062	(<62)	0.07	51.16

Grade Size Retained ϕ	Weight %	Cumulative Wt%	Remarks
-1.0	27.22	27.22	
0.0	15.85	43.07	
1.0	10.30	53.37	
2.0	6.68	60.05	
3.0	34.80	94.85	
4.0	4.59	99.44	
4.0	0.14	99.58	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 8 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 50.69 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve nθ	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	7.23	50.69
18	2.0-1.0	(2000-1000)	2.08	50.69
35	1.0-0.5	(1000-500)	1.15	50.69
60	0.5-0.25	(500-250)	1.51	50.69
120	0.25-.125	(250-125)	36.82	50.69
230	.125-.062	(125-62)	1.81	50.69
Pan	<0.062	<62	.05	50.69

Grade Size Retained ϕ	Weight %	Cumulative Wt %	Remarks
-1.0	14.25	14.25	
0.0	4.10	18.35	
1.0	2.27	20.62	
2.0	2.98	23.60	
3.0	72.45	96.05	
4.0	3.58	99.63	
4.0	0.99	100.62	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 9 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 37.81 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve nº	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	0.24	37.81
18	2.0-1.0	(2000-1000)	1.20	37.81
35	1.0-0.5	(1000-500)	1.63	37.81
60	0.5-0.25	(500-250)	3.64	37.81
120	0.25-.125	(250-125)	25.10	37.81
230	.125-.062	(125-62)	4.92	37.81
Pan	<0.062	<62	0.95	37.81

Grade Size Retained ϕ	Weight %	Cumulative Wt %	Remarks
-1.0	0.65	0.65	
0.0	3.29	3.94	
1.0	4.34	8.28	
2.0	9.67	17.95	
3.0	66.40	84.35	
4.0	13.10	97.45	
4.0	2.52	99.97	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 10 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 54.05 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve nº	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	22.09	54.05
18	2.0-1.0	(2000-1000)	5.53	54.05
35	1.0-0.5	(1000-500)	3.13	54.05
60	0.5-0.25	(500-250)	2.39	54.05
120	0.25-.125	(250-125)	16.19	54.05
230	.125-.062	(125-62)	4.34	54.05
Pan	<0.062	<62	0.19	54.05

Grade Size Retained	Weight %	Cumulative Wt %	Remarks
-1.0	40.08	40.08	
2.0	10.40	50.48	
1.0	5.79	56.27	
2.0	4.42	60.69	
3.0	29.77	90.46	
4.0	8.00	98.46	
4.0	0.35 ~~0.38~~	98.81	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 11 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla

Original bulk weight 55.80 grams

Summary of Preliminary Treatment Washed - dried - disaggregated

U.S. Std Sieve no.	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	11.62	55.80
18	2.0-1.0	(2000-1000)	3.63	55.80
35	1.0-0.5	(1000-500)	2.59	55.80
60	0.5-.25	(500-250)	3.82	55.80
120	.25-.125	(250-125)	29.74	55.80
230	.125-.062	(125-62)	4.18	55.80
Pan	<0.062	(<62)	0.07	55.80

Grade Size Retained ø	Weight %	Cumulative Wt %	Remarks
-1.0	20.00	20.00	
0.0	6.52	26.52	
1.0	4.65	31.17	
2.0	6.85	38.02	
3.0	53.30	91.32	
4.0	7.50	98.82	
>4.0	0.12	98.94	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 12 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla

Original bulk weight 59.97 grams

Summary of Preliminary Treatment Washed-Dried-disaggregated

U.S. Std Sieve no	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	15.98	59.97
18	2.0-1.0	(2000-1000)	5.75	59.97
35	1.0-0.5	(1000-500)	3.58	59.97
60	0.5-.25	(500-250)	3.94	59.97
120	.25-.125	(250-125)	28.~~45~~	59.97
230	.125-.062	(125-62)	1.96	59.97
Pan	<0.062	(<62)	0.10	59.97

Grade Size Retained ø	Weight %	Cumulative Wt%	Remarks
-1.0	26.65	26.65	
0.0	9.60	36.25	
1.0	5.93	42.18	
2.0	~~47.50~~ 6.57	48.75	
3.0	~~3.29~~ 47.50	96.25	
4.0	3.27	99.52	
>4.0	0.16	99.68	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 13 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 68.95 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve no.	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	0	68.95
18	2.0-1.0	(2000-1000)	0	68.95
35	1.0-0.5	(1000-500)	0.17	68.95
60	0.5-.25	(500-250)	0.91	68.95
120	.25-.125	(250-125)	60.77	68.95
230	.125-.062	(125-62)	6.81	68.95
Pan	<0.062	(<62)	0.15	68.95

Grade Size Retained ø	Weight %	Cumulative Wt %	Remarks
-1.0	0	0	
0.0	0	0	
1.0	~~0.25 2.46~~	~~0.25 2.46~~	
2.0	1.32	1.57	
3.0	88.20	89.77	
4.0	9.87	99.64	
>4.0	0.22	99.86	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 14 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original buld weight 65.18 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve No	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	9.60	65.18
18	2.0-1.0	(2000-1000)	2.88	65.18
35	1.0-.5	(1000-500)	1.48	65.18
60	.5-.25	(500-250)	2.35	65.18
120	.25-.125	(250-125)	44.90	65.18
230	.125-.062	(125-62)	3.87	65.18
Pan	<0.062	(<62)	0.17	65.18

Grade Size Retained Φ	Weight %	Cumulative Wt %	Remarks
-1.0	14.65	14.65	
0.0	4.42	19.07	
1.0	2.27	21.34	
2.0	3.61	24.95	
3.0	68.70	93.65	
4.0	5.94	99.59	
>4.0	0.26	99.85	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 15 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original buld weight 59.64 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve No	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	12.46	59.64
18	2.0-1.0	(2000-1000)	2.28	59.64
35	1.0-.5	(1000-500)	1.65	59.64
60	.5-.25	(500-250)	2.15	59.64
120	.25-.125	(250-125)	36.30	59.64
230	.125-.062	(125-62)	4.68	59.64
Pan	<0.062	(<62)	0.25	59.64

Grade Size Retained Φ	Weight %	Cumulative Wt %	Remarks
-1.0	20.90	20.90	
0.0	3.82	24.72	
1.0	2.77	27.49	
2.0	3.61	31.10	
3.0	60.85	91.95	
4.0	7.85	99.80	
>4.0	0.42	100.22	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 16 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 59.15 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve No	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	1.43	59.15
18	2.0-1.0	(2000-1000)	0.45	59.15
35	1.0-.5	(1000-500)	0.59	59.15
60	.5-.25	(500-250)	1.68	59.15
120	.25-.125	(250-125)	50.45	59.15
230	.125-.062	(125-62)	4.28	59.15
Pan	<0.062	(<62)	0.08	59.15

Grade Size Retained (ϕ)	Weight %	Cumulative Wt%	Remarks
-1.0	2.42	2.42	
0.0	0.76	3.18	
1.0	0.99	4.17	
2.0	2.82	6.99	
3.0	85.20	92.19	
4.0	7.24	99.43	
>4.0	0.14	99.57	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 17 Analyst Richard Barth Date 12/1/68

Location Big Pass — Sarasota, Fla

Original bulk weight 62.51 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve No	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	2.44	62.51
18	2.0-1.0	(2000-1000)	3.17	62.51
35	1.0-.5	(1000-500)	2.64	62.51
60	.5-.25	(500-250)	2.98	62.51
120	.25-.125	(250-125)	45.26	62.51
230	.125-.062	(125-62)	5.72	62.51
Pan	<0.062	(<62)	0.10	62.51

Grade Size Retained (ø)	Weight %	Cumulative Wt%	Remarks
-1.0	3.91	3.91	
0.0	5.05	8.96	
1.0	4.21	13.17	
2.0	4.76	17.93	
3.0	72.40	90.33	
4.0	9.15	99.48	
> 4.0	0.15	99.63	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 18 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 59.10 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve No	Grade Size Retained mm	(Microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	4.95	59.10
18	2.0-1.0	(2000-1000)	3.35	59.10
35	1.0-.5	(1000-500)	2.07	59.10
60	.5-.25	(500-250)	1.72	59.10
120	.25-.125	(250-125)	35.16	59.10
230	.125-.062	(125-62)	11.20	59.10
Pan	< 0.062	(<62)	0.31	59.10

Grade Size Retained (ϕ)	Weight %	Cumulative Wt%	Remarks
-1.0	8.38	8.38	
0.0	5.66	14.04	
1.0	3.50	17.54	
2.0	2.91	20.45	
3.0	59.40	79.85	
4.0	18.95	98.80	
> 4.0	0.52	99.32	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 19 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 58.46 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve No	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	2.33	58.46
18	2.0-1.0	(2000-1000)	2.21	58.46
35	1.0-.5	(1000-500)	1.76	58.46
60	.5-.25	(500-250)	2.03	58.46
120	.25-.125	(250-125)	42.00	58.46
230	.125-.062	(125-62)	7.77	58.46
Pan	<0.062	(<62)	0.13	58.46

Grade Size Retained (ø)	Weight %	Cumulative Wt%	Remarks
-1.0	3.99	3.99	
0.0	3.79	7.78	
1.0	3.00	10.78	
2.0	3.48	14.26	
3.0	71.95	86.21	
4.0	13.30	99.51	
>4.0	0.22	99.73	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 20 Analyst Richard Bauth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 63.82 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve No	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
~~10~~	> 2.0	(> 2000)	0.91	63.82
~~18~~	~~2.0-1.0~~	~~(2000-1000)~~	1.37	63.82
~~35~~	~~1.0-.5~~	~~(1000-500)~~	1.36	63.82
~~60~~	~~.5-.25~~	~~(500-250)~~	2.85	63.82
~~120~~	~~.25-.125~~	~~(250-125)~~	54.40	63.82
~~230~~	~~.125-.062~~	~~(125-62)~~	2.83	63.82
Pan	< 0.062	(< 62)	-0-	63.82

Grade Size Retained 0	Weight %	Cumulative Wt %	Remarks
-1.0	1.42	1.42	
0.0	2.14	3.56	
1.0	2.14	5.70	
2.0	4.47	10.17	
3.0	85.25	95.42	
4.0	4.44	99.86	
>4.0	-0-	99.86	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 21 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original buld weight 57.72 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve No	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	3.31	57.72
18	2.0-1.0	(2000-1000)	1.51	57.72
35	1.0-.5	(1000-500)	1.08	57.72
60	.5-.25	(500-250)	2.78	57.72
120	.25-.125	(250-125)	47.37	57.72
230	.125-.062	(125-62)	3.90	57.72
Pan	<0.062	(<62)	-0-	57.72

Grade Size Retained 0	Weight %	Cumulative Wt %	Remarks
-1.0	5.74	5.74	
0.0	2.62	8.36	
1.0	1.84	10.20	
2.0	4.61	14.81	
3.0	81.95	96.76	
4.0	6.76	103.52	
>4.0	-0-	103.52	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 22 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 55.76 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve no.	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	0.71	55.76
18	2.0-1.0	(2000-1000)	0.39	55.76
35	1.0-0.5	(1000-500)	0.47	55.76
60	0.5-.25	(500-250)	1.43	55.76
120	.25-.125	(250-125)	48.04	55.76
230	.125-.062	(125-62)	4.68	55.76
Pan	<0.062	(<62)	0.06	55.76

Grade Size Retained Ø	Weight %	Cumulative Wt %	Remarks
-1.0	1.27	1.27	
0.0	0.70	1.97	
1.0	0.84	2.81	
2.0	2.56	5.37	
3.0	86.30	91.67	
4.0	8.40	100.07	
>4.0	0.17	100.24	

SUMMARY ØWSIZE ANALYSIS
University of South Florida

Sample No. 23 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 62.64 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve no.	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	0.07	62.64
18	2.0-1.0	(2000-1000)	0.08	62.64
35	1.0-0.5	(1000-500)	0.34	62.64
60	0.5-.25	(500-250)	1.58	62.64
120	.25-.125	(250-125)	56.18	62.64
230	.125-.062	(125-62)	4.27	62.64
Pan	<0.062	(<62)	0.04	62.64

Grade Size Retained Ø	Weight %	Cumulative Wt %	Remarks
-1.0	0.11	0.11	
0.0	0.12	0.23	
1.0	0.54	0.77	
2.0	2.52	3.29	
3.0	89.98	93.27	
4.0	6.82	100.09	
>4.0	0.06	100.15	

SUMMARY OF SIZE ANALYSIS
University of South Florida

Sample No. 24 Analyst Richard Barth Date 12/1/68

Location Big Pass - Sarasota, Fla.

Original bulk weight 52.65 grams

Summary of Preliminary Treatment Washed-dried-disaggregated

U.S. Std Sieve nº	Grade Size Retained mm	(microns)	Weight Retained (g)	Orig. bulk wt (g)
10	>2.0	(>2000)	0.05	52.65
18	2.0-1.0	(2000-1000)	0.11	52.65
35	1.0-0.5	(1000-500)	0.28	52.65
60	0.5-0.25	(500-250)	0.88	52.65
120	0.25-.125	(250-125)	43.99	52.65
230	.125-.062	(125-62)	8.15	52.65
Pan	<0.062	<62	0.11	52.65

Grade Size Retained ϕ	Weight %	Cumulative Wt %	Remarks
-1.0	0.09	0.09	
0.0	0.21	0.30	
1.0	0.54	0.84	
2.0	1.67	2.51	
3.0	83.50	86.01	
4.0	15.47	101.48	
4.0	0.21	101.69	

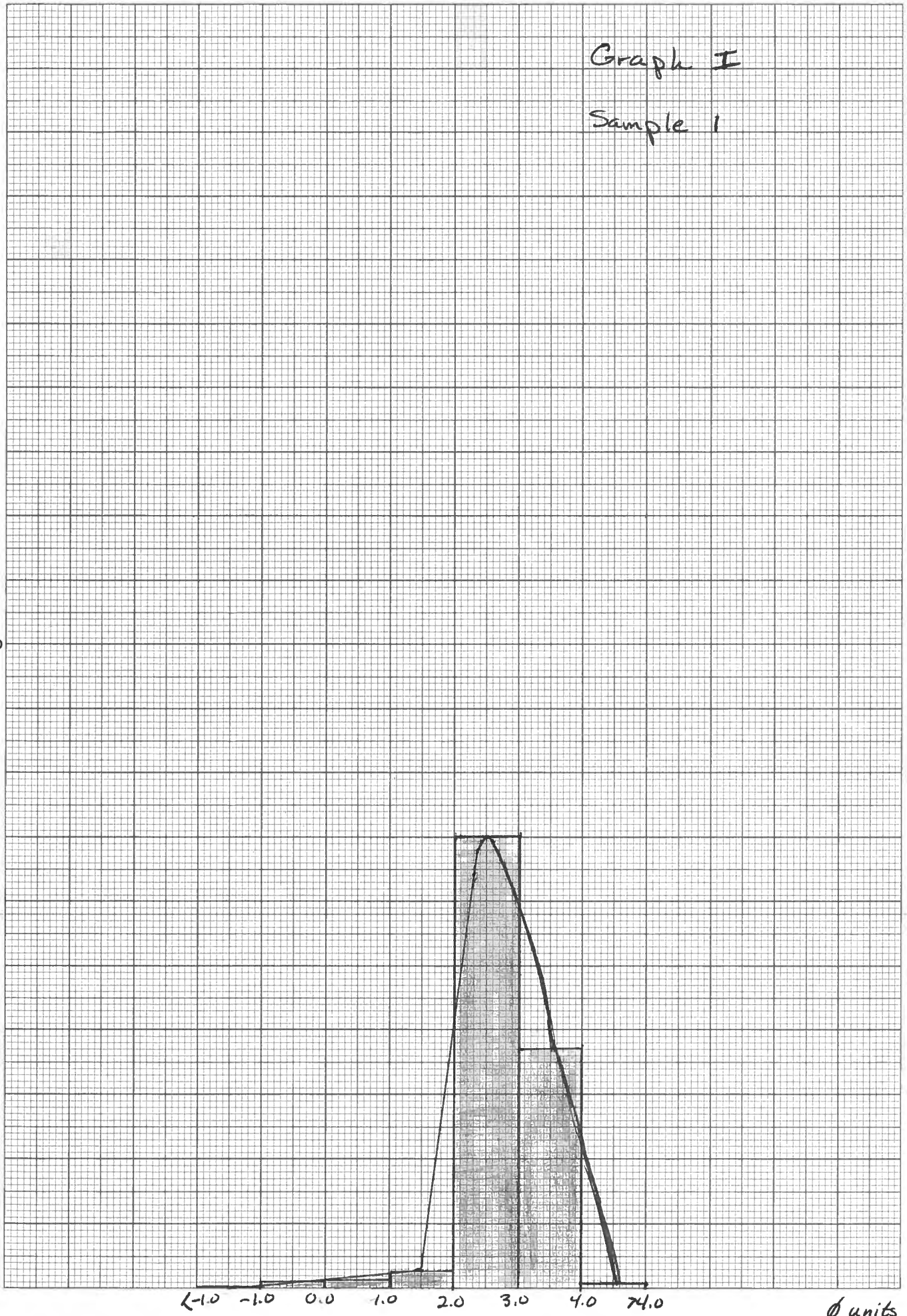
WEIGHT % GRAPHS (HISTOGRAMS)

BIG PASS BOTTOM SEDIMENTS

SARASOTA, FLORIDA

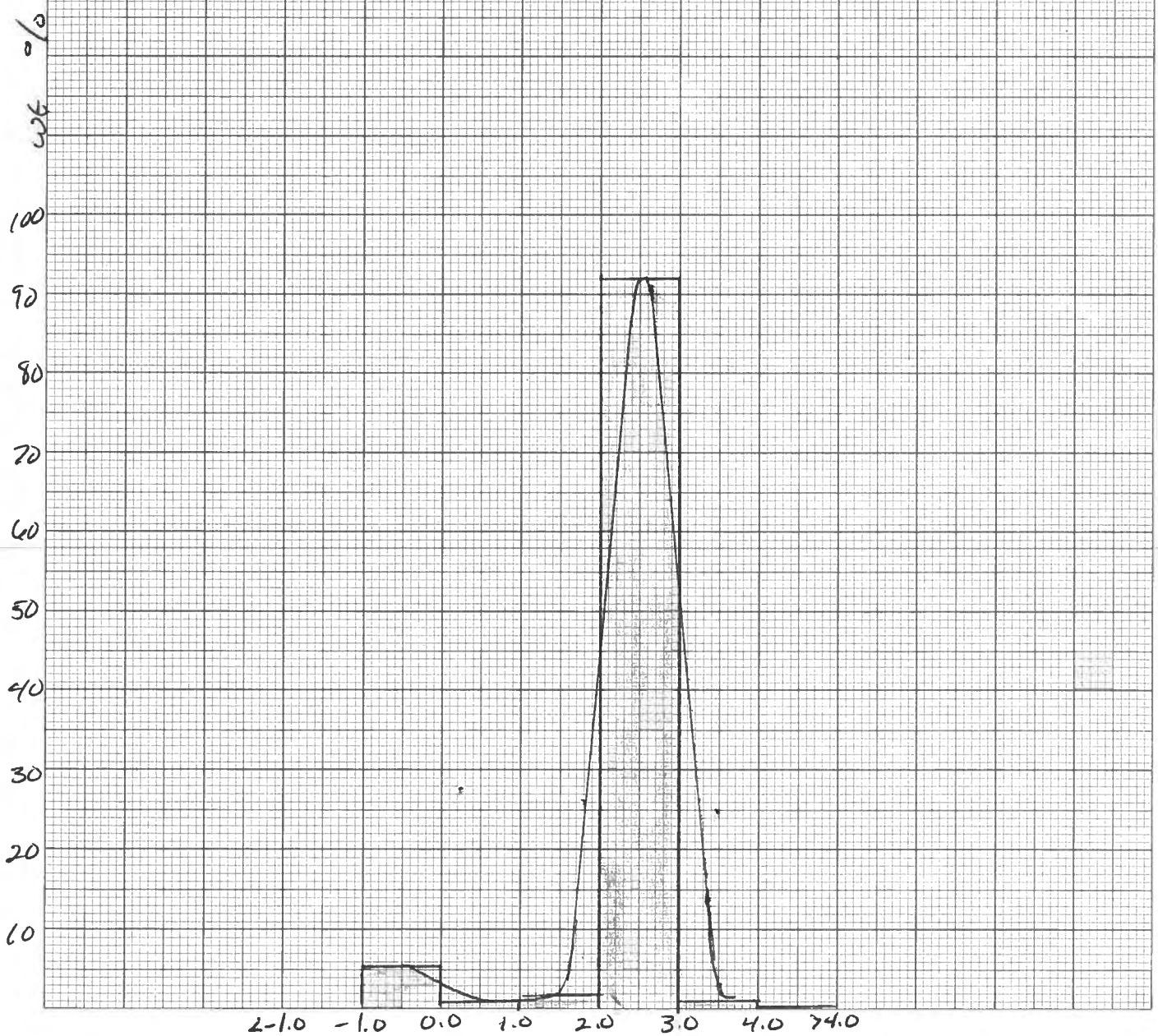
Graph I

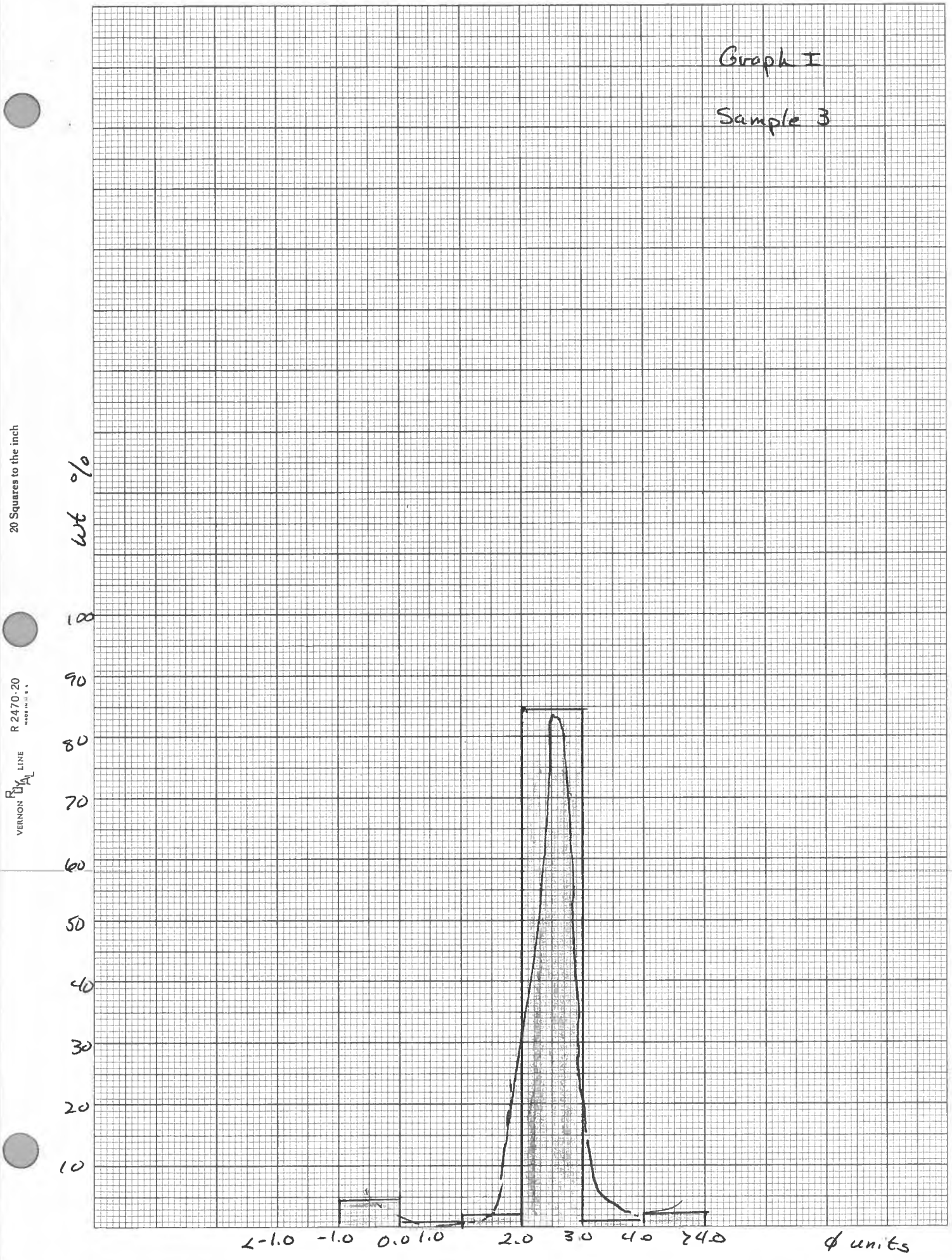
Sample 1



Graph I

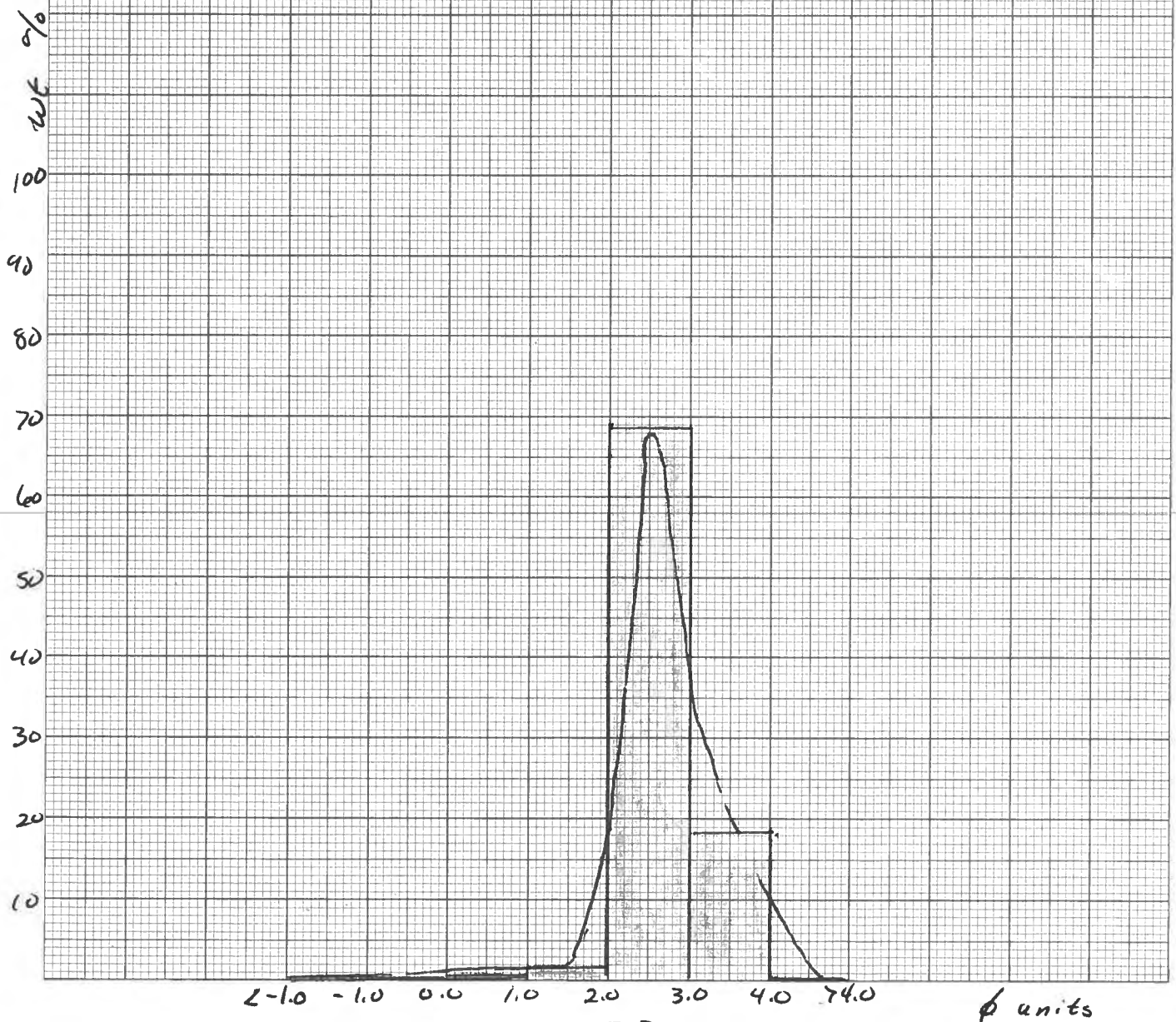
Sample 2





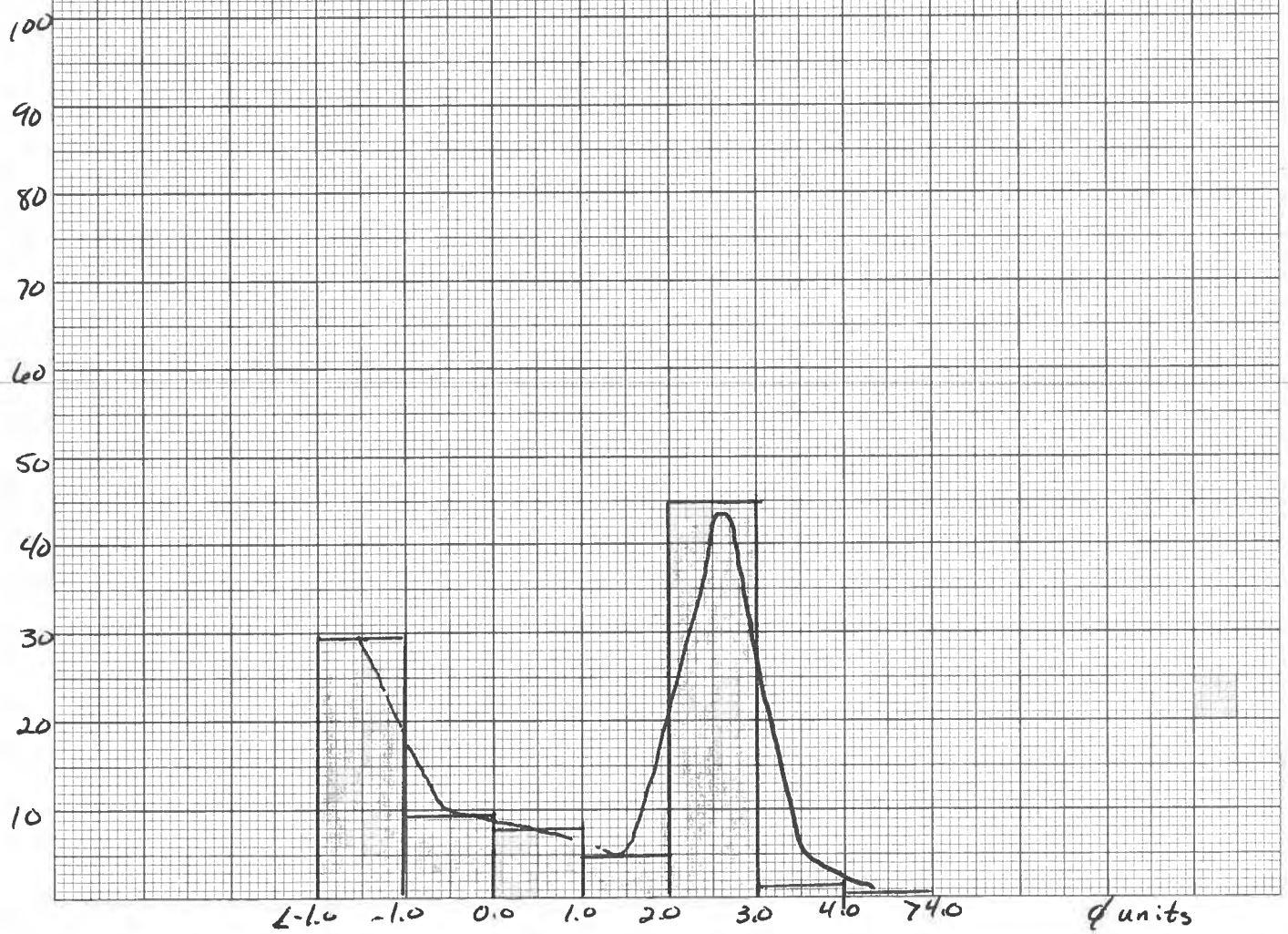
Graph I

Sample 4



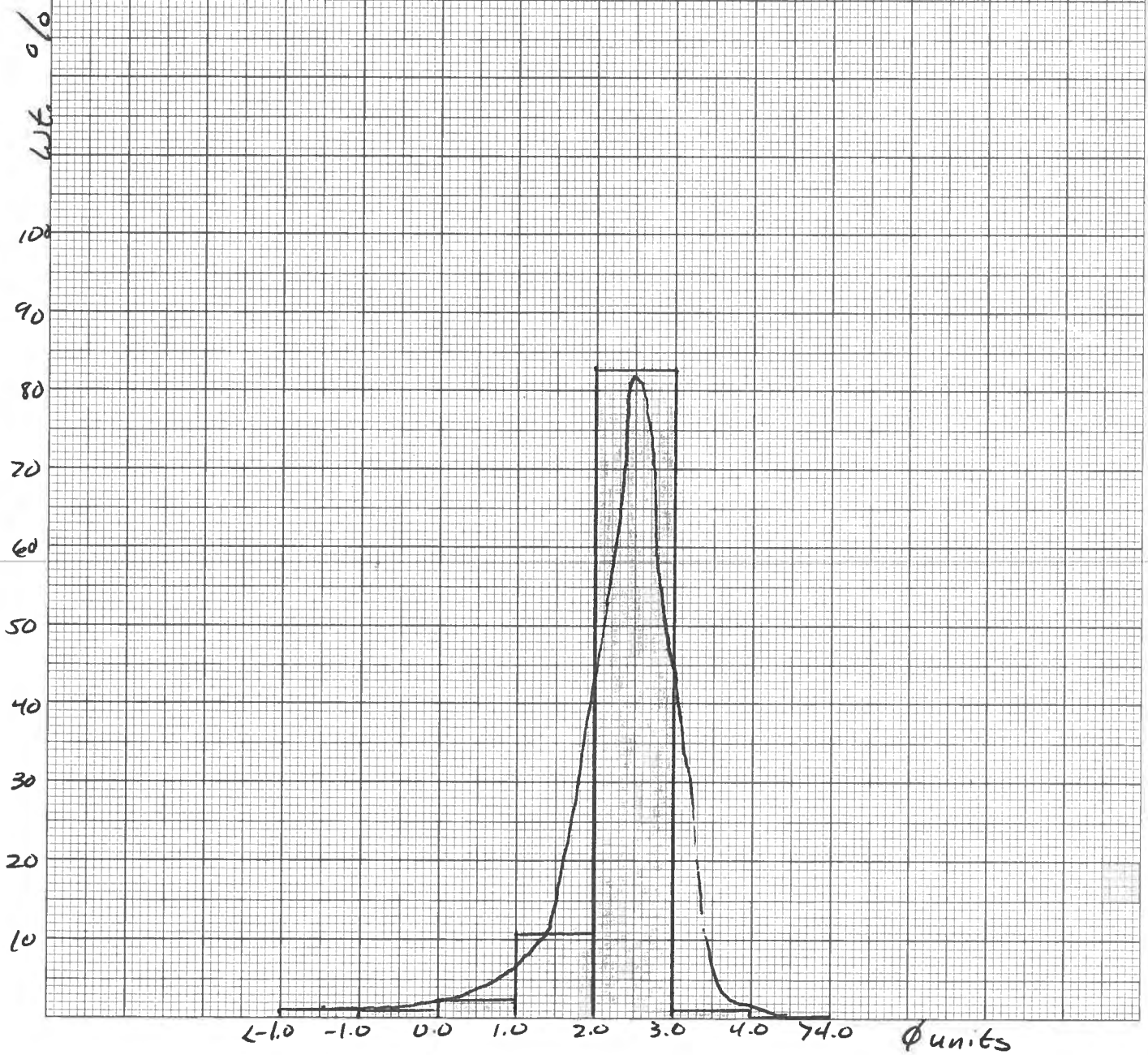
Graph I

Sample 5



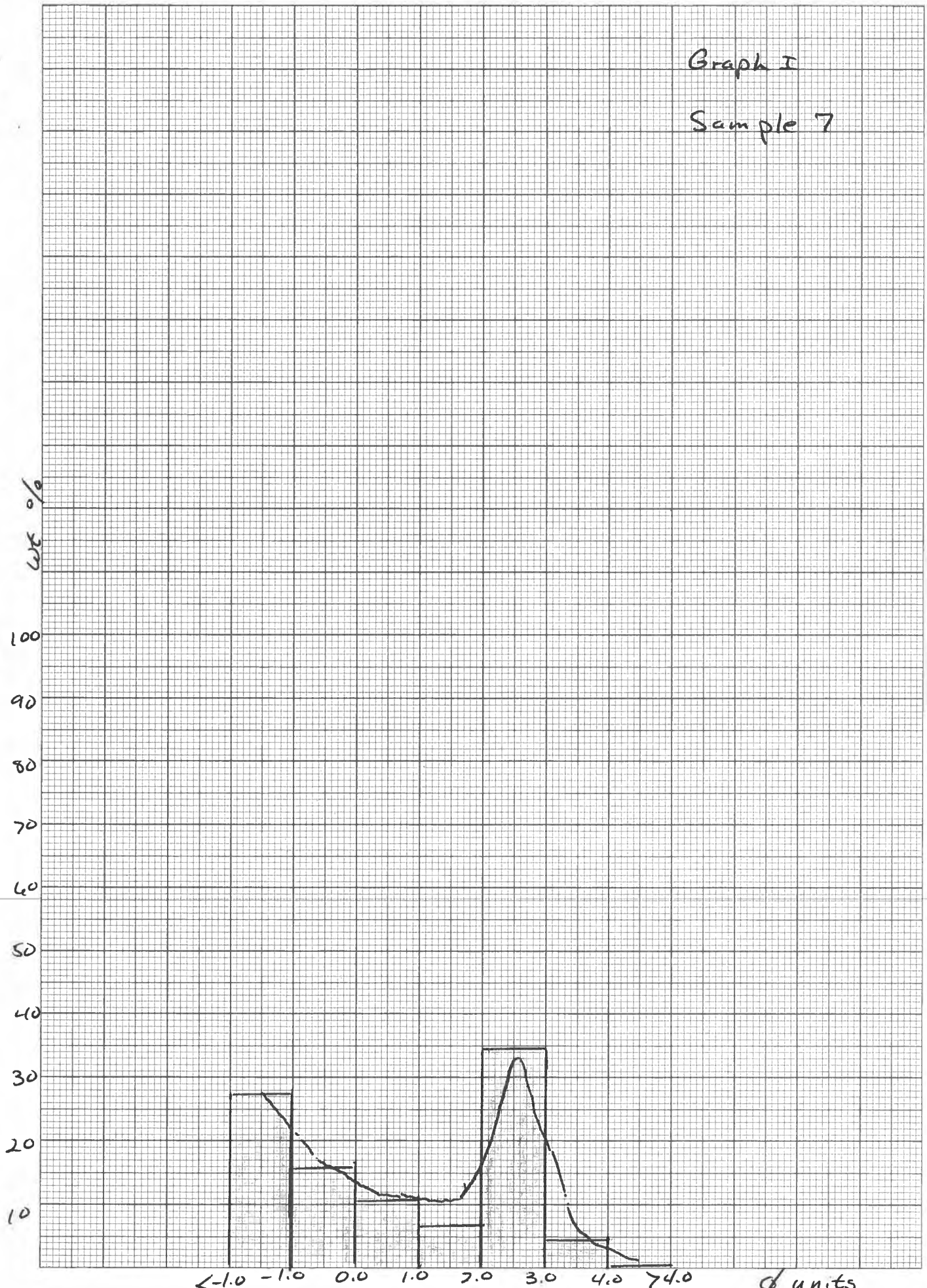
Graph I

Sample 6



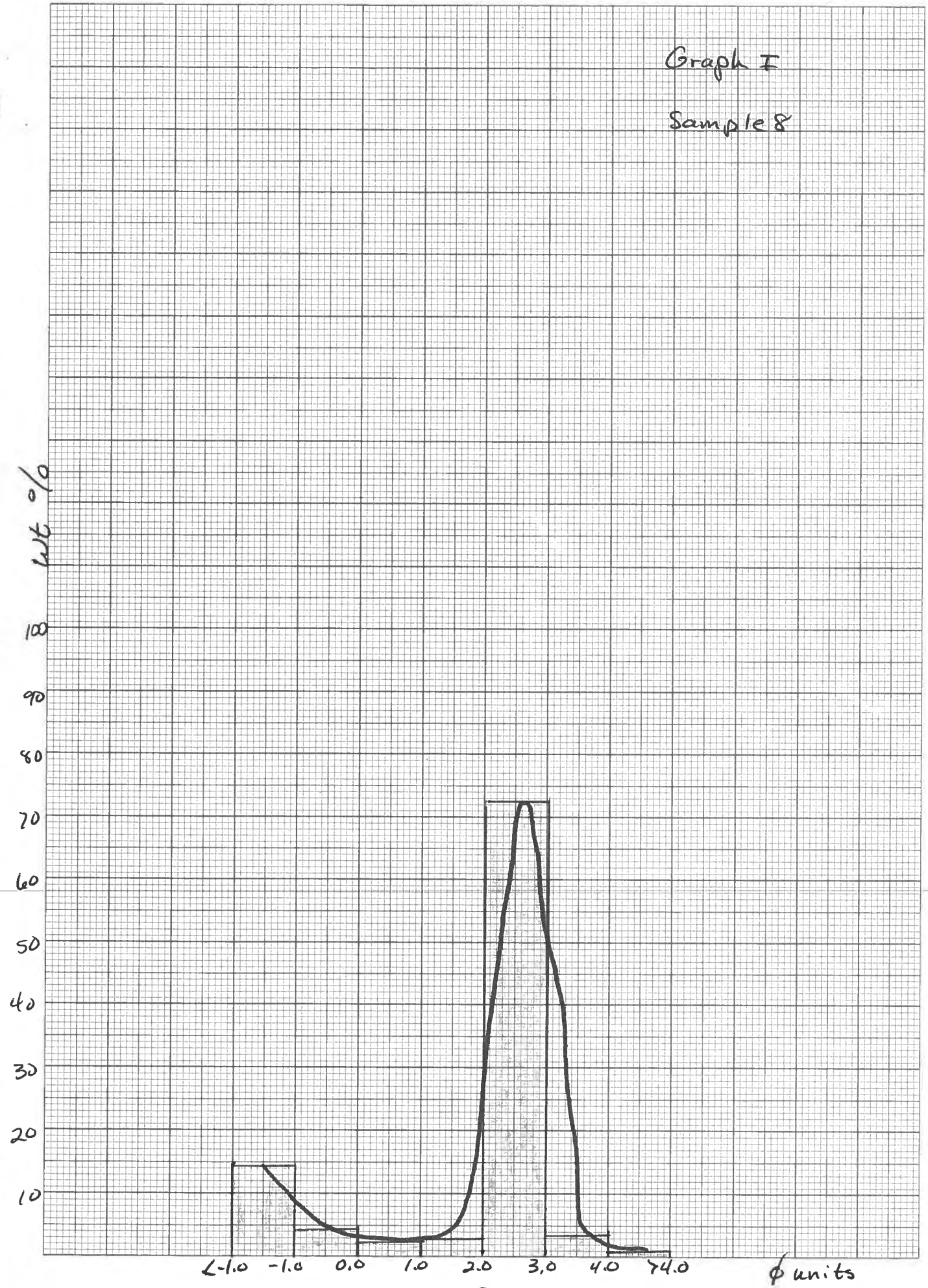
Graph I

Sample 7



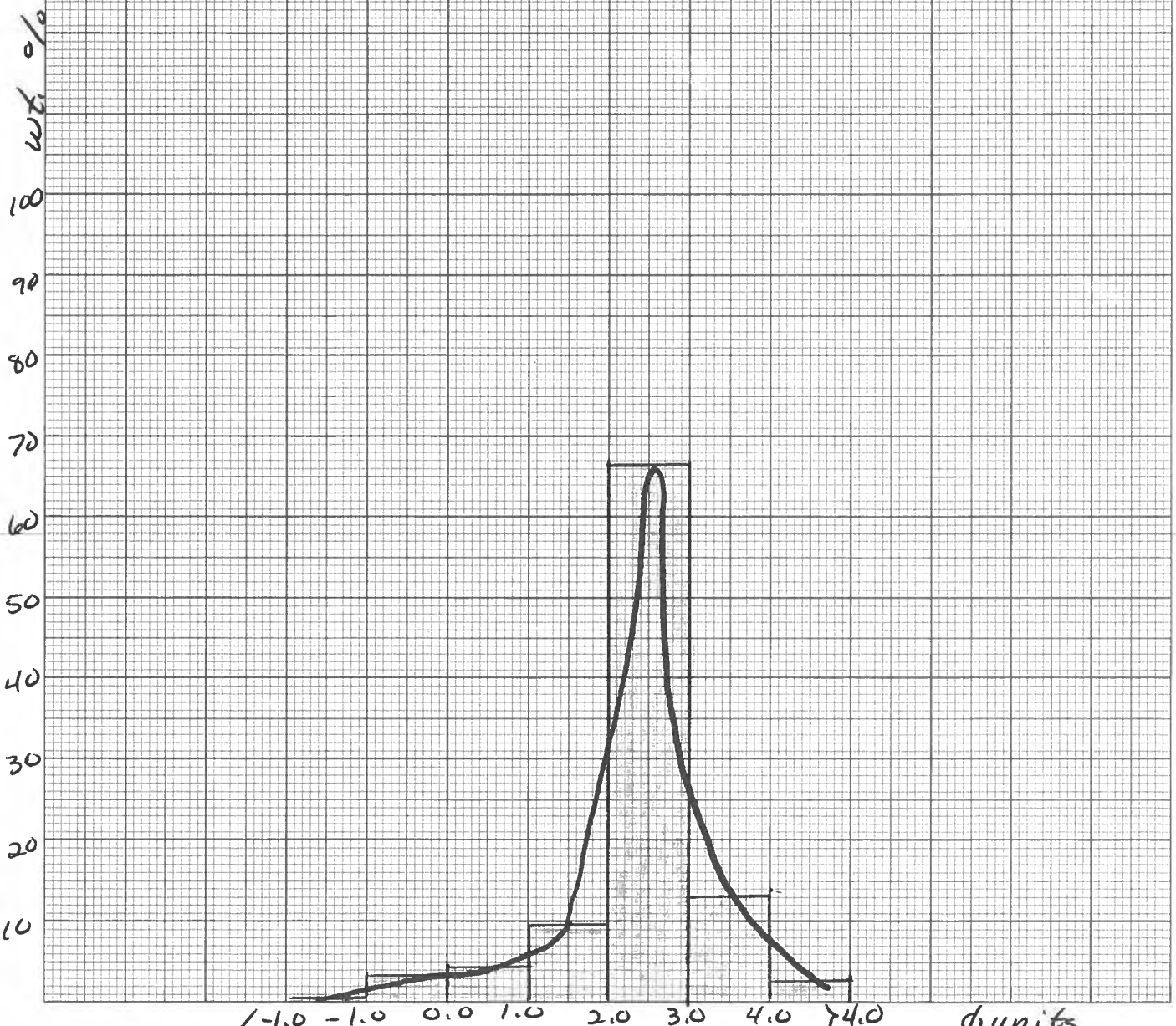
Graph I

Sample 8



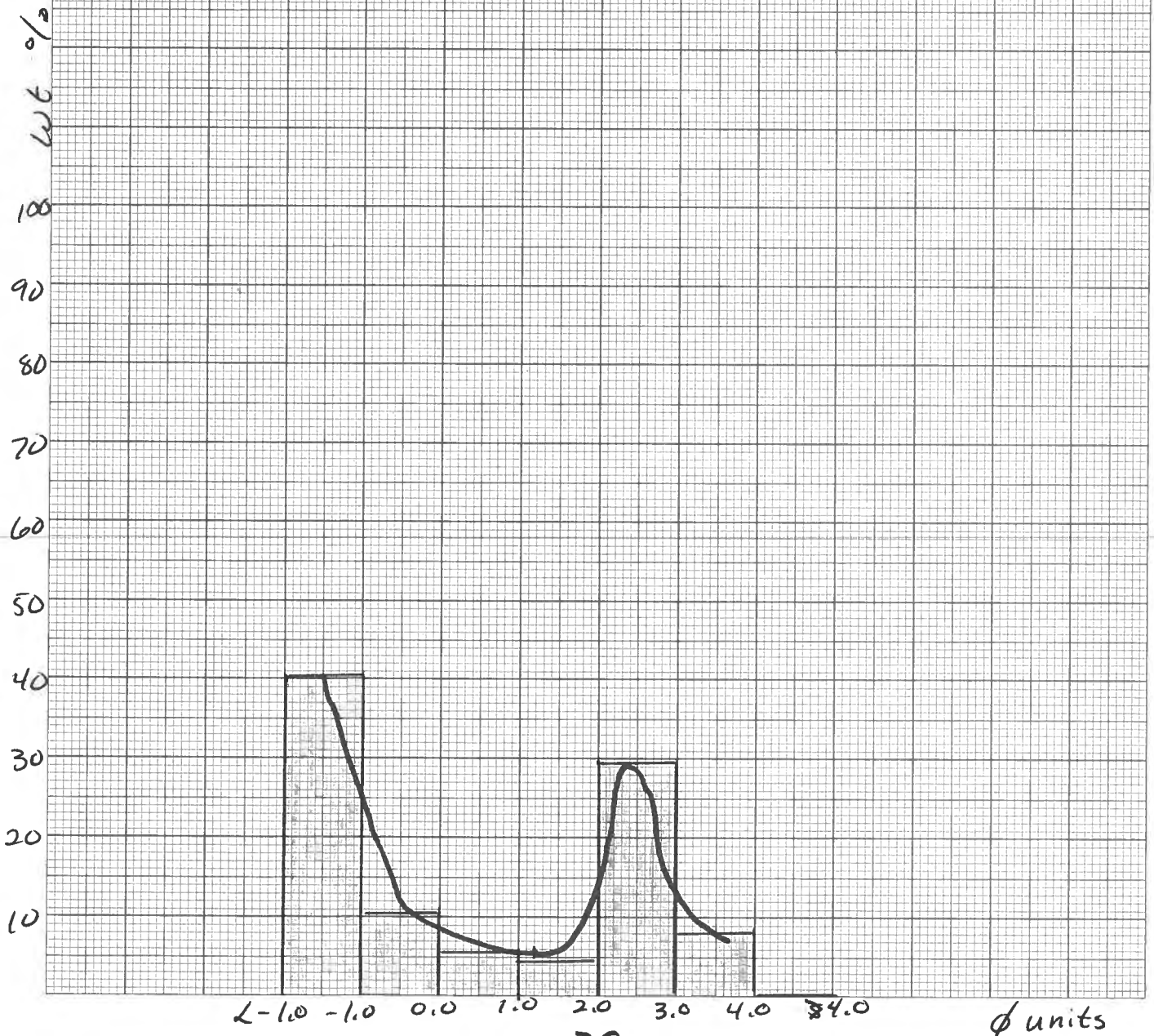
Graph I

Sample 9



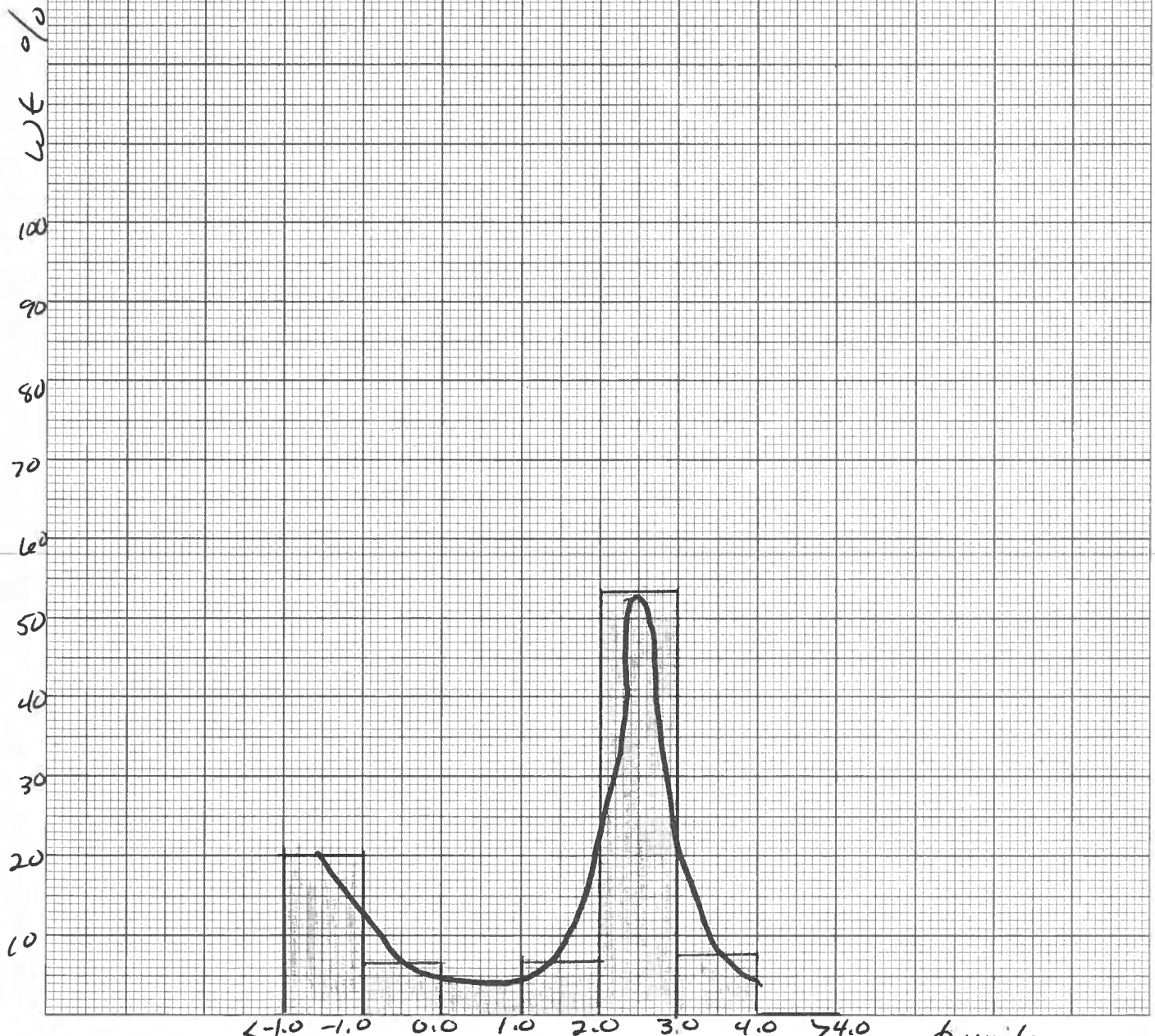
Graph I

Sample 10



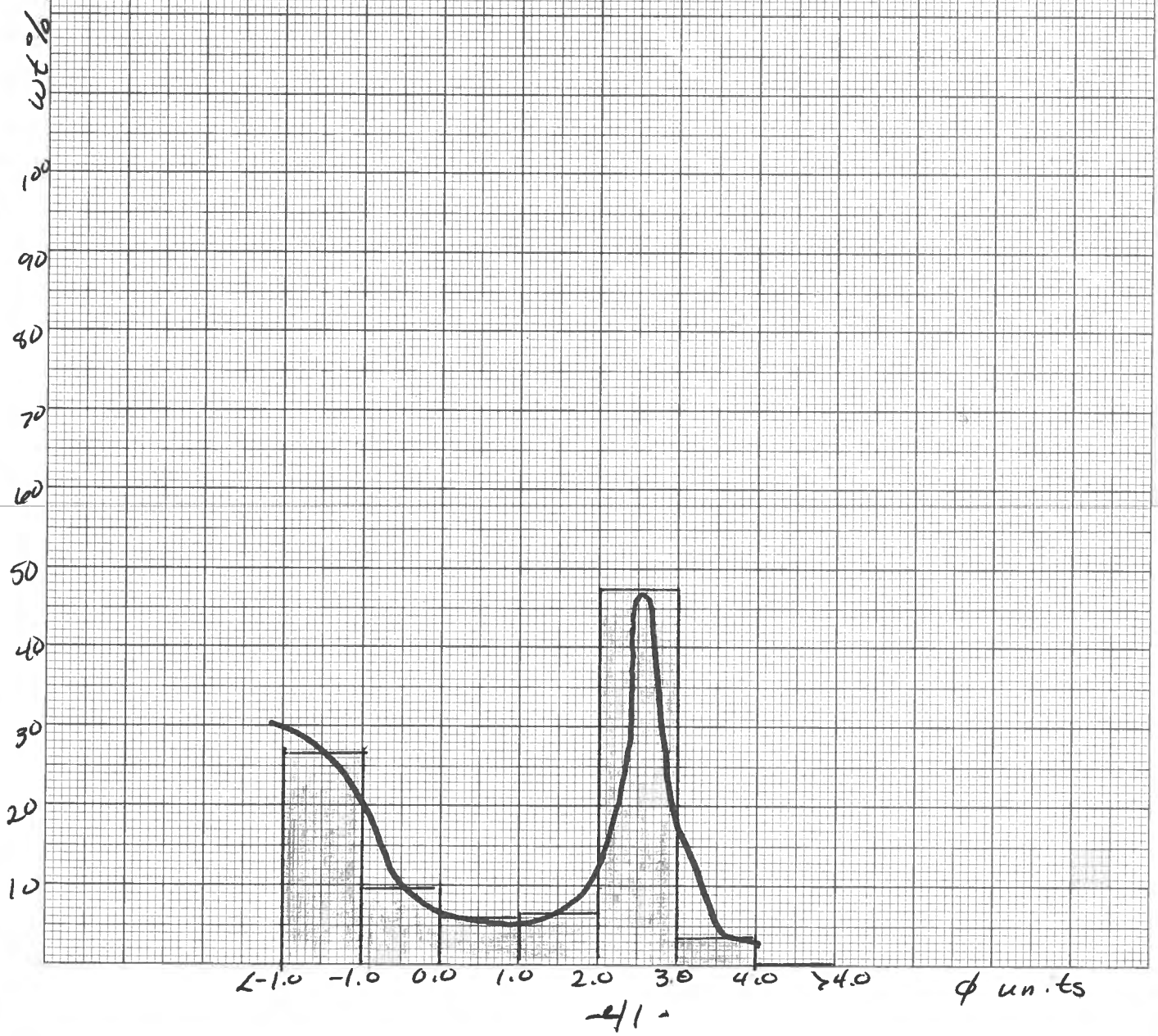
Graph I

Sample II



Graph I

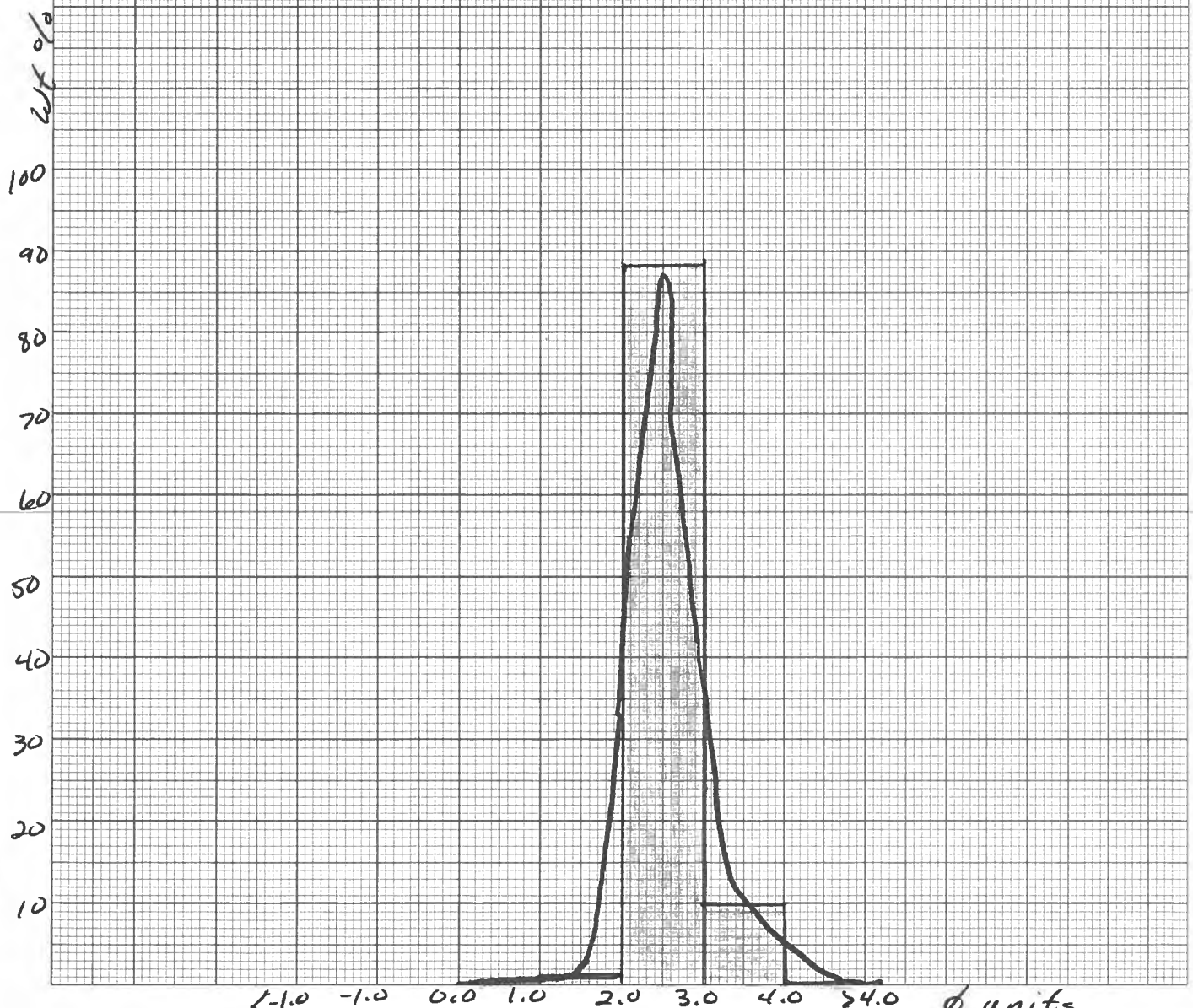
Sample 12



-4/1-

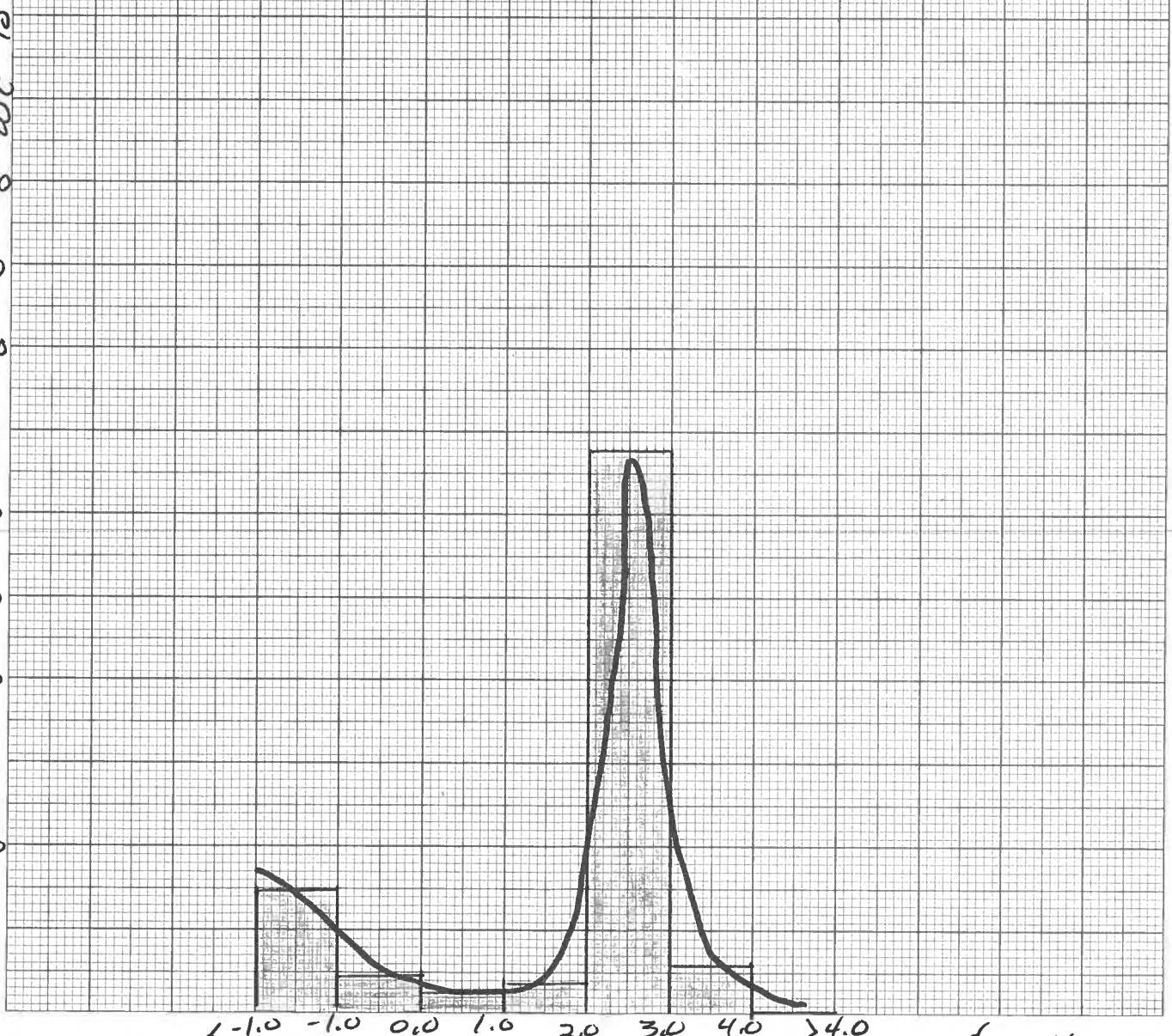
Graph I

Sample 13



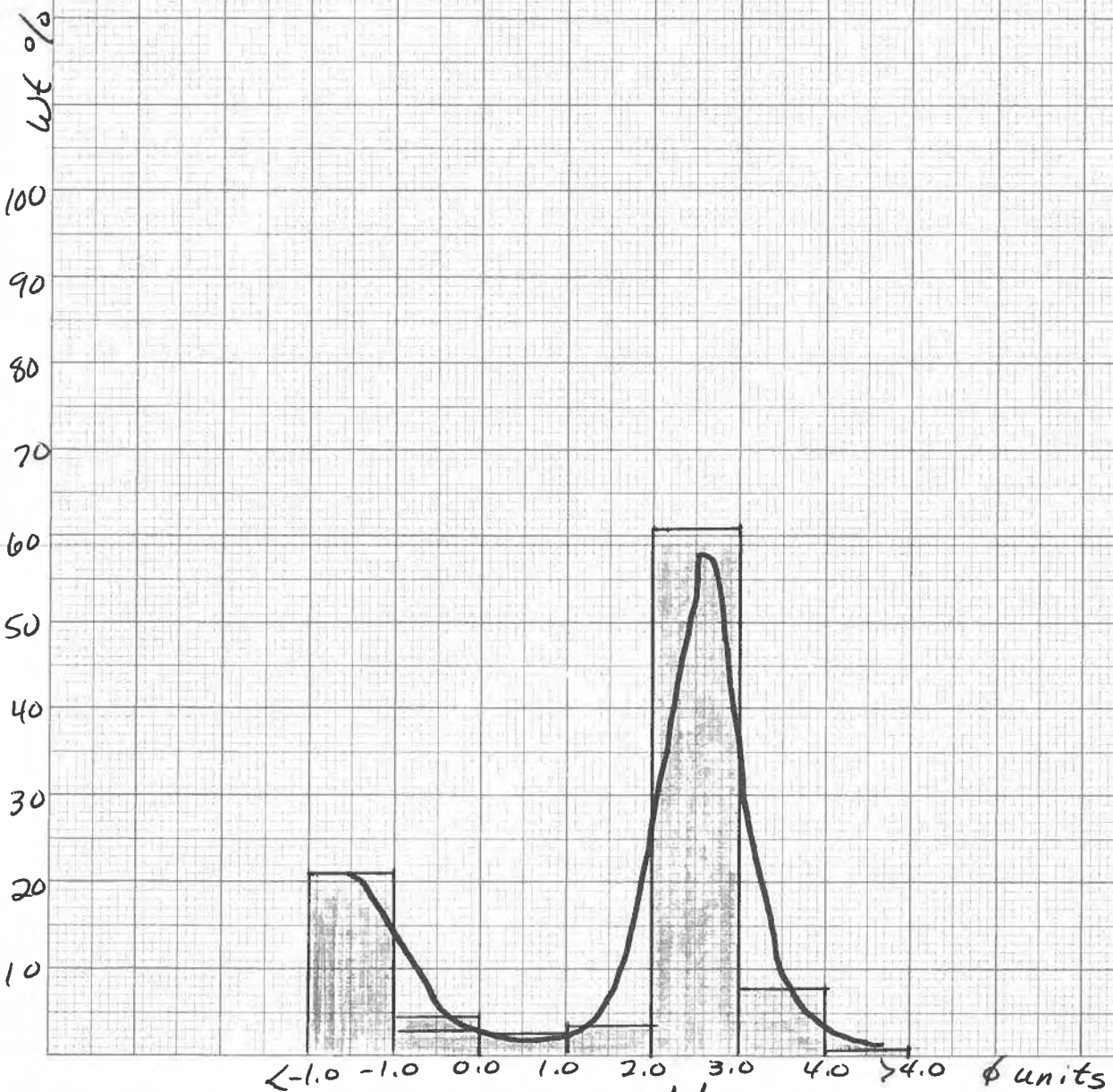
Graph I

Sample 14



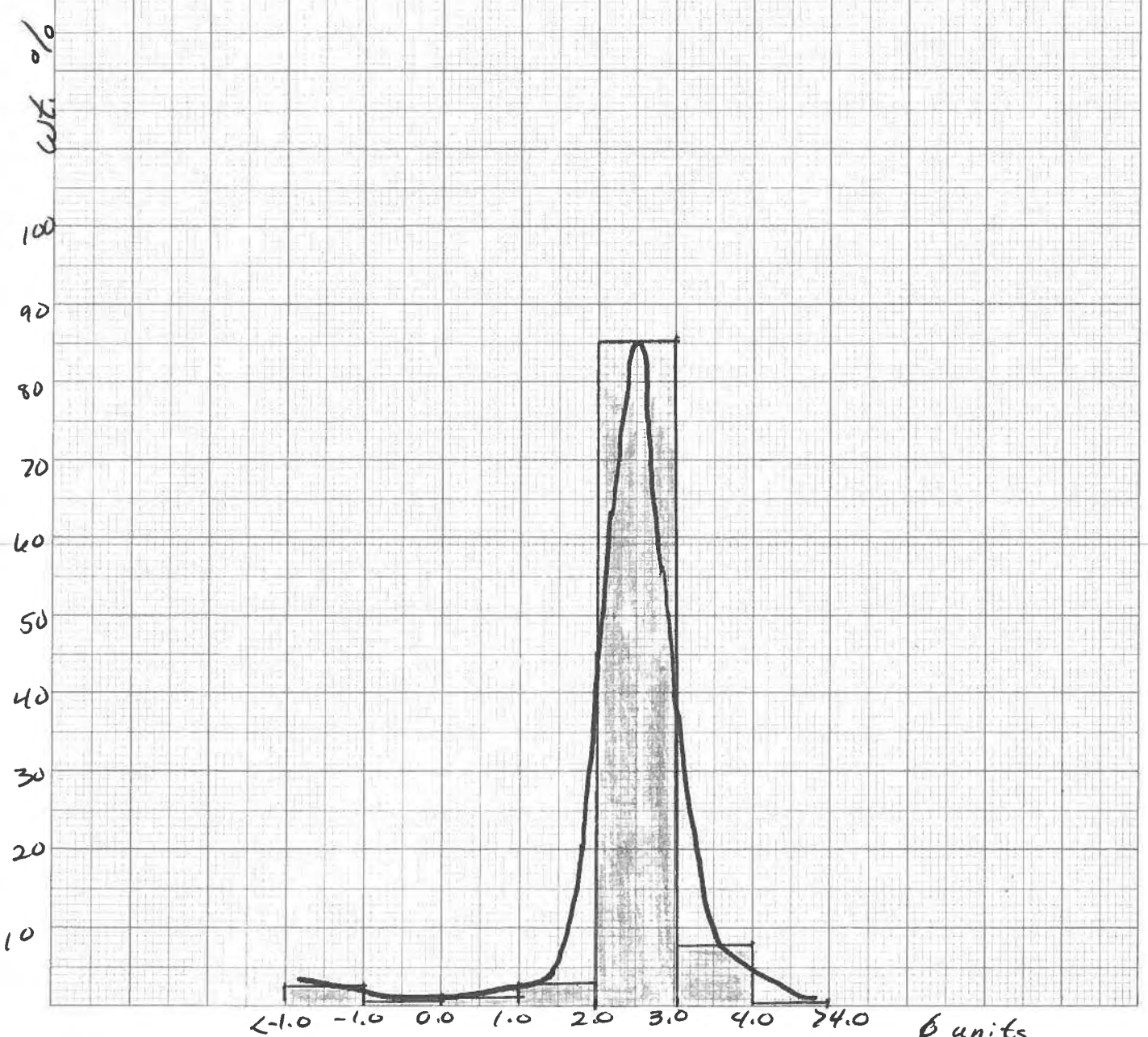
Graph I

Sample 15



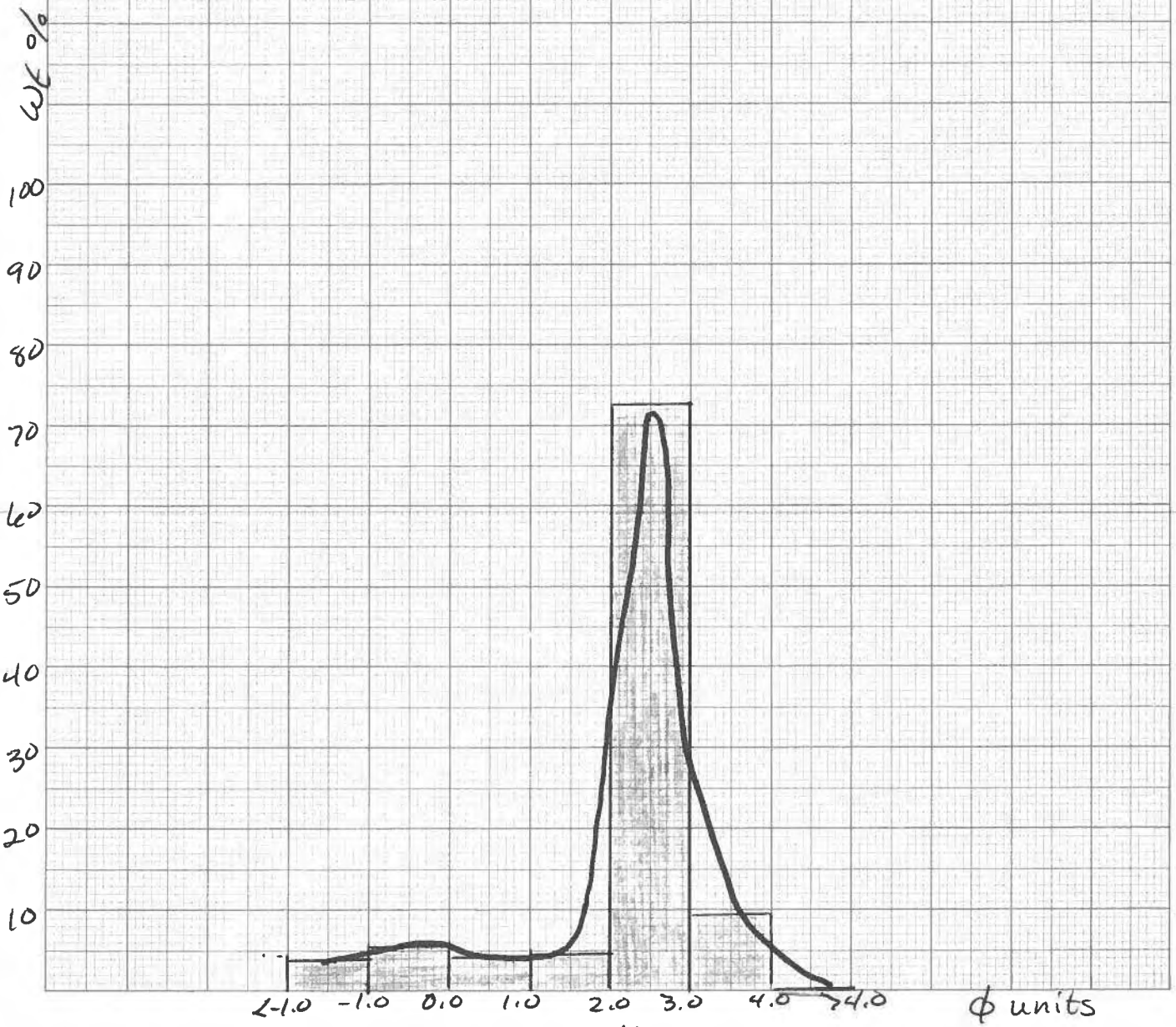
Graph I

Sample 16



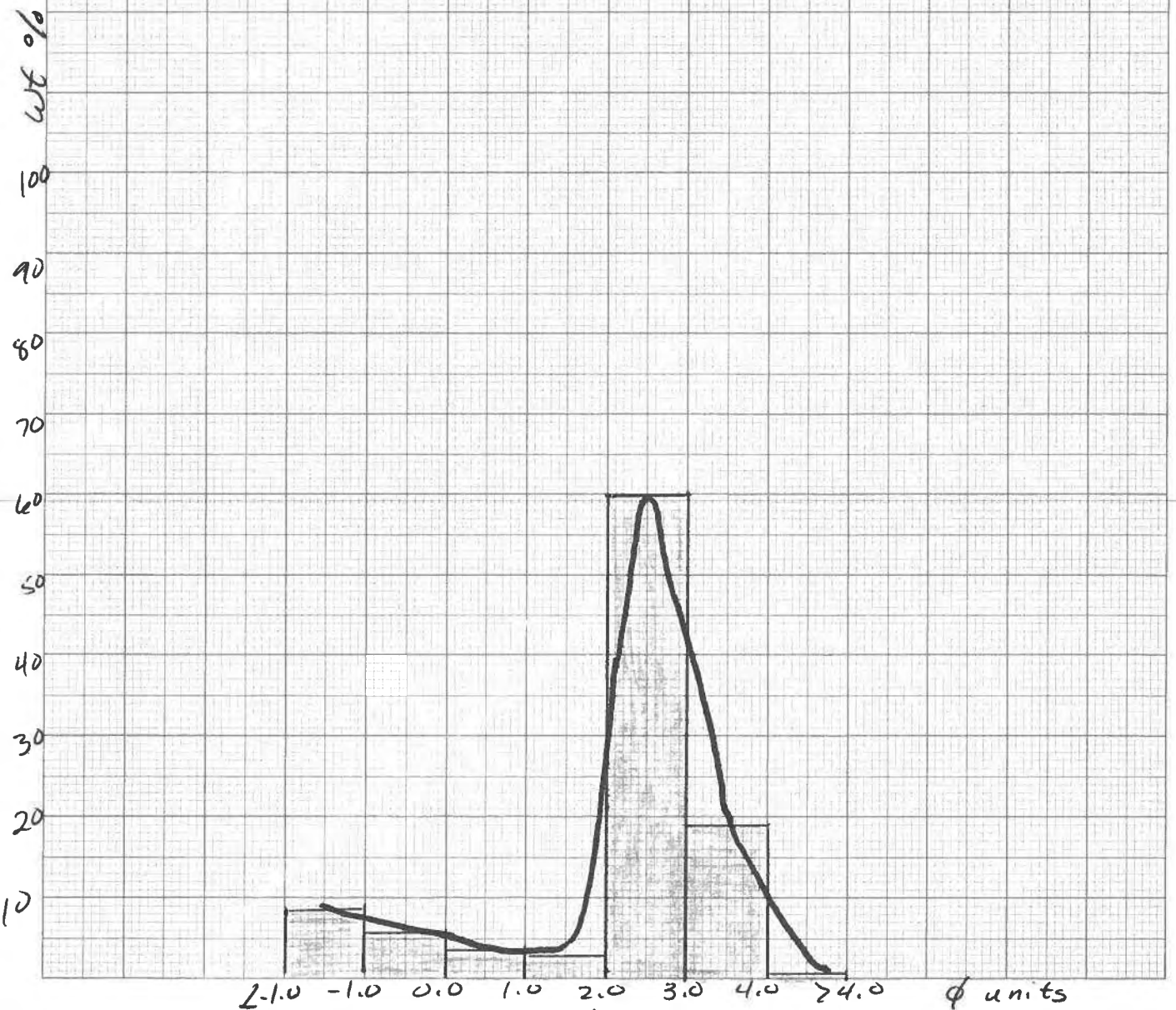
Graph I

Sample 17



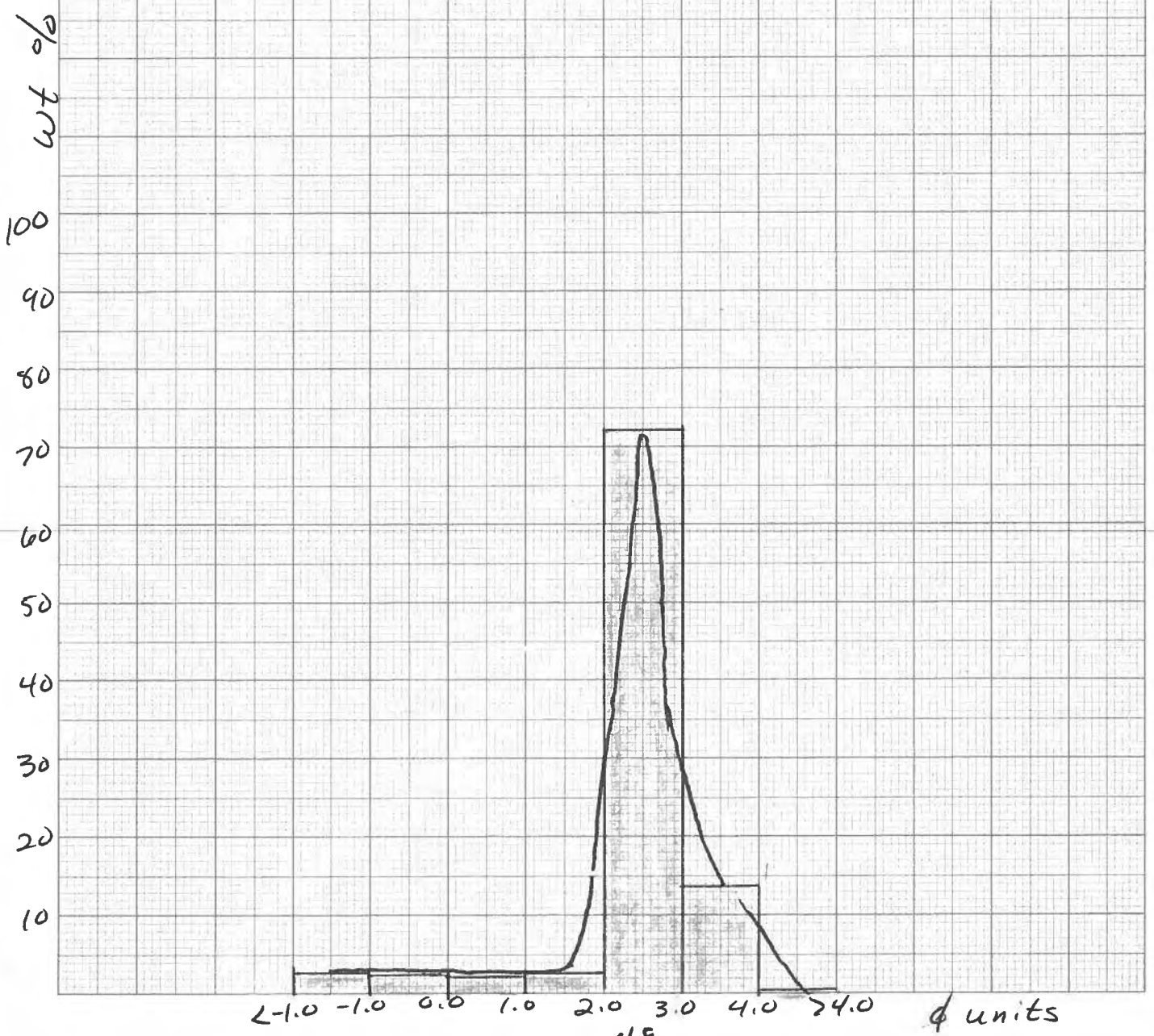
Graph I

Sample 18



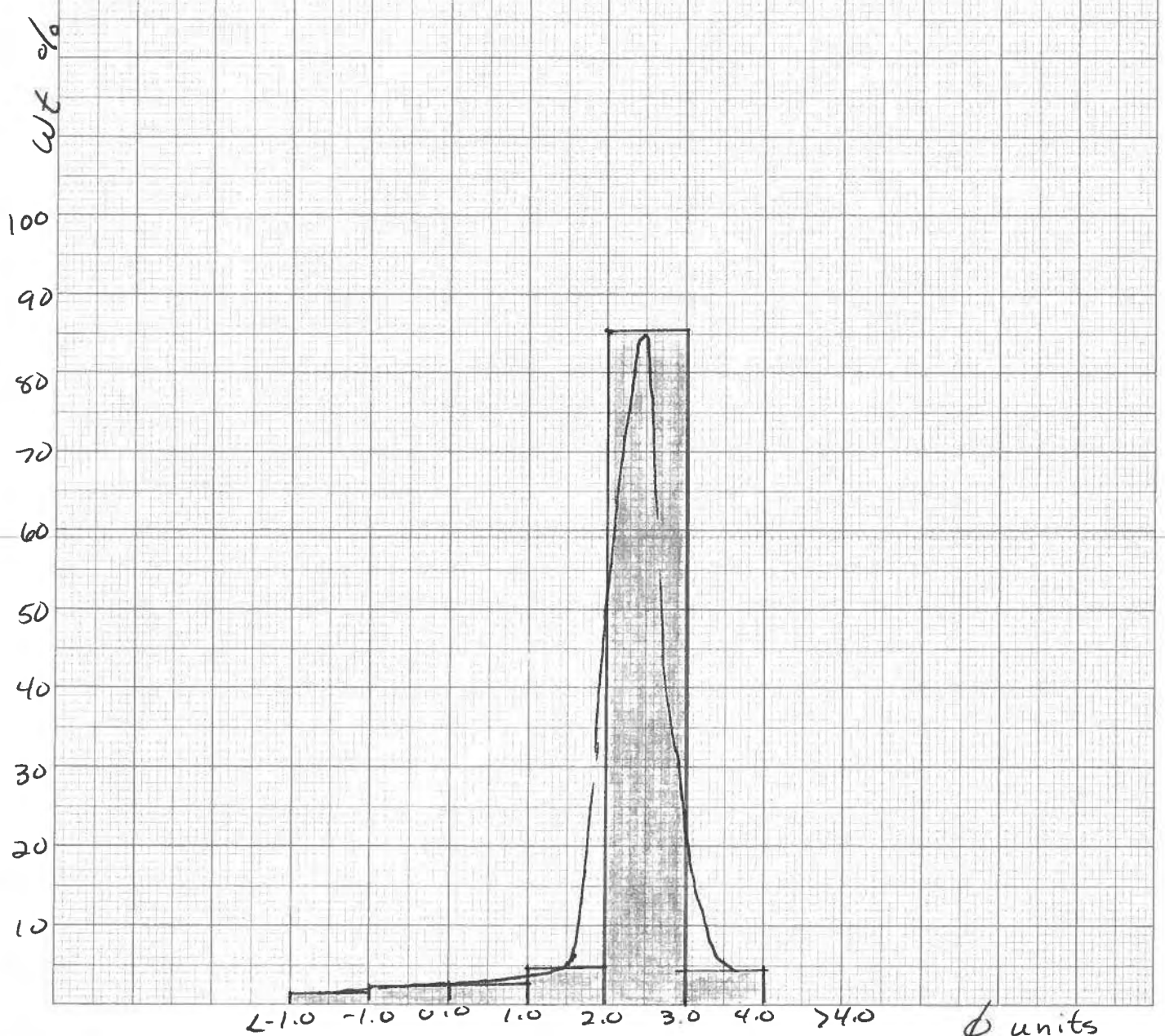
Graph I

Sample 19



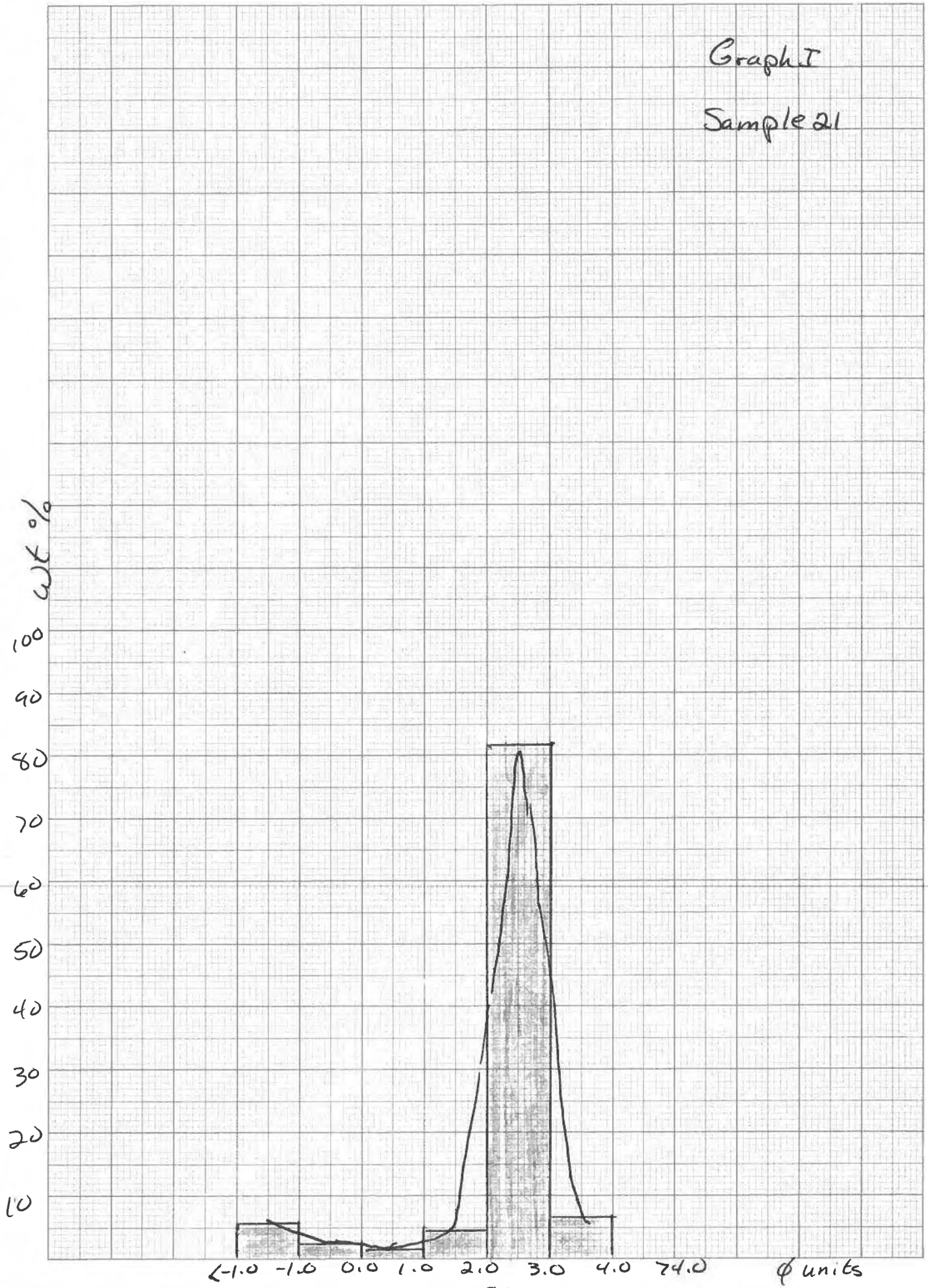
Graph I

Sample 20



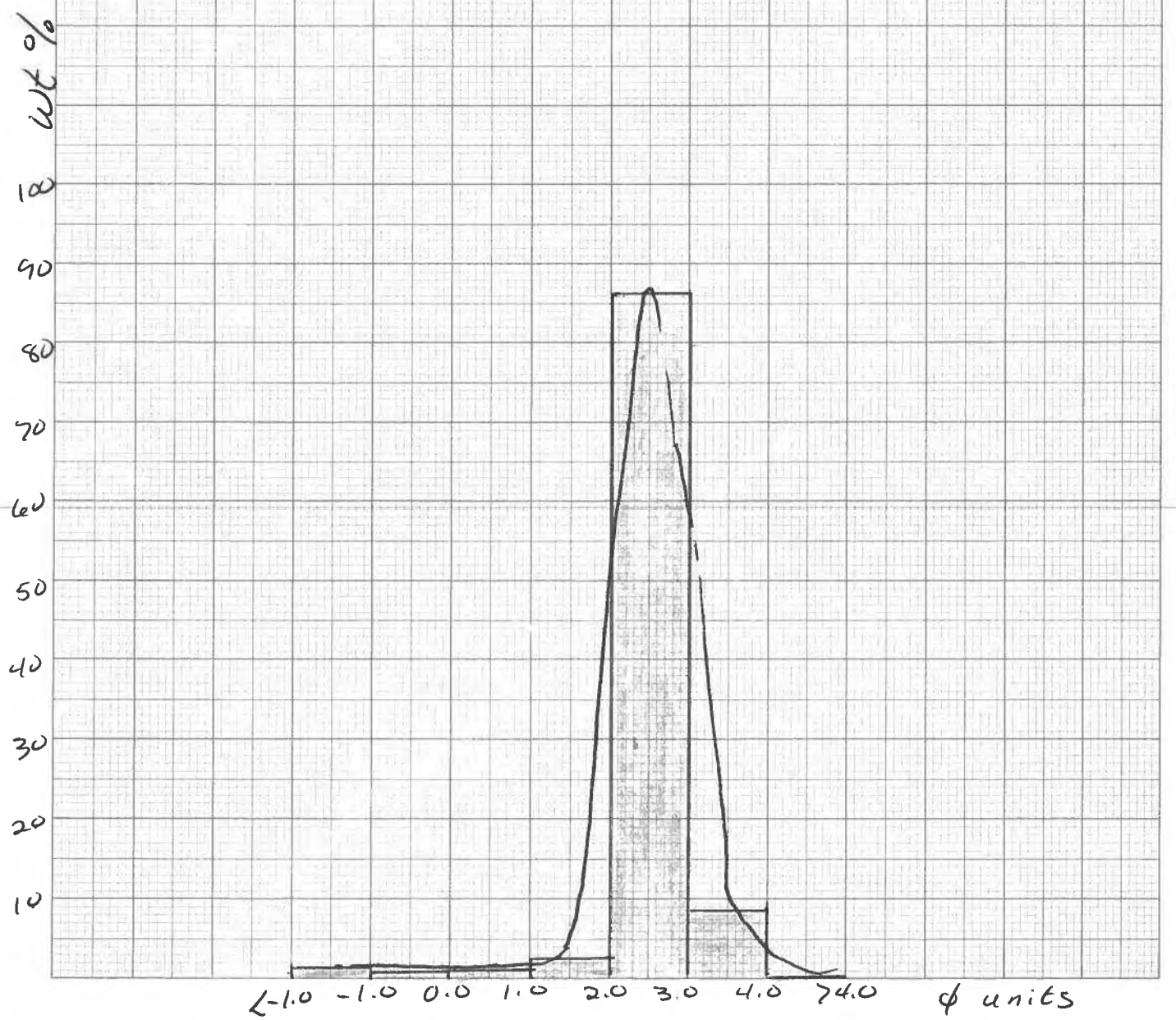
Graph I

Sample 21



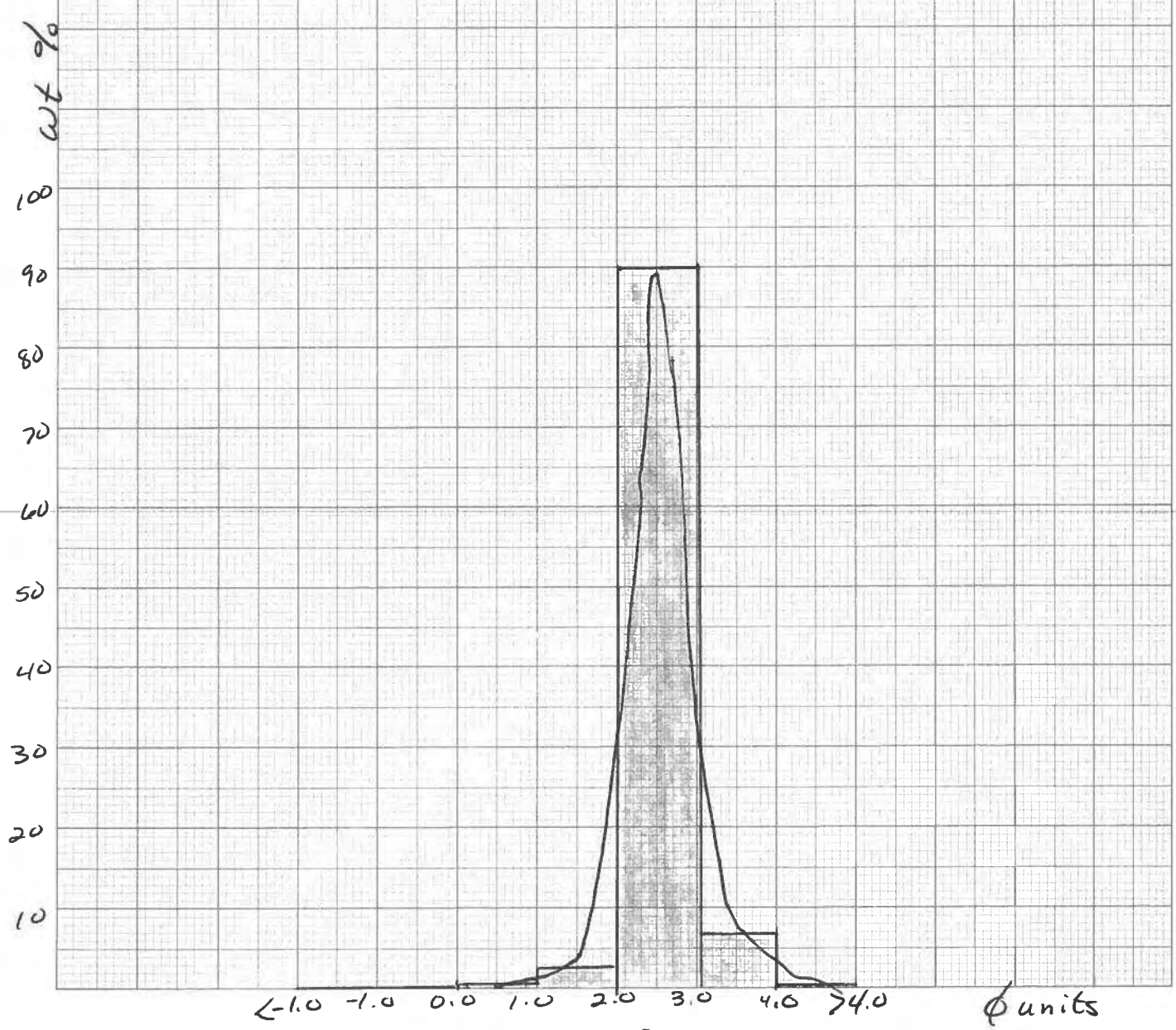
Graph I

Sample 22



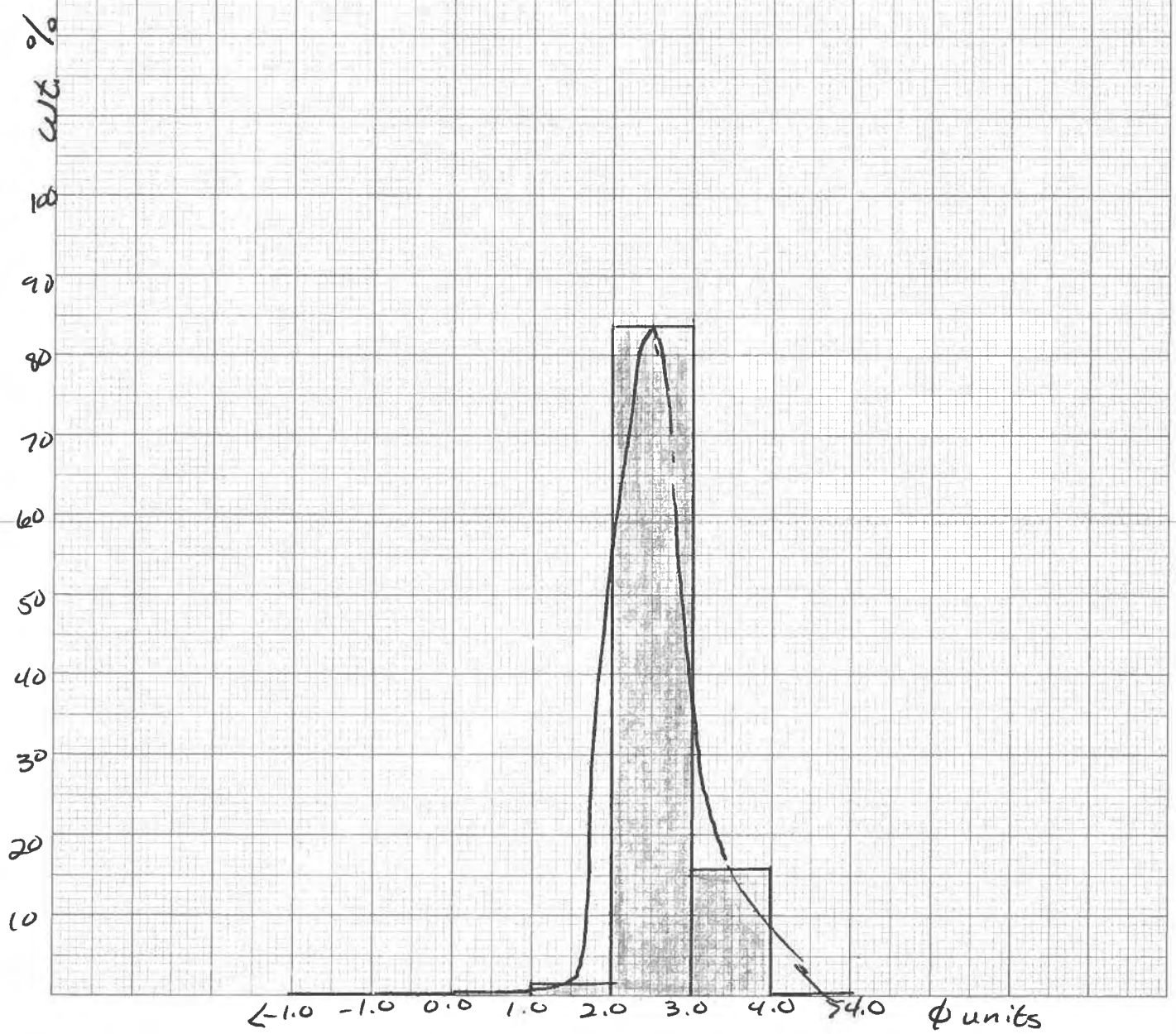
Graph I

Sample 23



Graph I

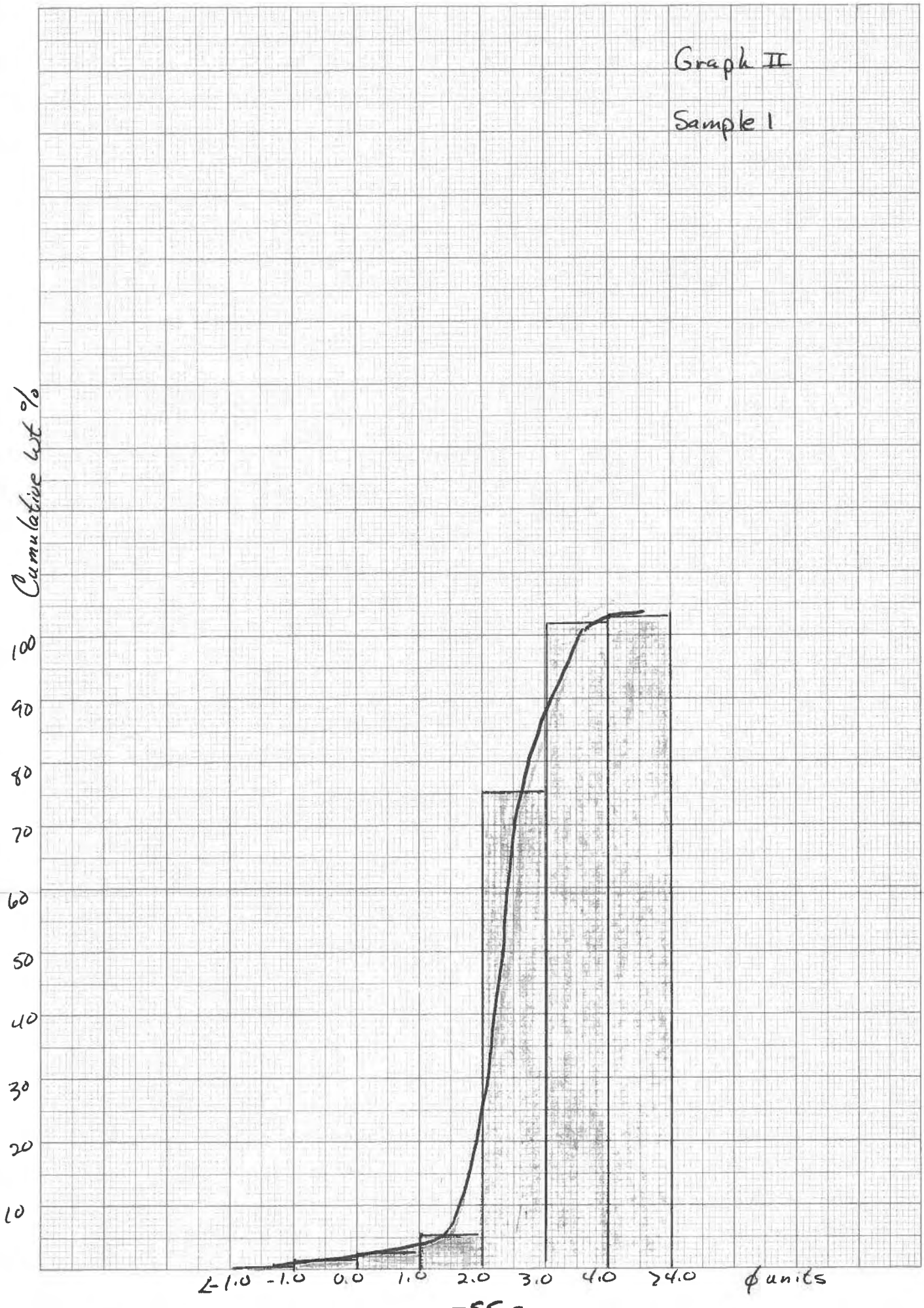
Sample 24



CUMULATIVE WEIGHT %

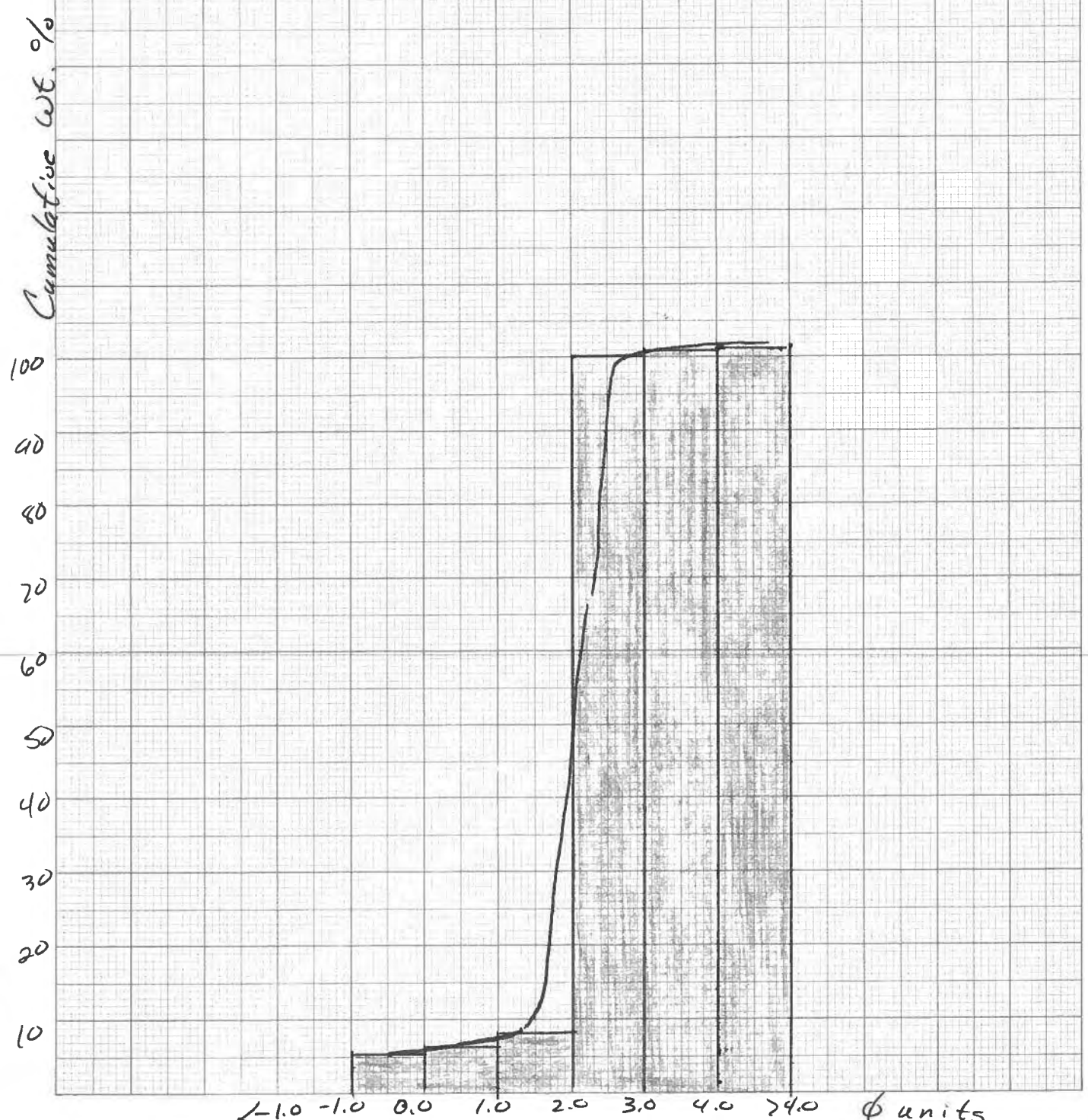
BIG PASS BOTTOM SEDIMENTS

SARASOTA, FLORIDA


Graph II
Sample 1
Cumulative wt %
100
90
80
70
60
50
40
30
20
10
<-1.0
-1.0
0.0
1.0
2.0
3.0
4.0
>4.0
ϕ units

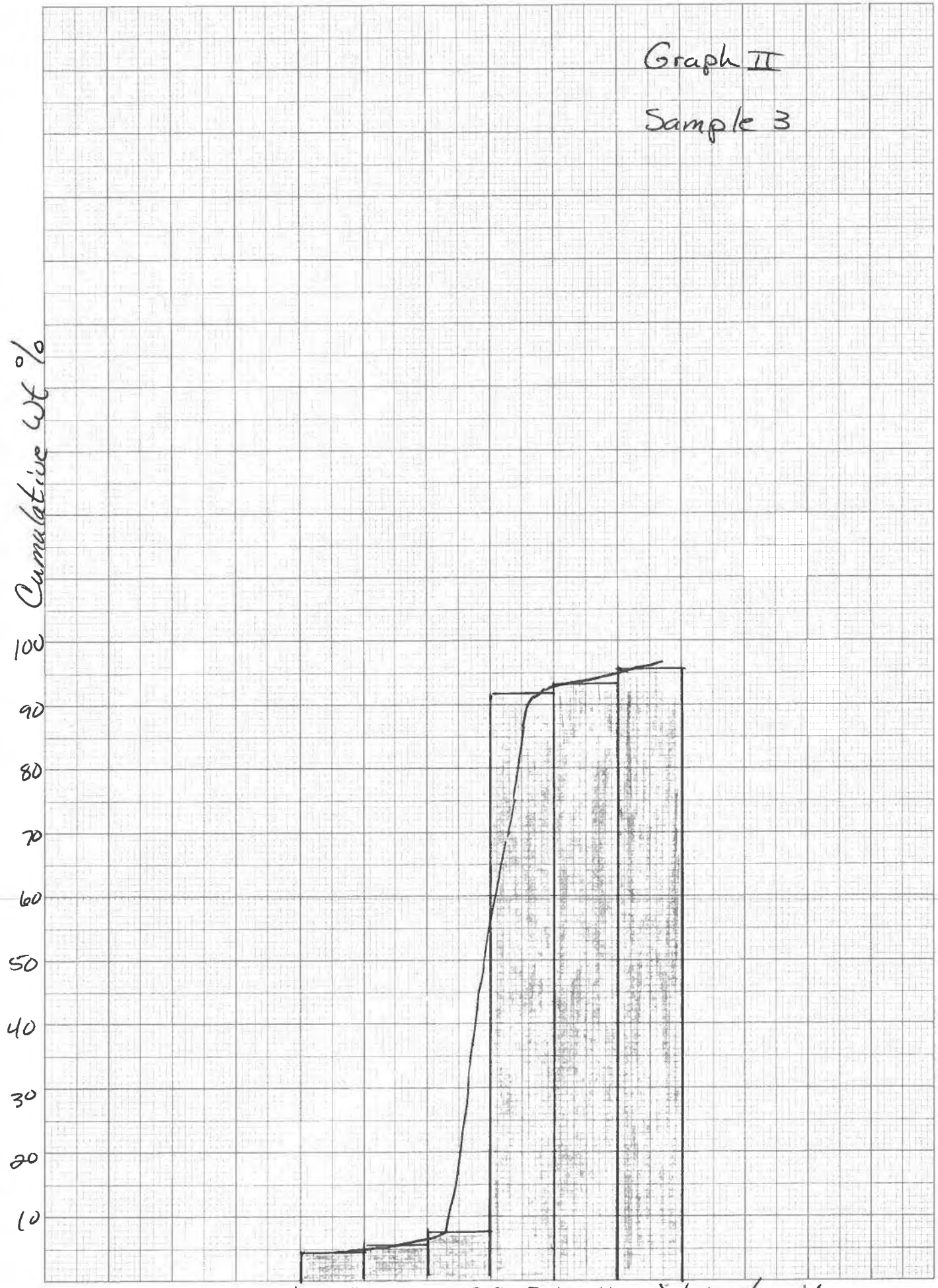
Graph II

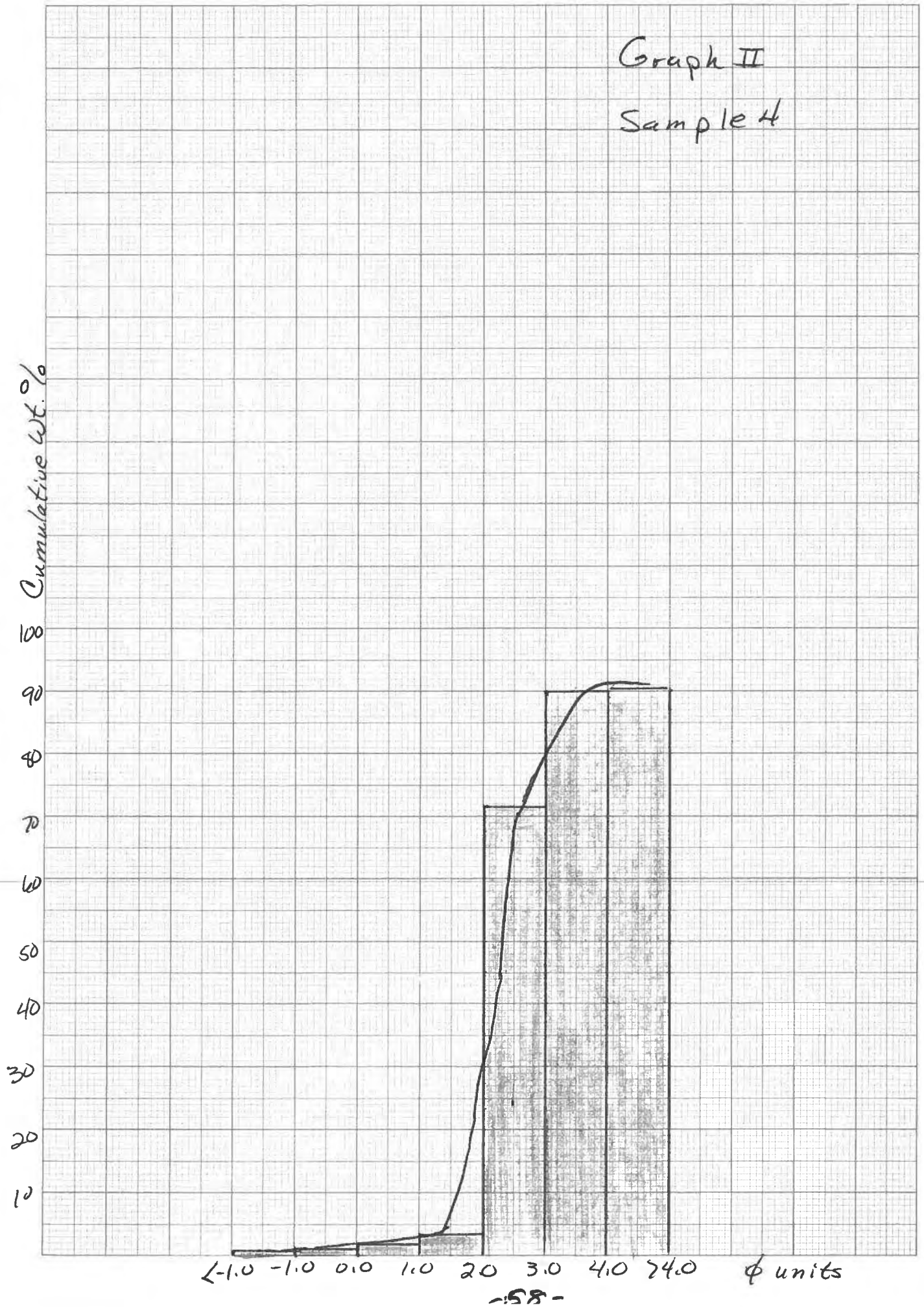
Sample 2



Graph II

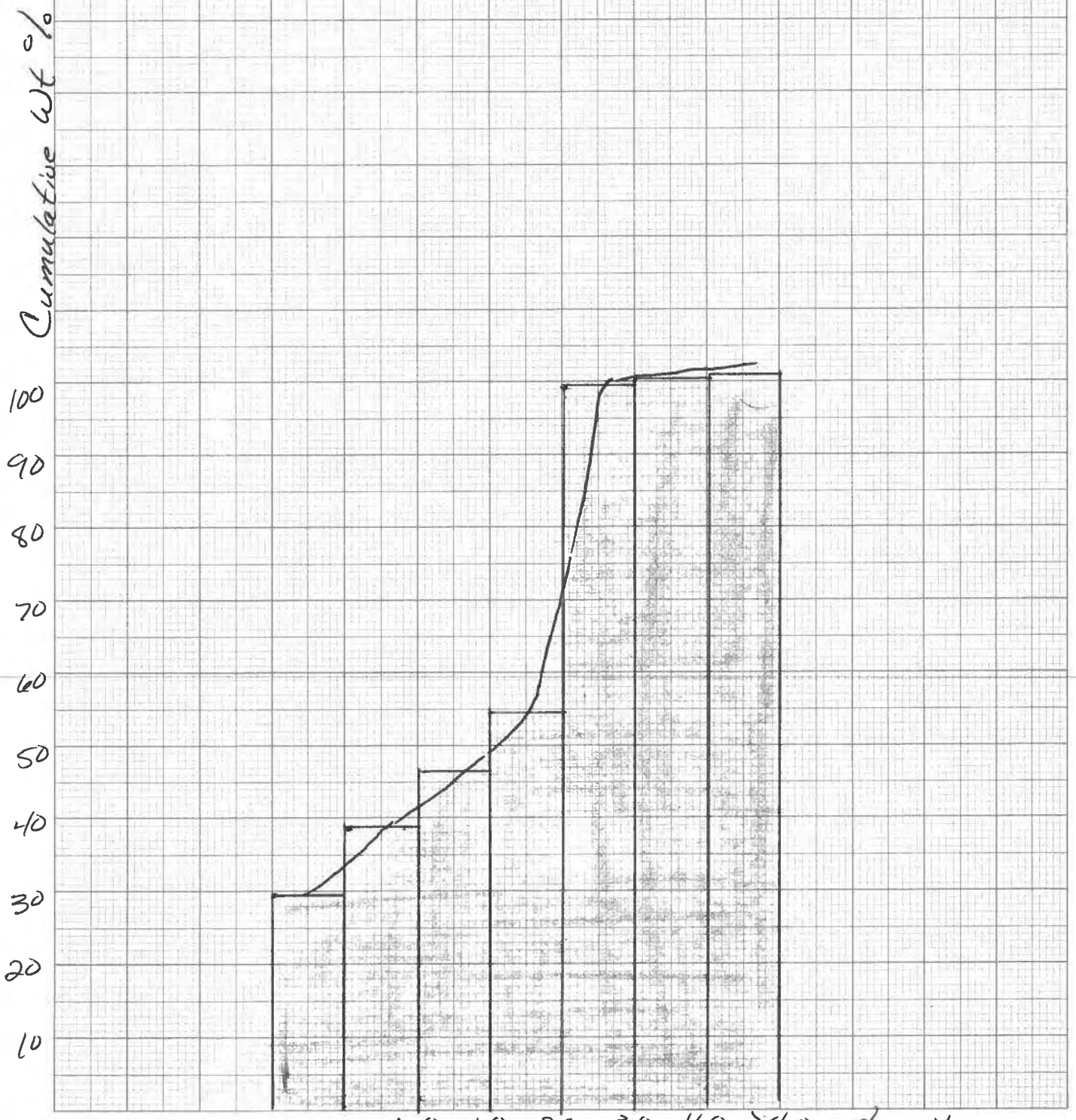
Sample 3




Graph II
Sample 4
Cumulative Wt. %
100
90
80
70
60
50
40
30
20
10
<-1.0
-1.0
0.0
1.0
2.0
3.0
4.0
>4.0
ϕ units

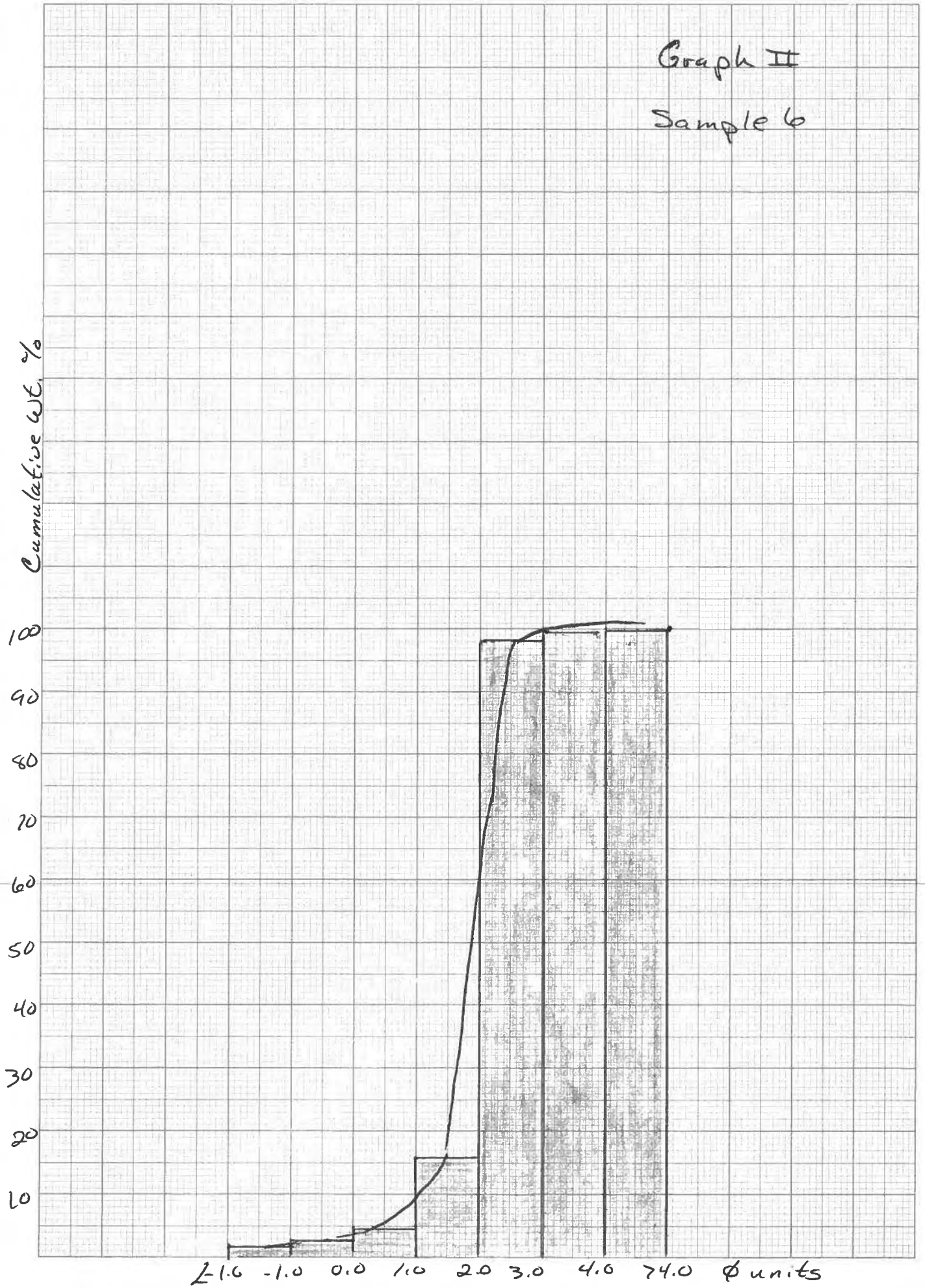
Graph II

Sample 5



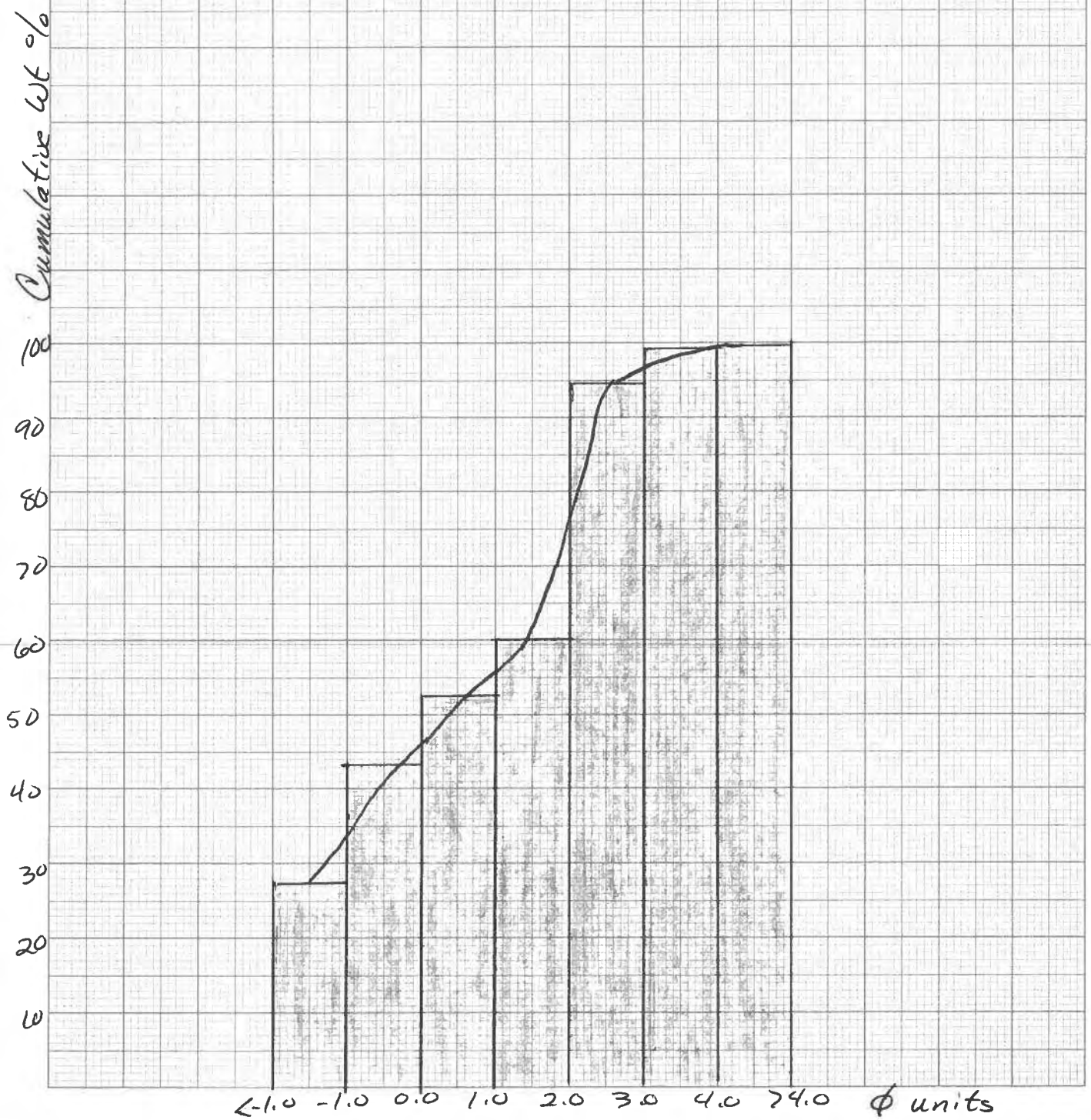
Graph II

Sample 6



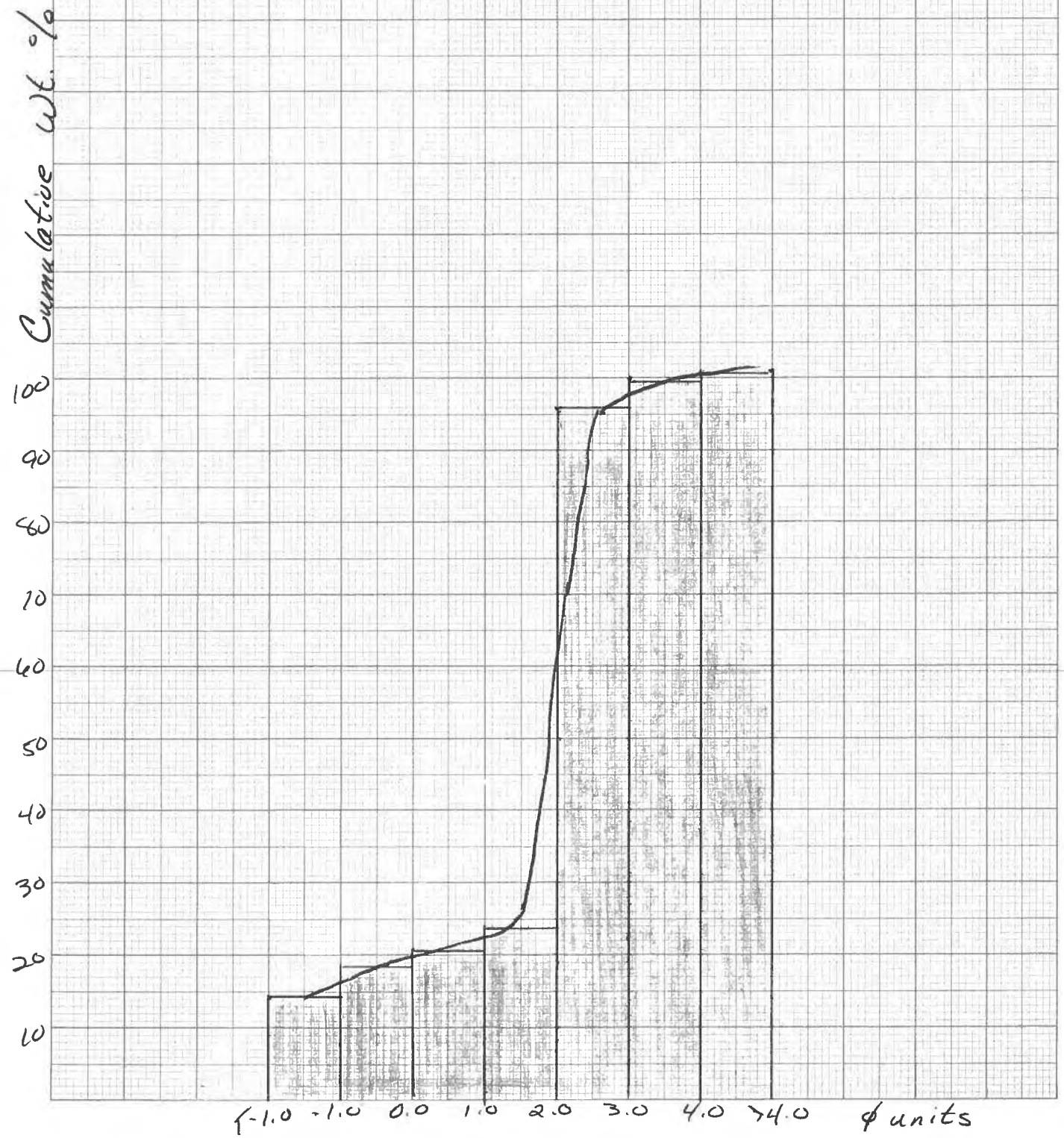
Graph II

Sample 7



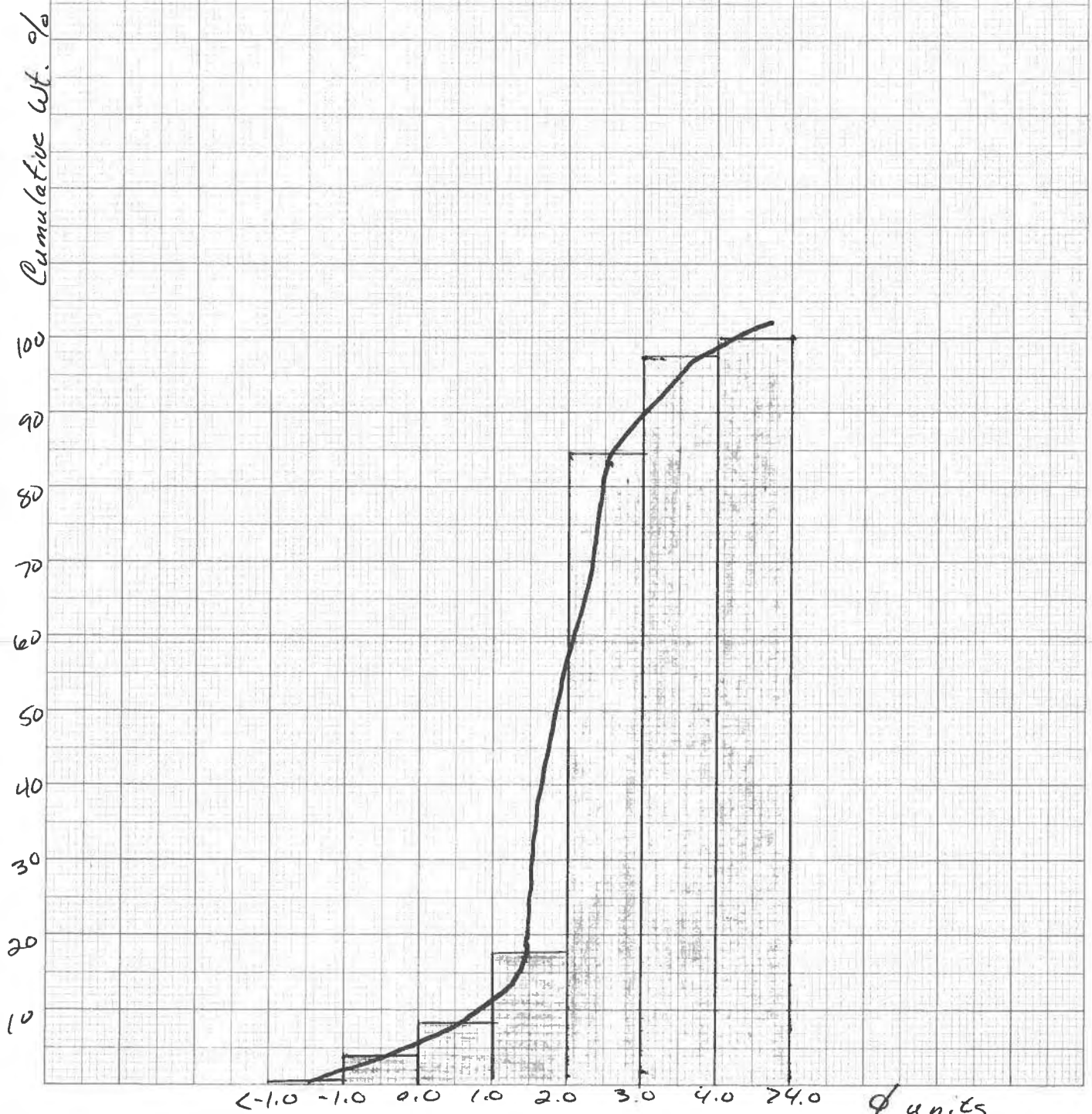
Graph II

Sample 8



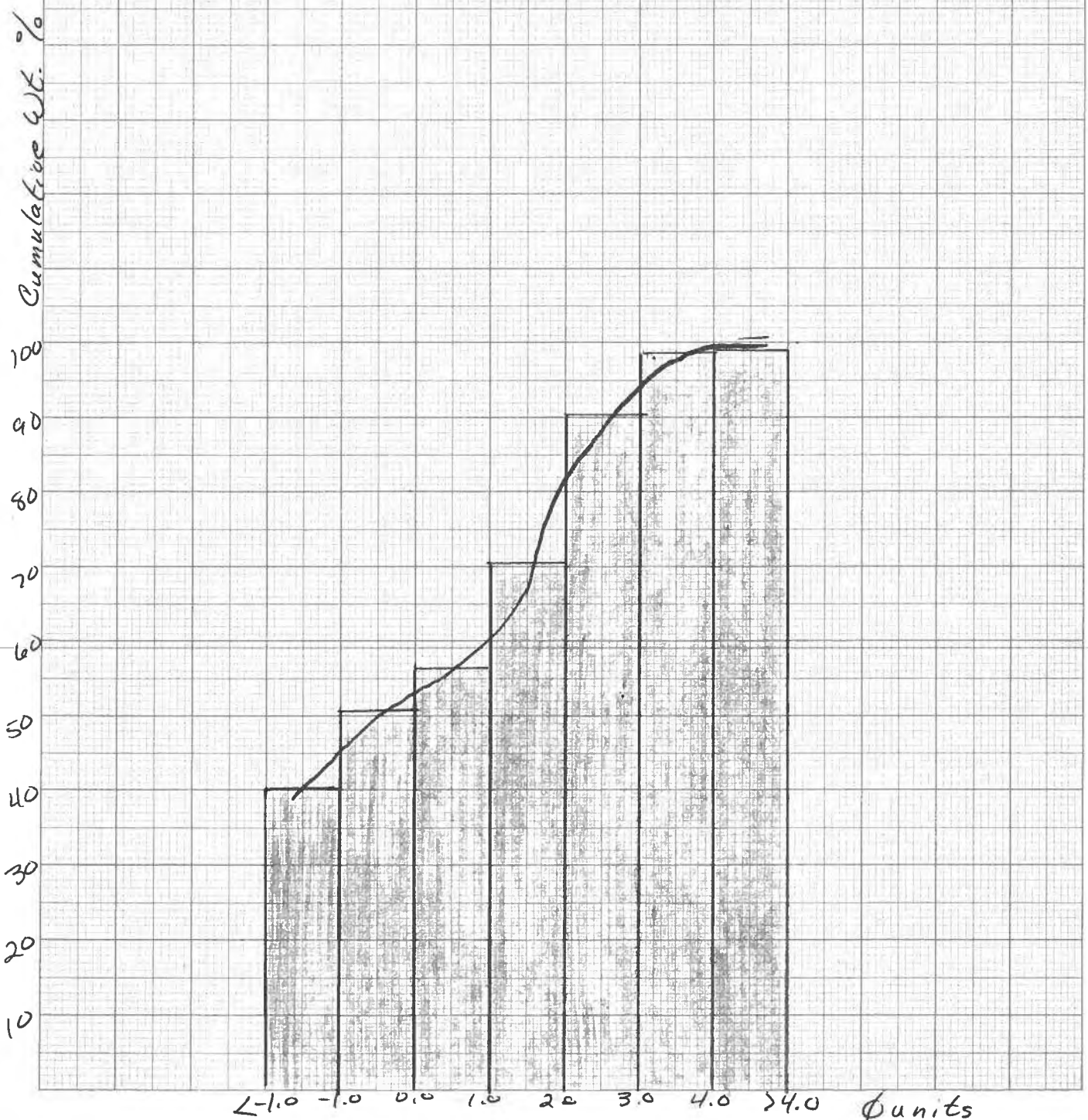
Graph II

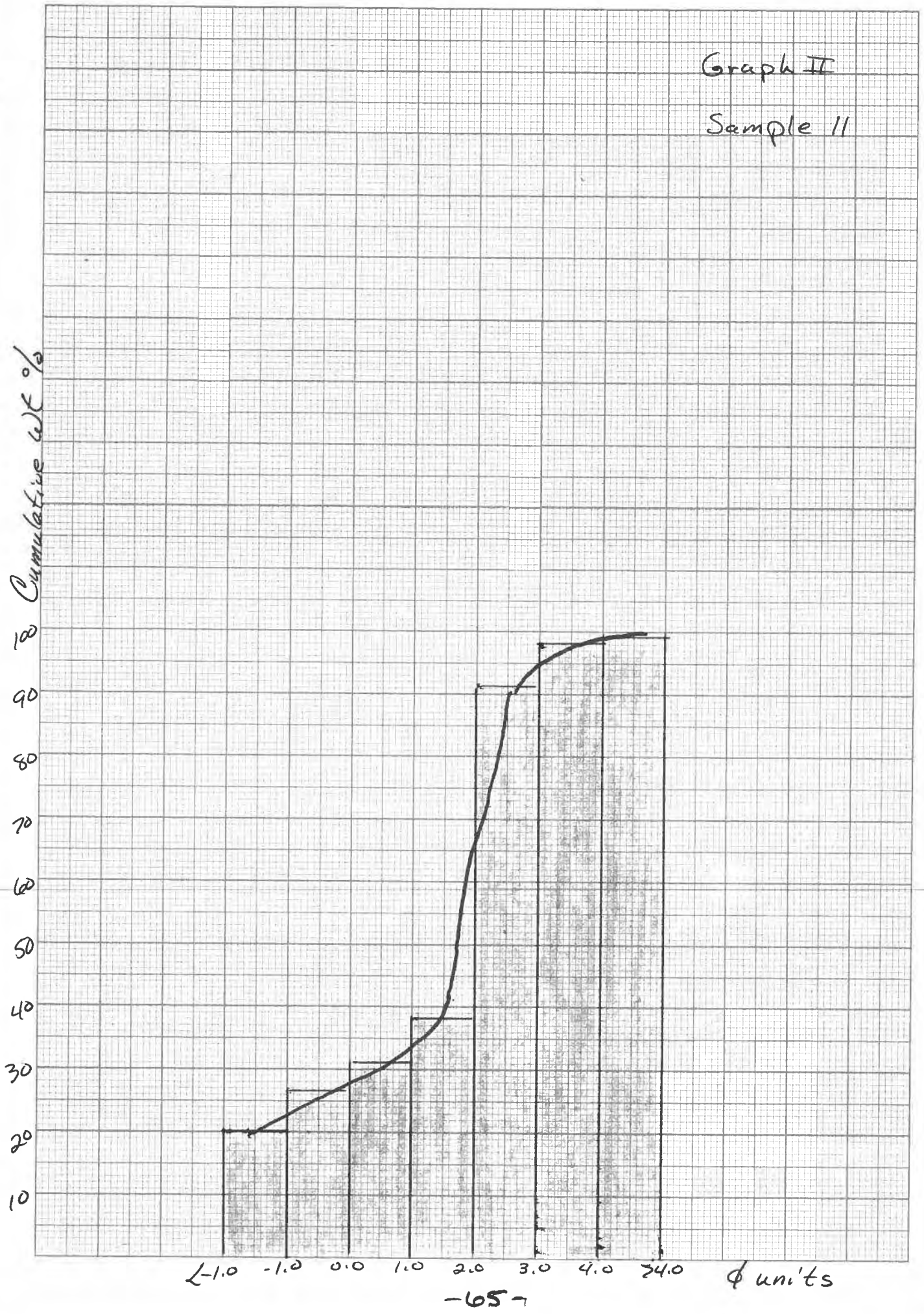
Sample 9

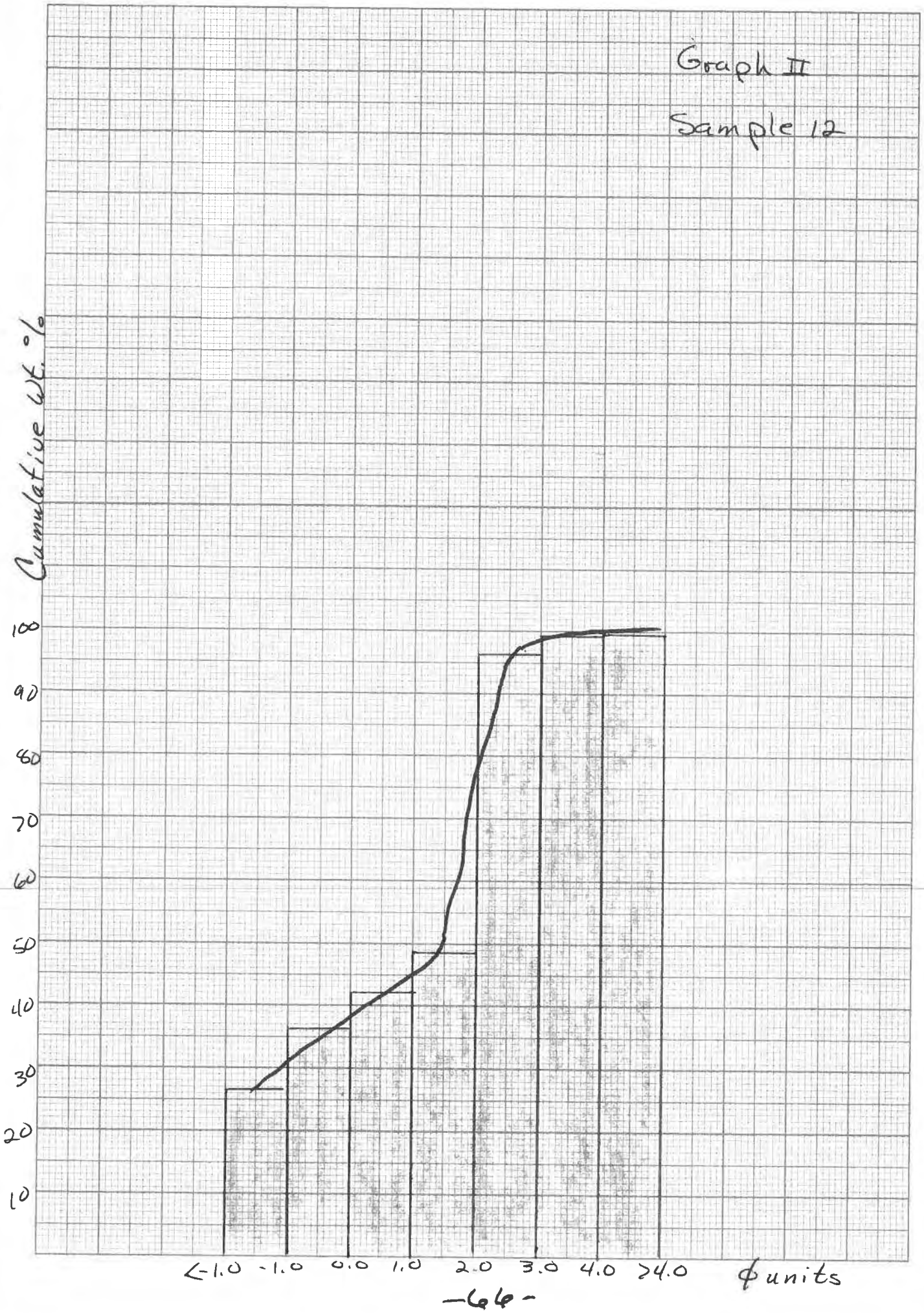


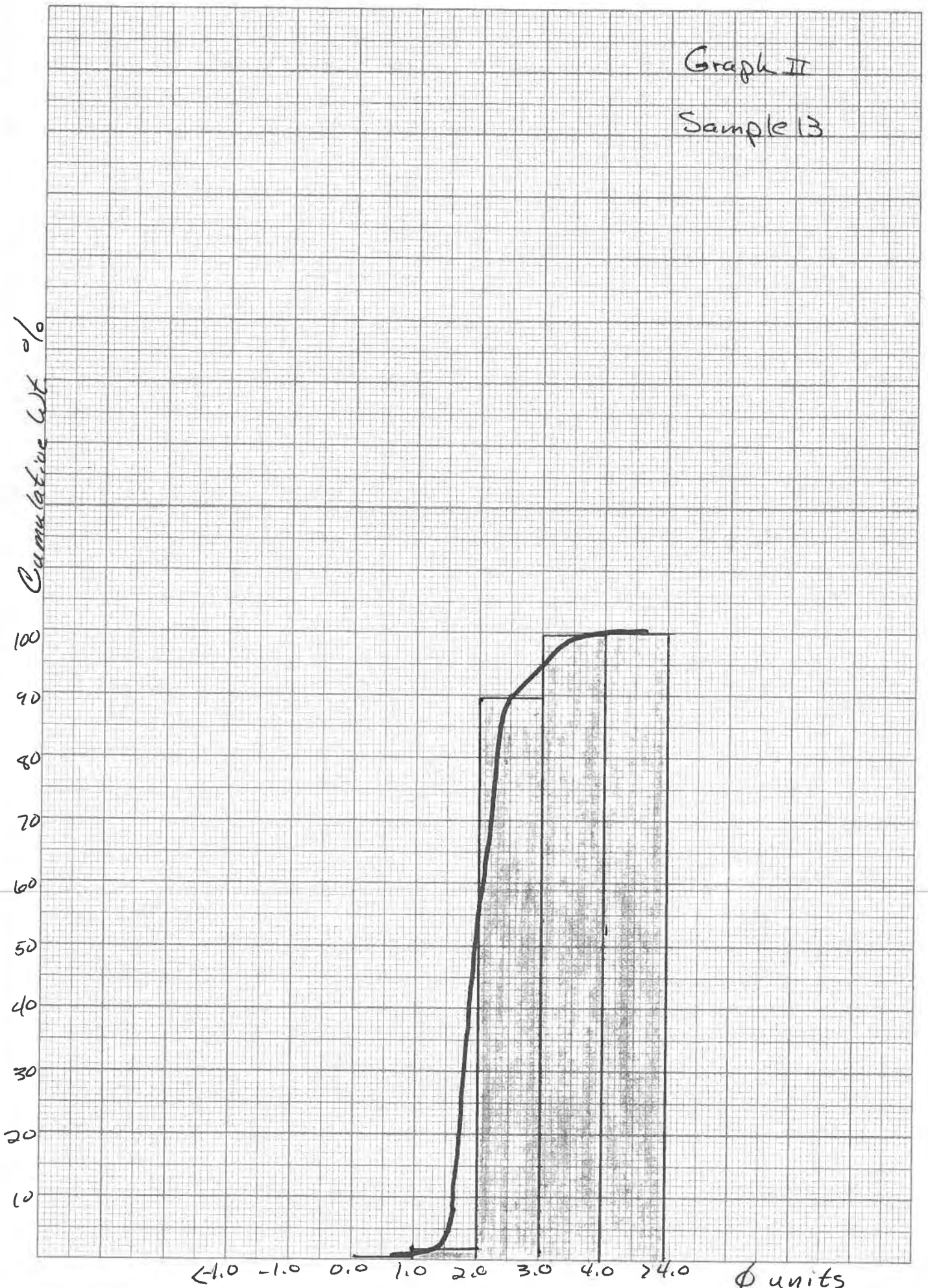
Graph II

Sample 10



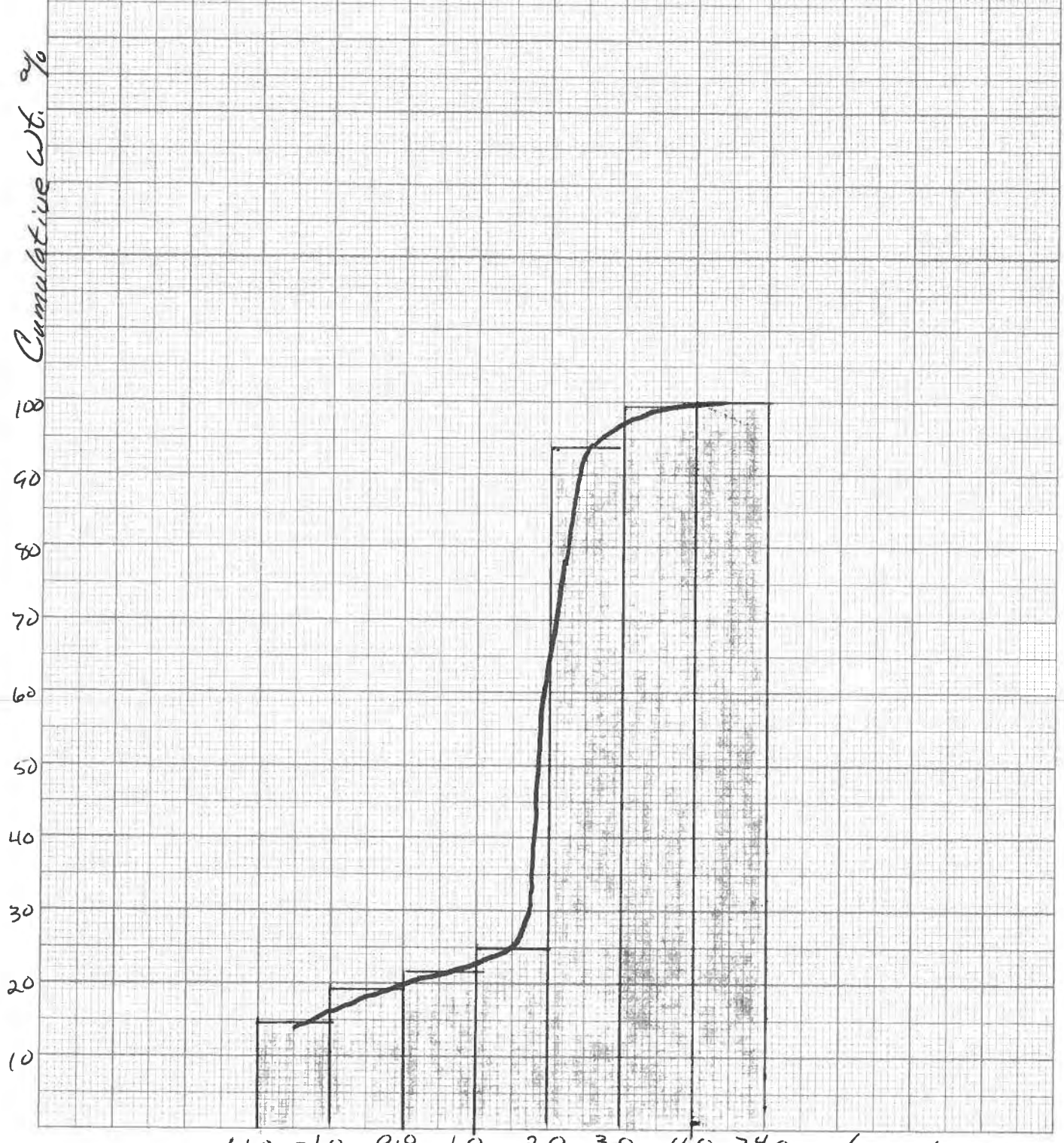

Graph II
Sample II
Cumulative wt %
100
90
80
70
60
50
40
30
20
10
-1.0
-1.0
0.0
1.0
2.0
3.0
4.0
4.0
ϕ units


Graph II
Sample 12
Cumulative Wt. %
100
90
80
70
60
50
40
30
20
10
<-1.0
-1.0
0.0
1.0
2.0
3.0
4.0
>4.0
ϕ units



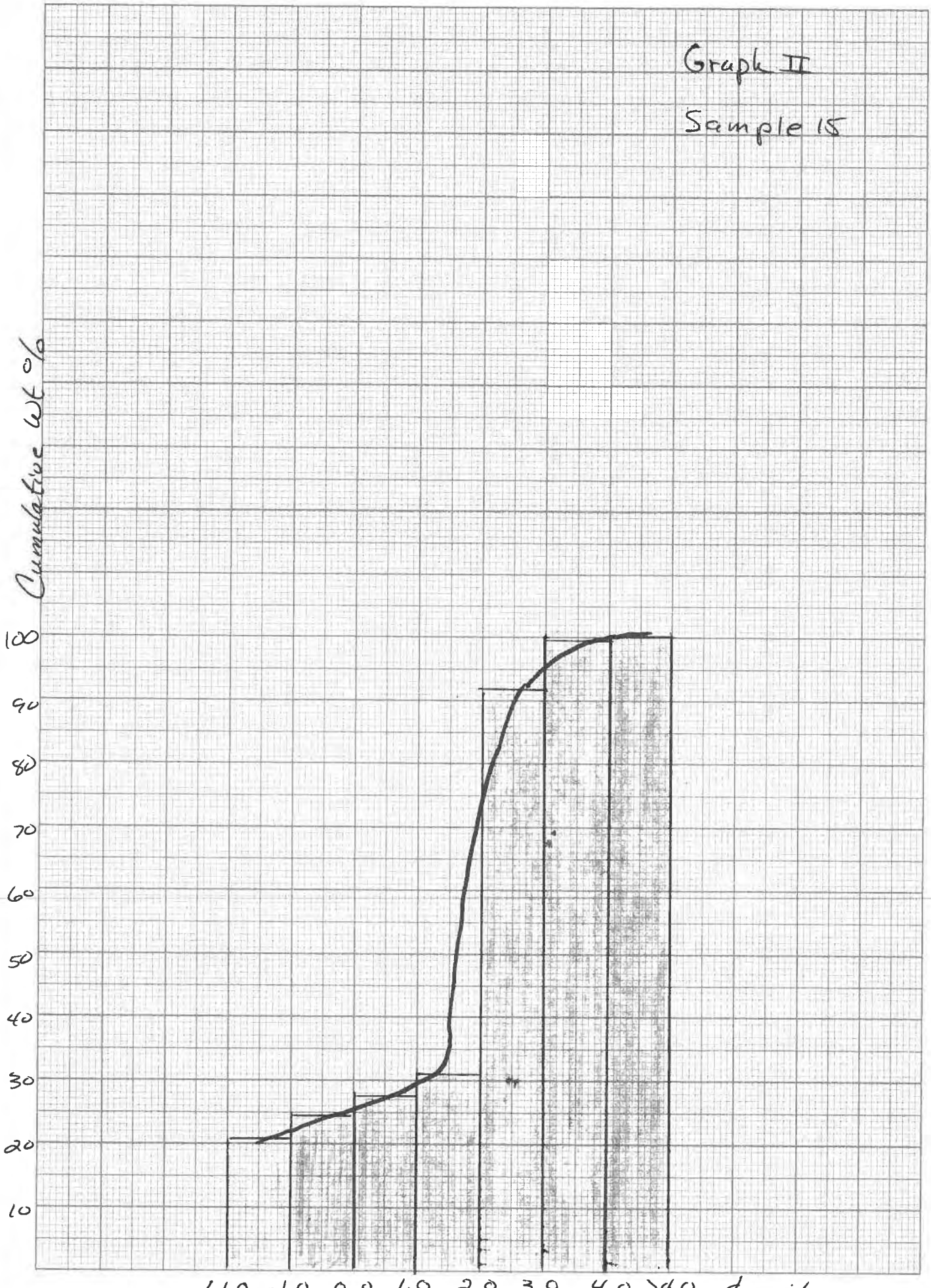
Graph II

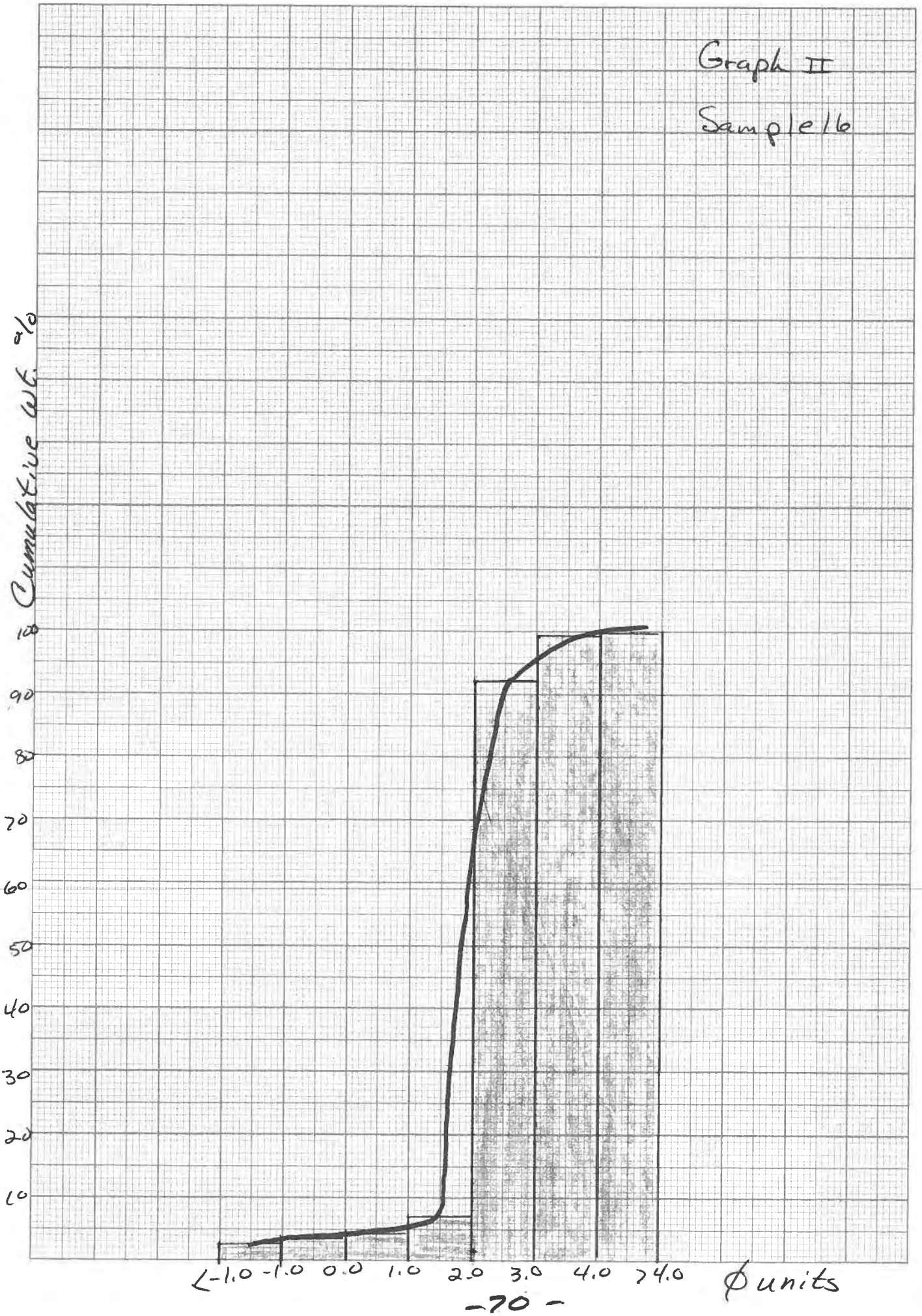
Sample 14



Graph II

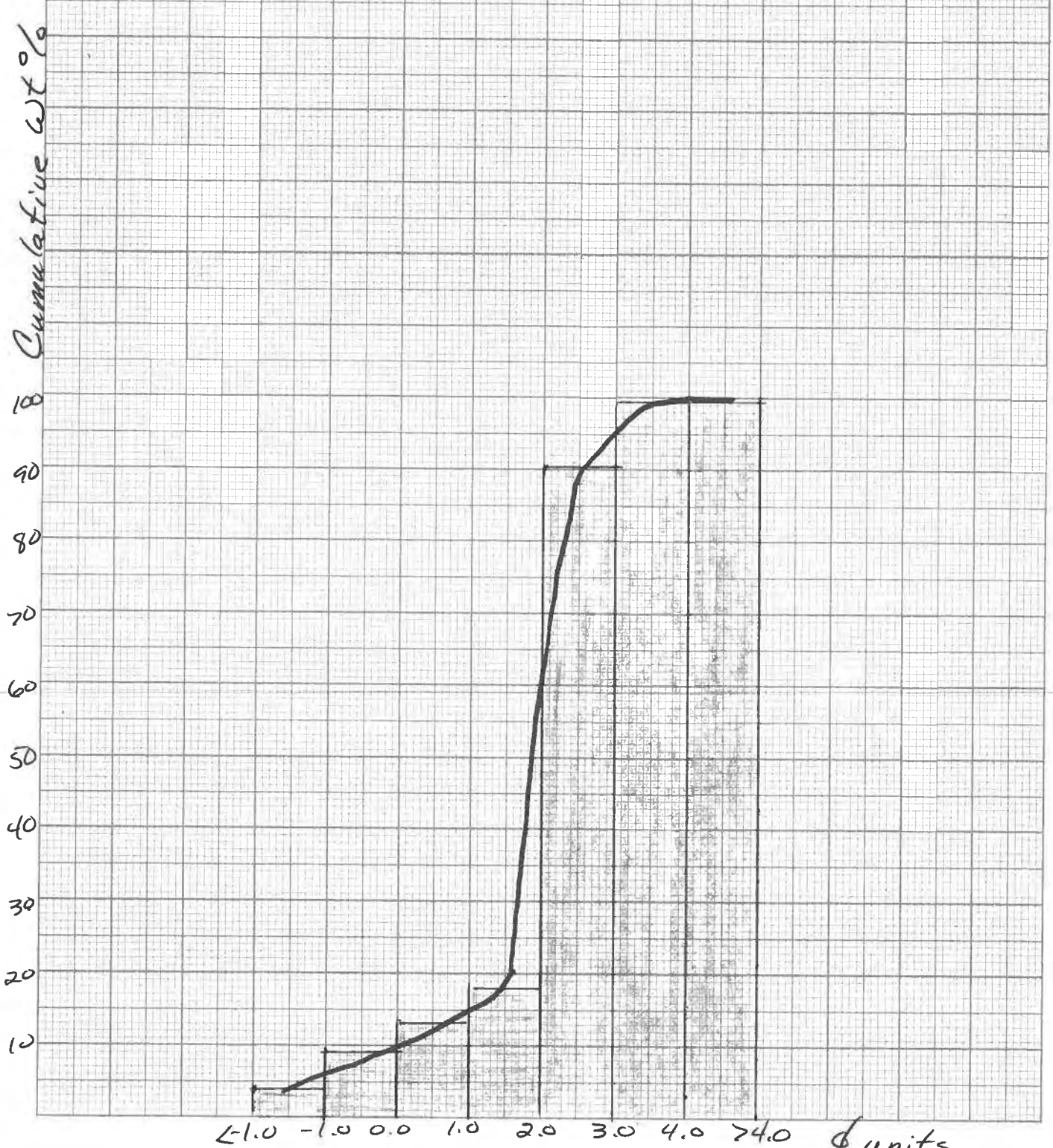
Sample 15




Graph II
Sample 16
Cumulative Wt. %
100
90
80
70
60
50
40
30
20
10
<-1.0
-1.0
0.0
1.0
2.0
3.0
4.0
>4.0
ϕ units

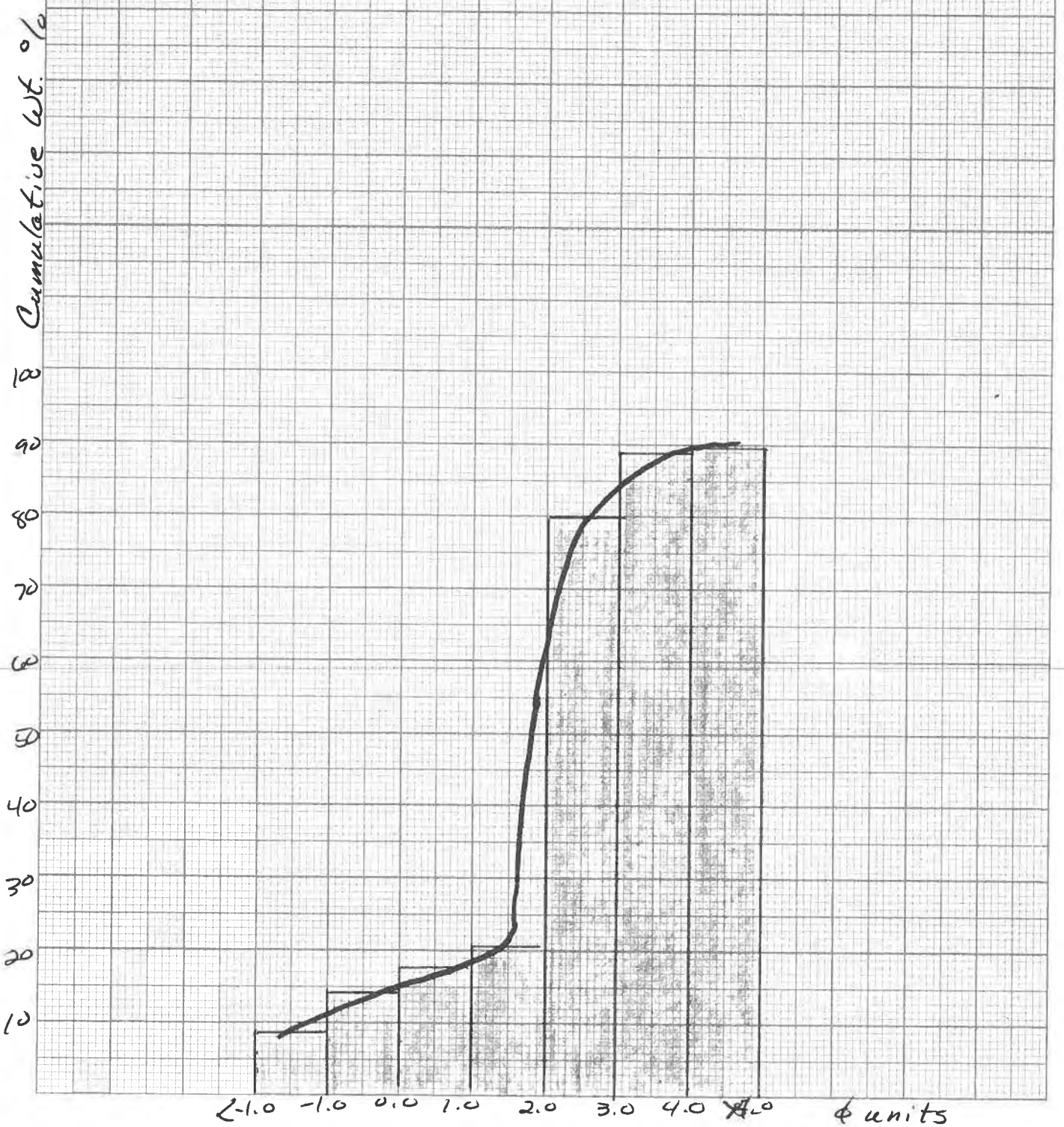
Graph II

Sample 12



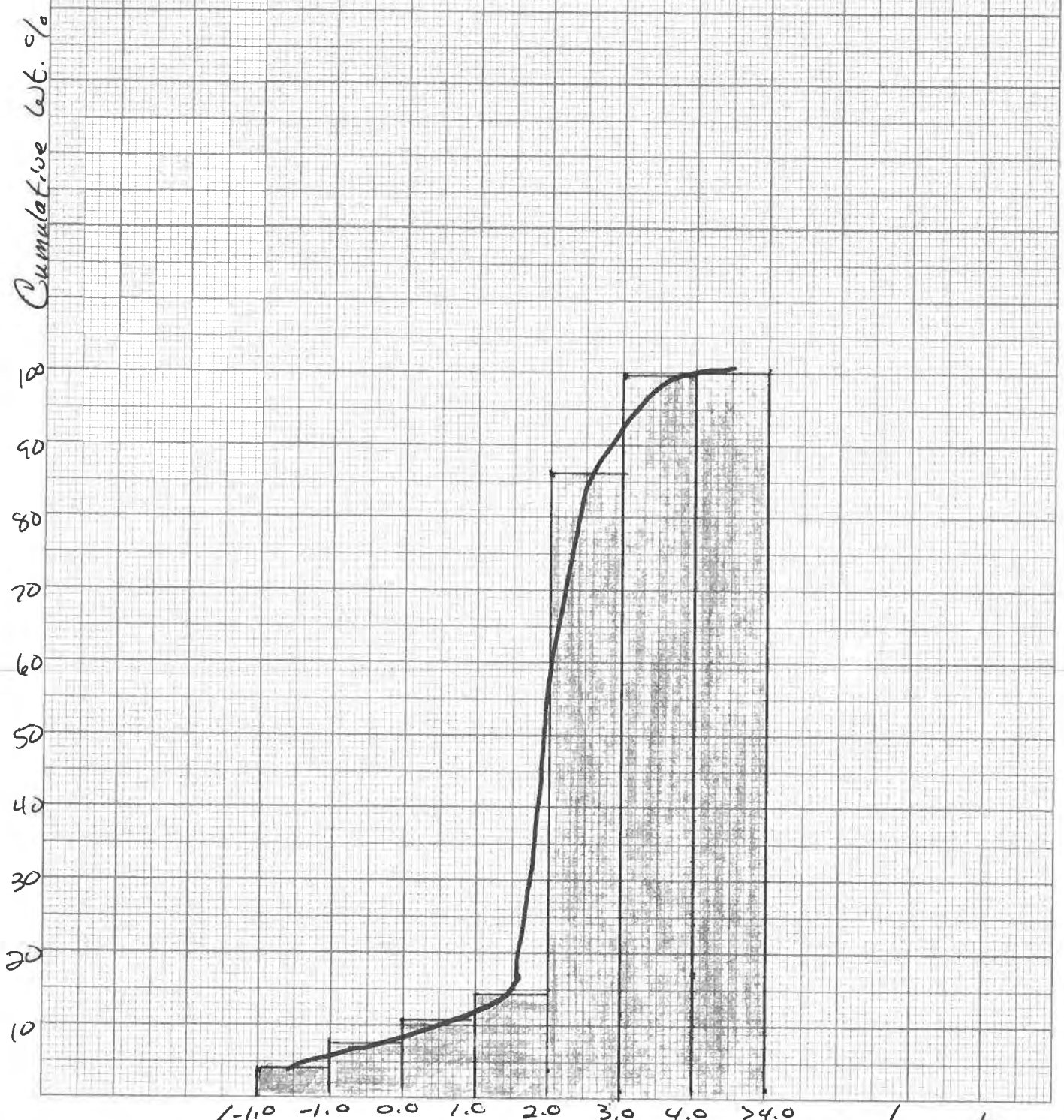
Graph II

Sample 18



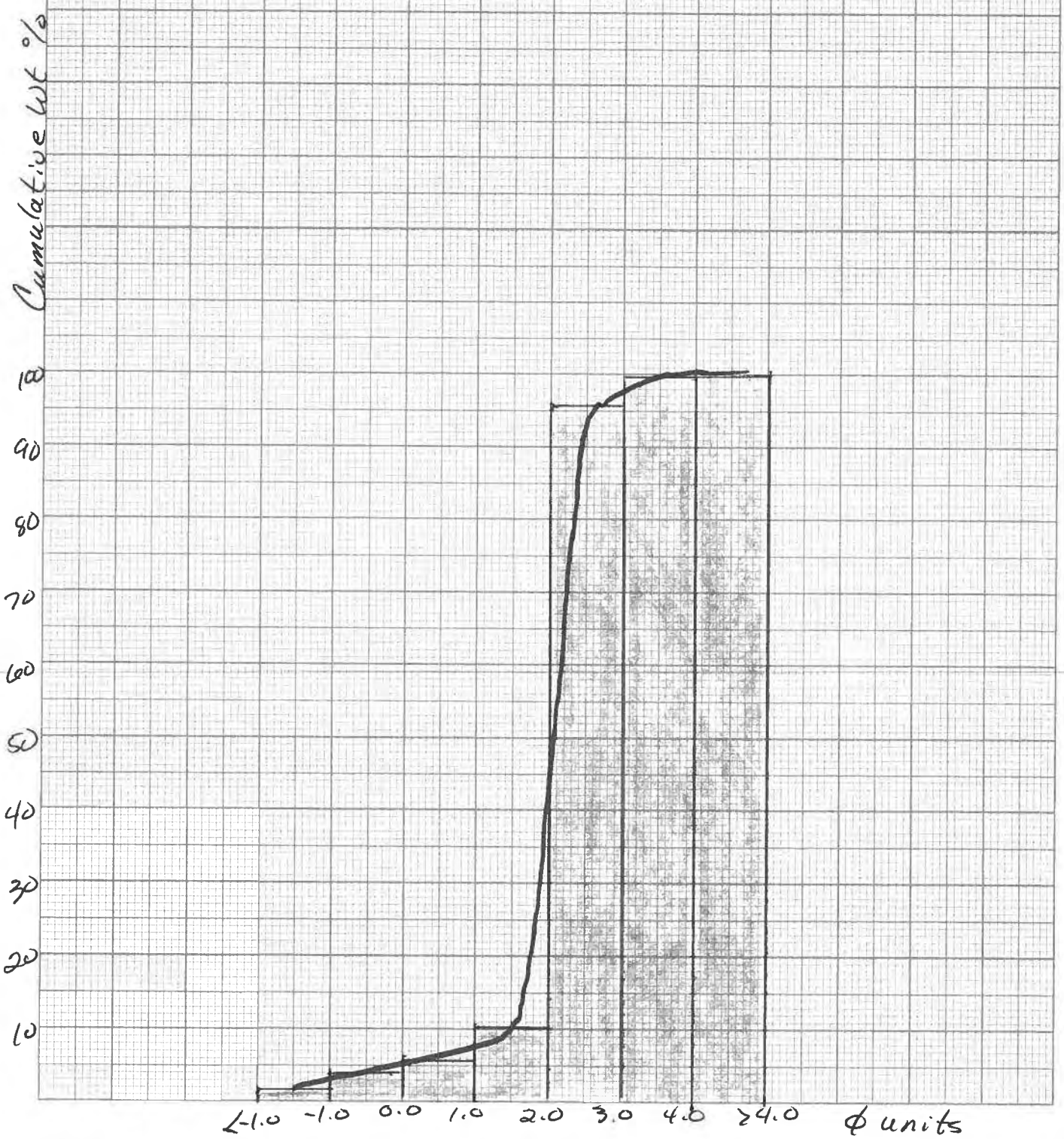
Graph II

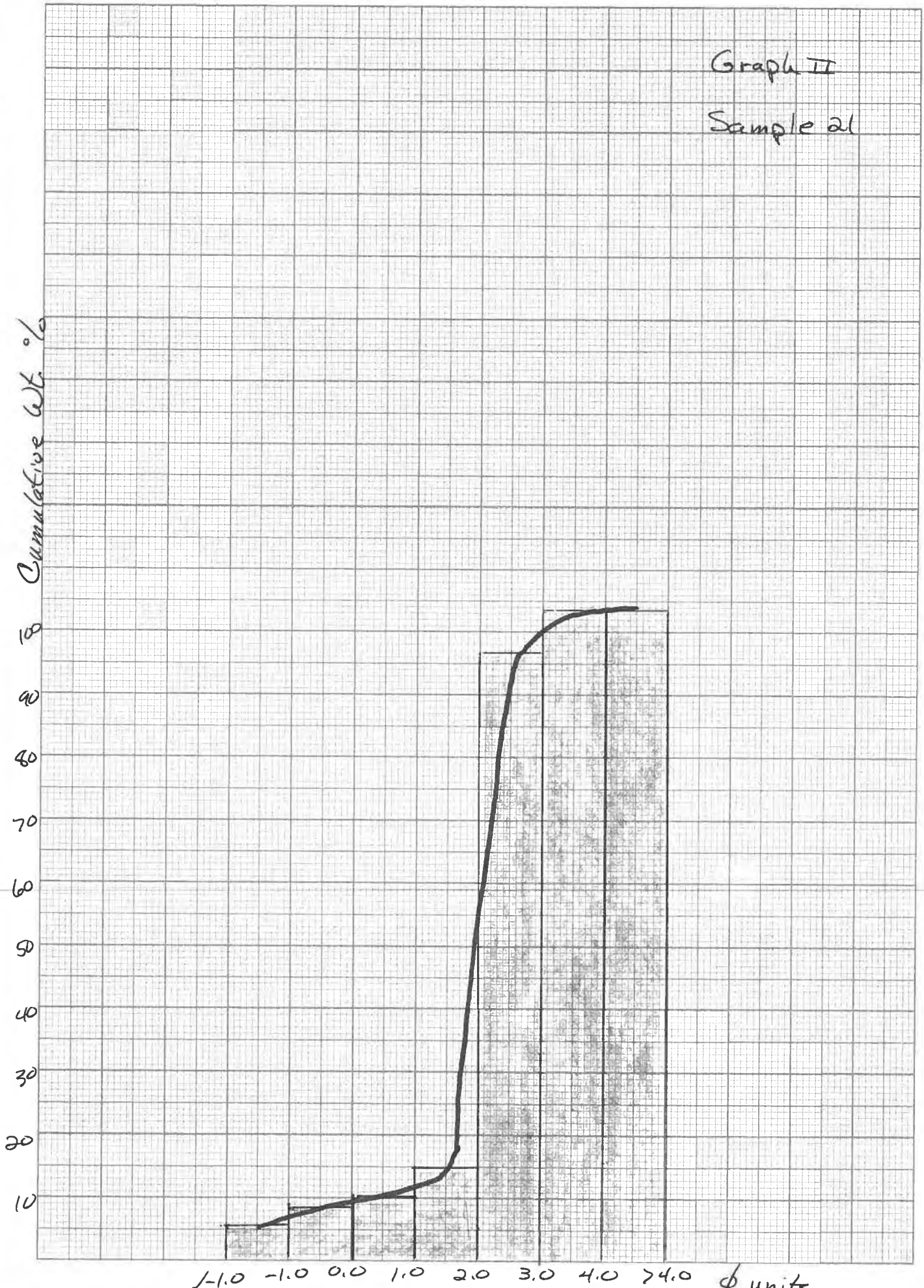
Sample 19

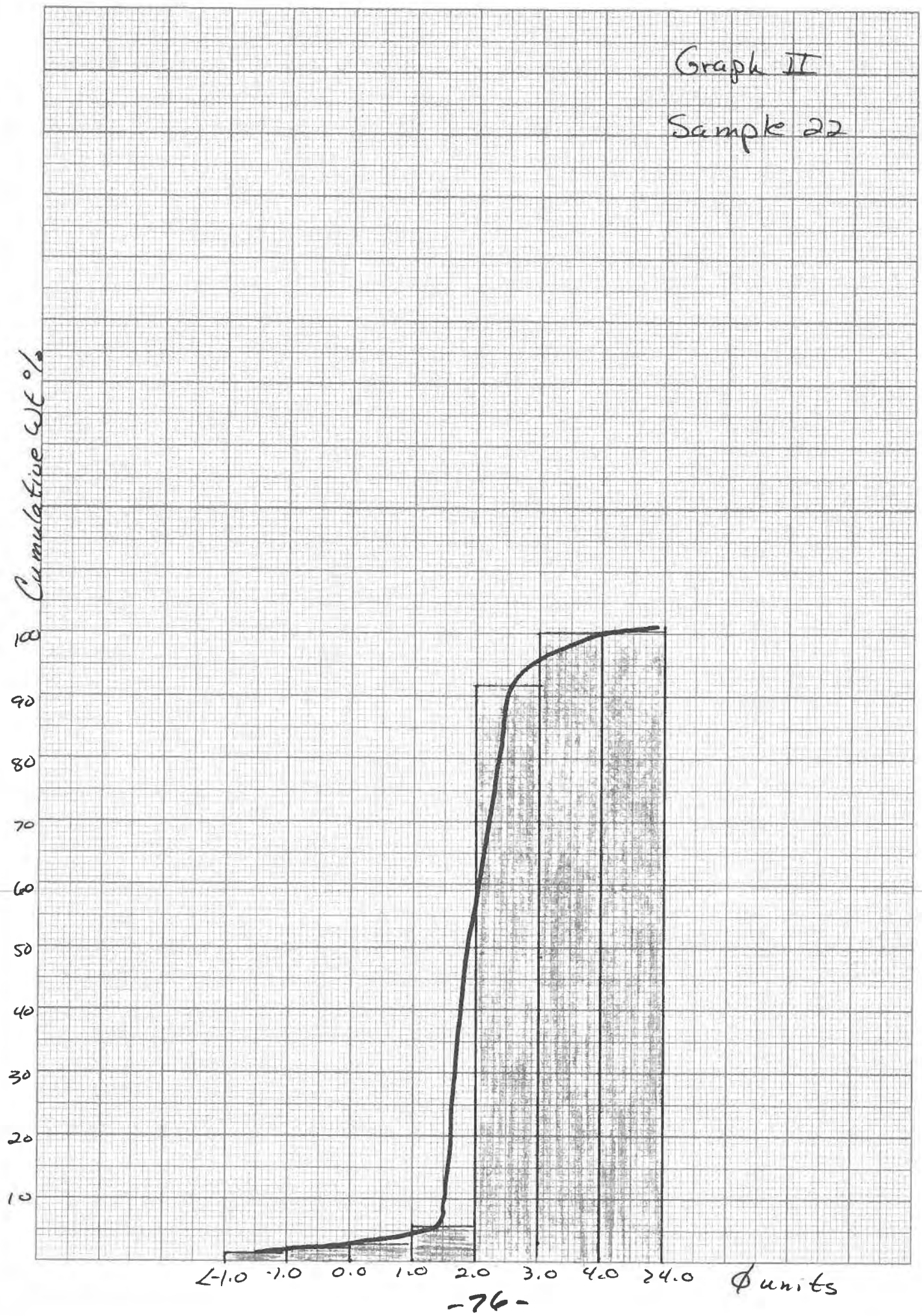


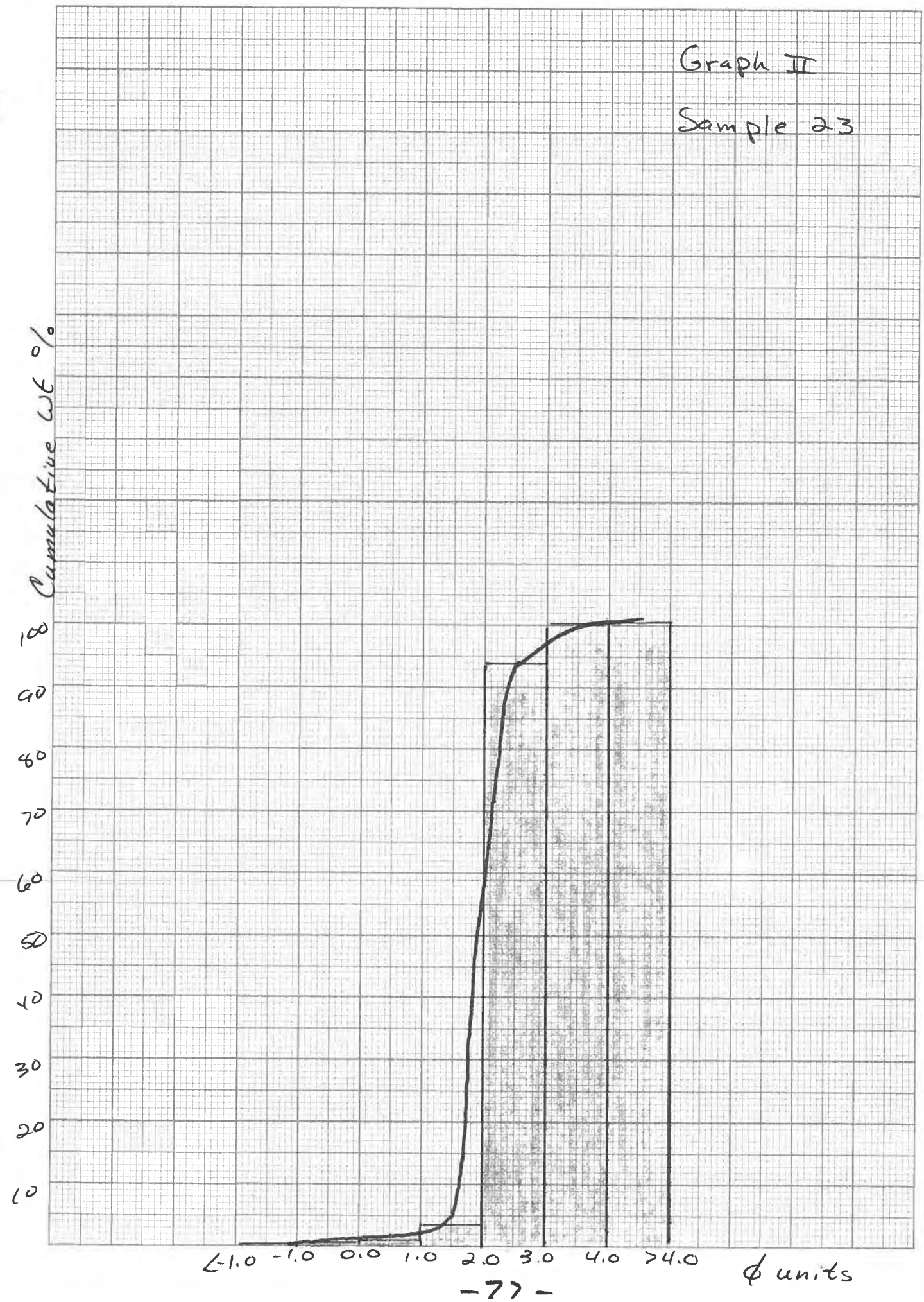
Graph II

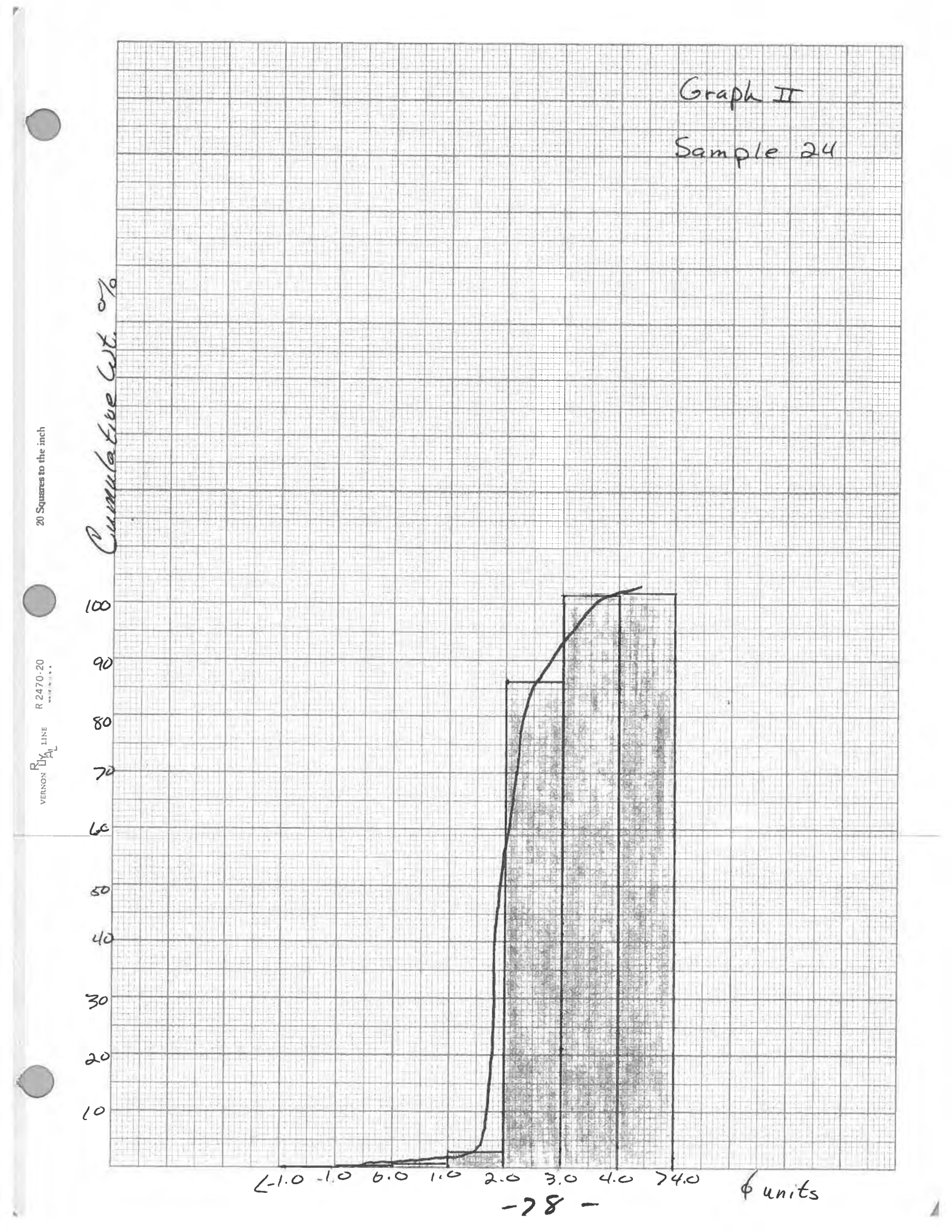
Sample 20









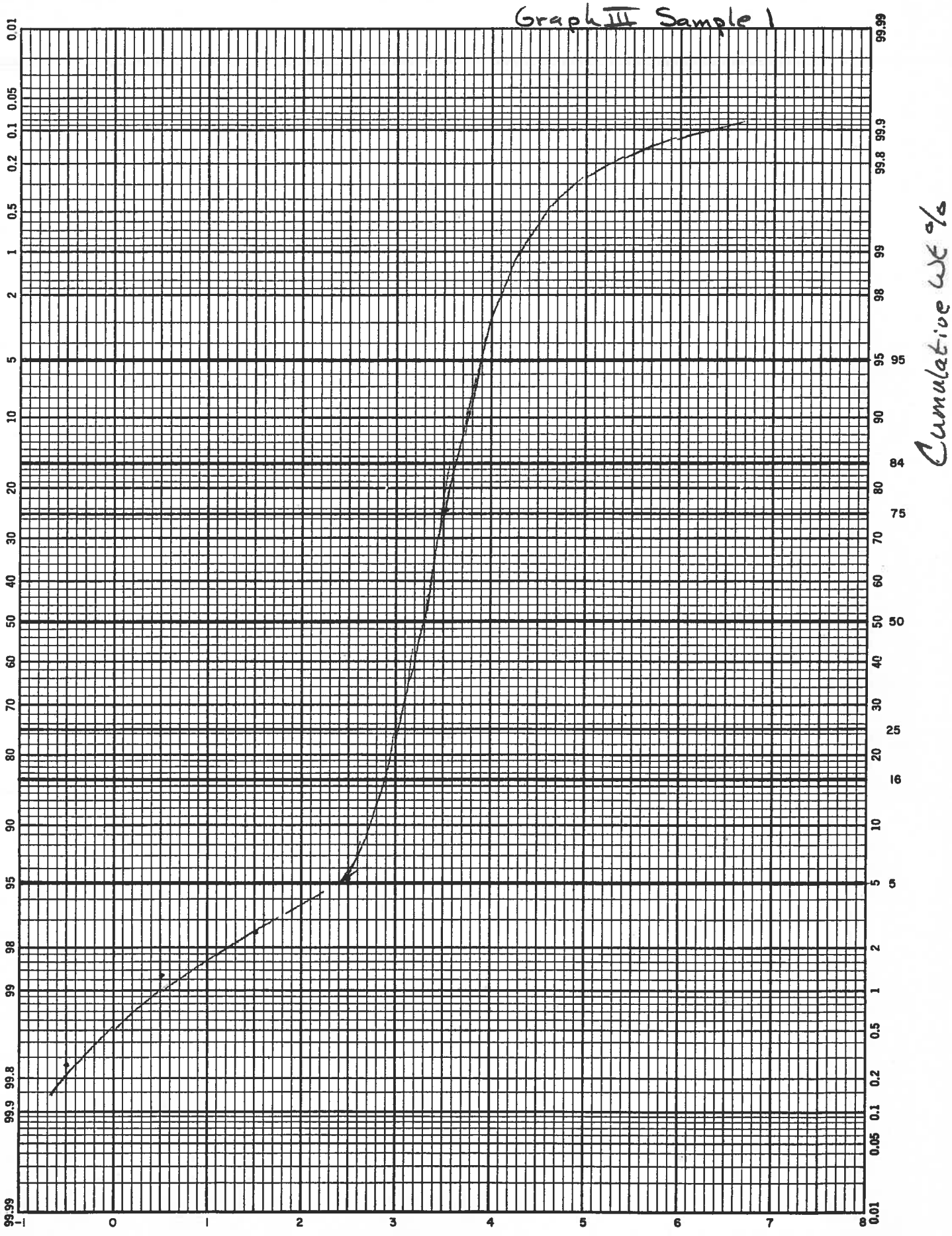

Graph II
Sample 24
Cumulative Wt. %
100
90
80
70
60
50
40
30
20
10
<-1.0
-1.0
0.0
1.0
2.0
3.0
4.0
>4.0
ϕ units

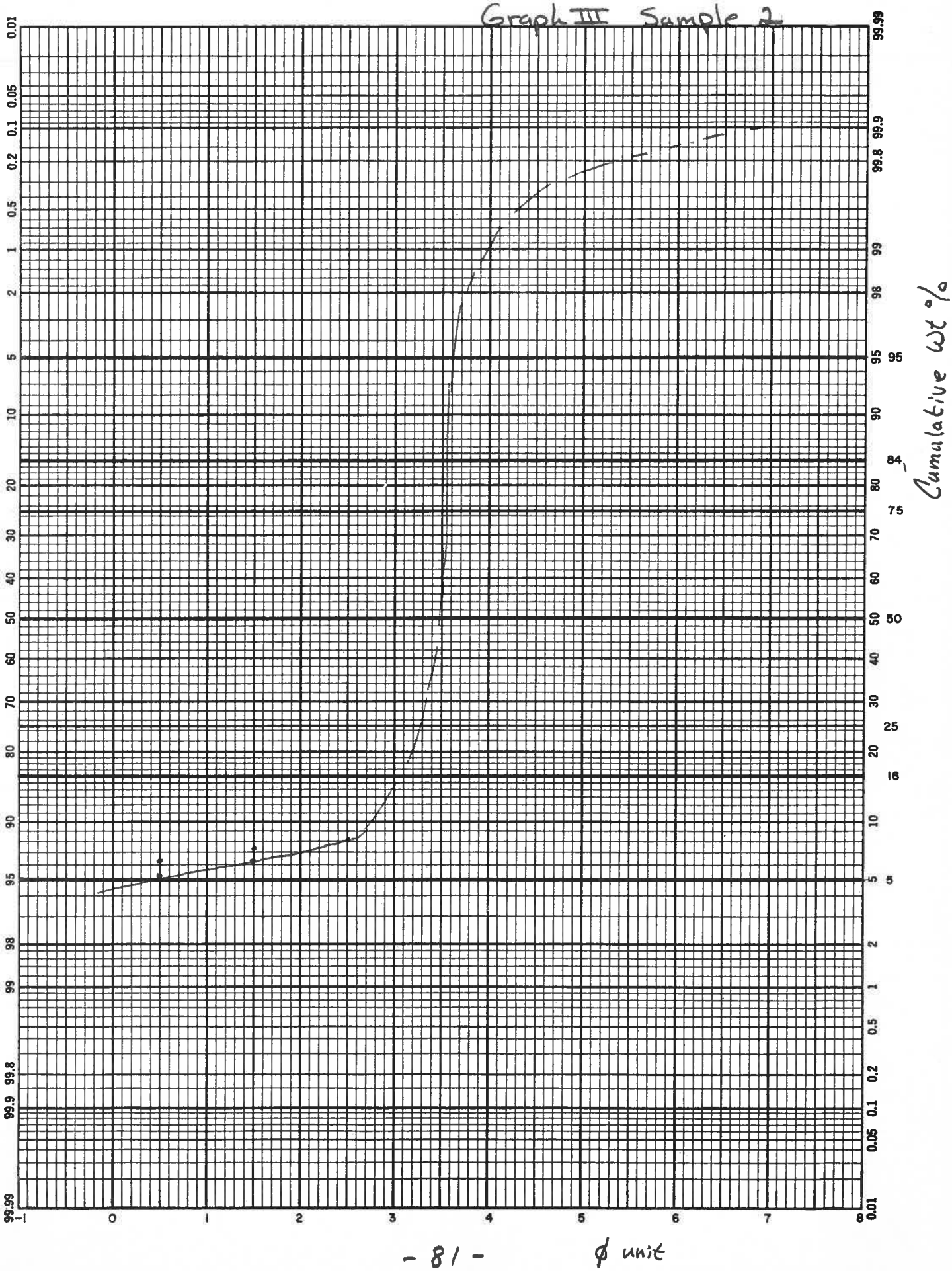
LOG PROBABILITY GRAPHS

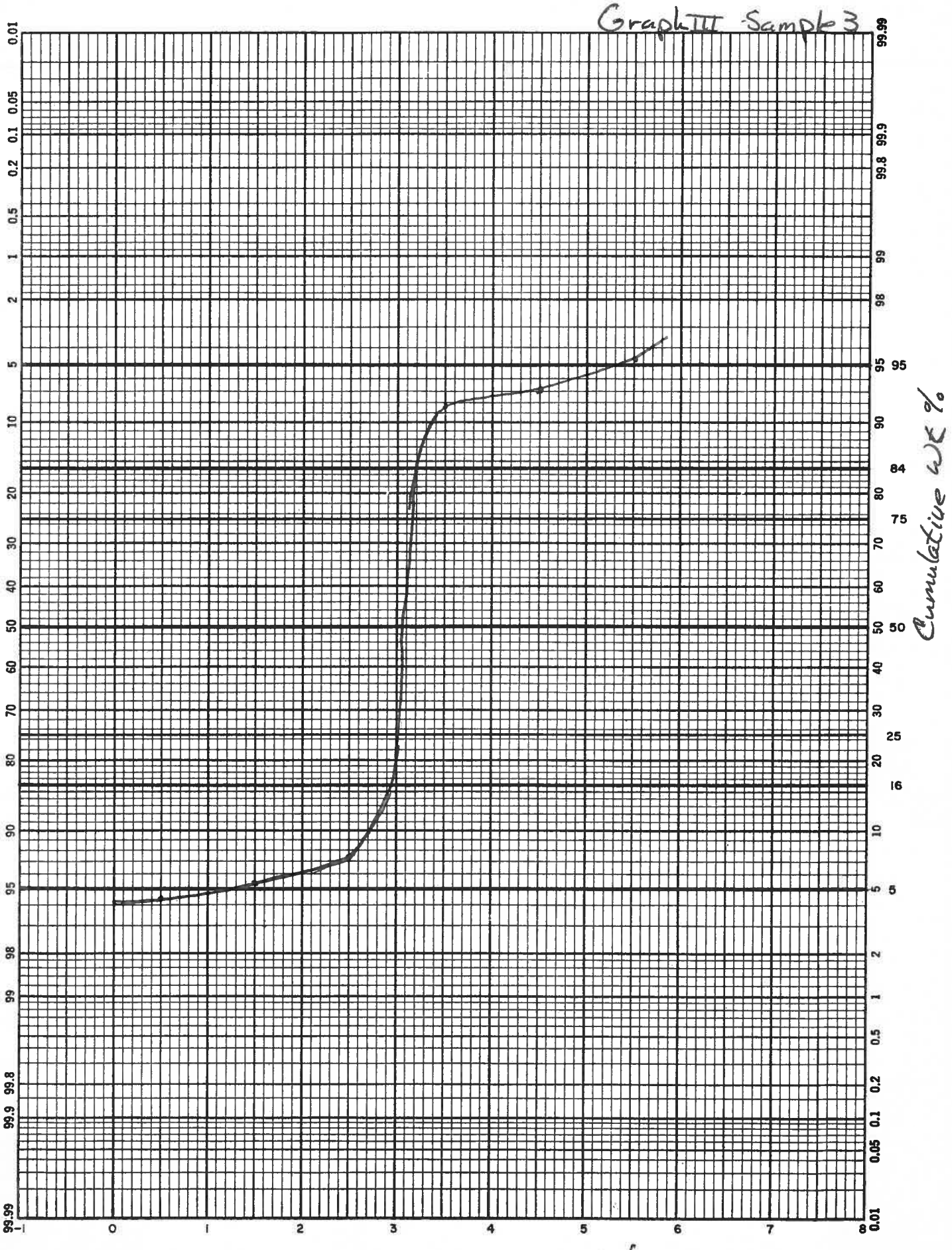
BIG PASS BOTTOM SEDIMENTS

SARASOTA, FLORIDA

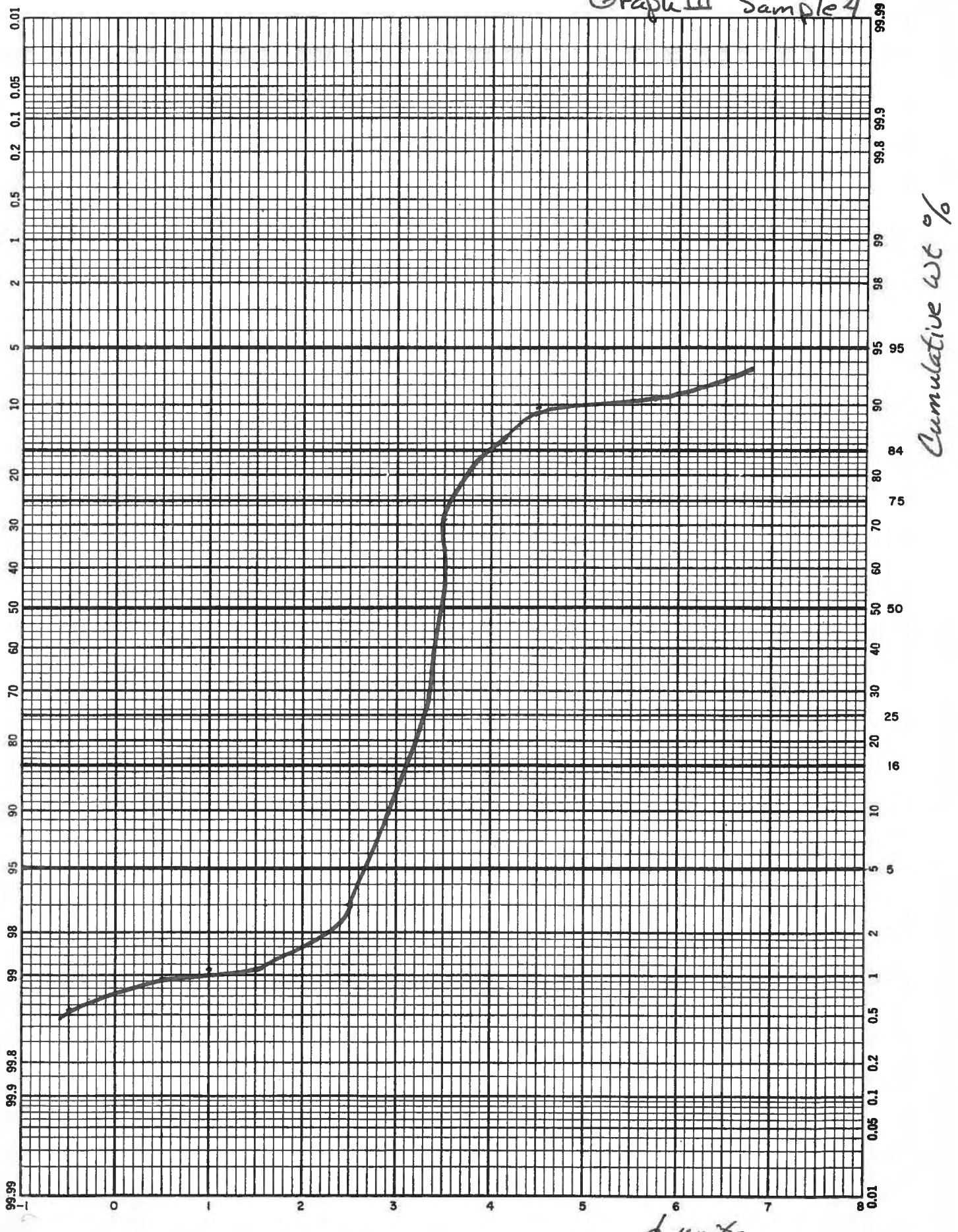
Graph III Sample 1

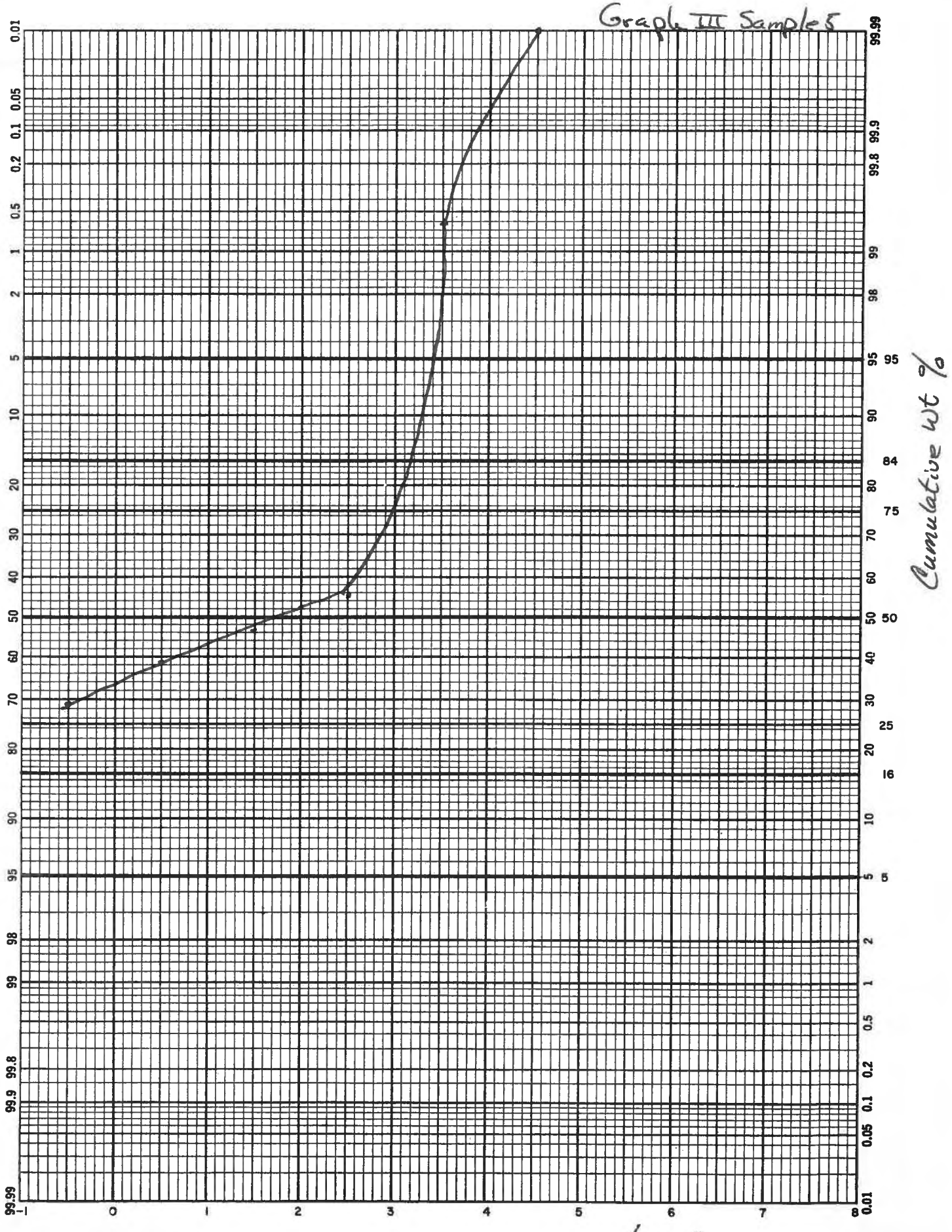


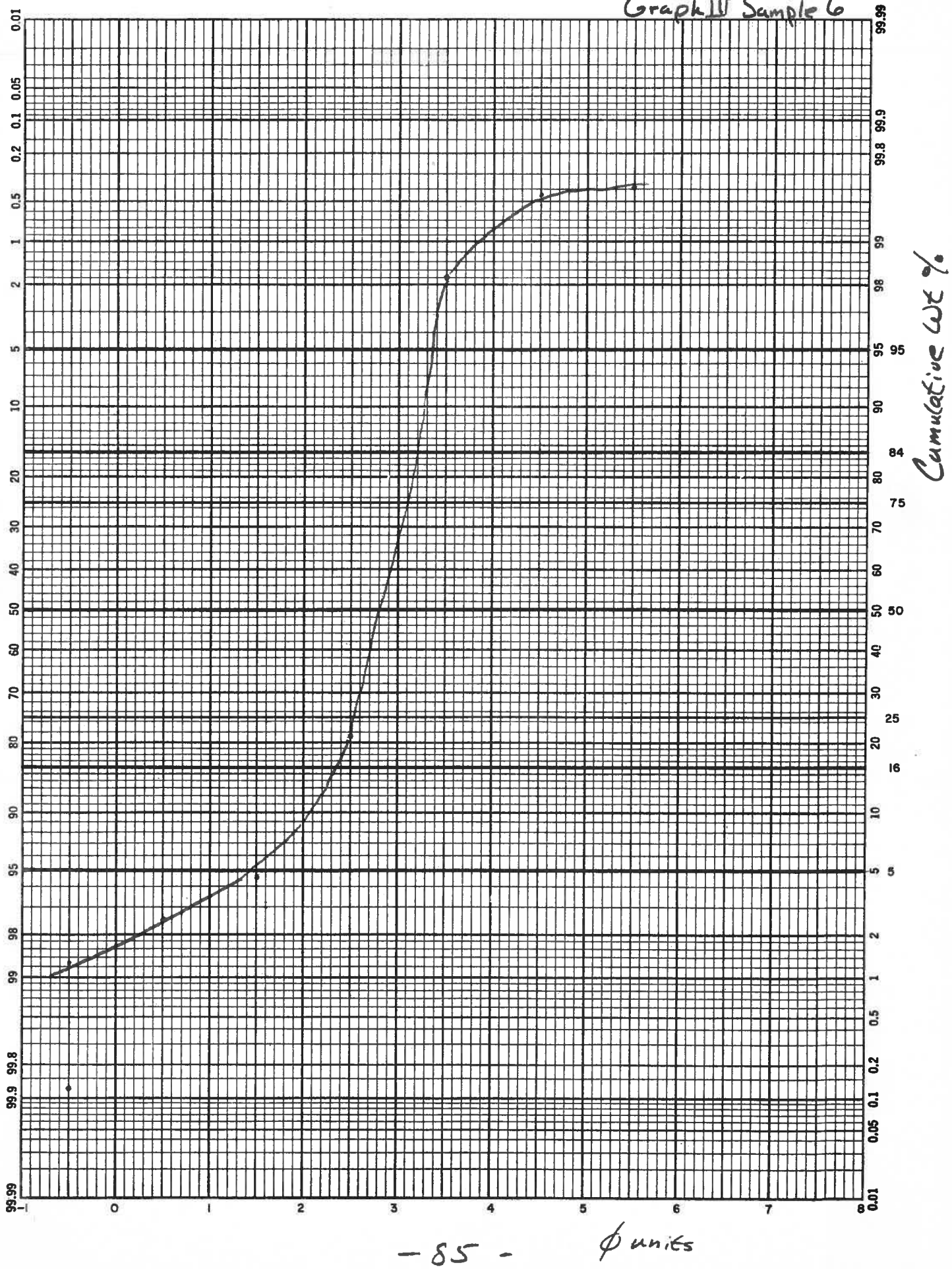

Graph II Sample 2
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
99.99
99.9
99.8
99
98
95
90
84
80
75
70
60
50
40
30
25
20
16
10
5
2
1
0.5
0.2
0.1
0.05
0.01
-1
0
1
2
3
4
5
6
7
8
Cumulative Wt %
ϕ unit


Graph III Sample 3
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
99.99
99.9
99.8
99
98
95
90
84
80
75
70
60
50
40
30
25
20
16
10
5
2
1
0.5
0.2
0.1
0.05
0.01
-1
0
1
2
3
4
5
6
7
8
Cumulative Wt %
ϕ units

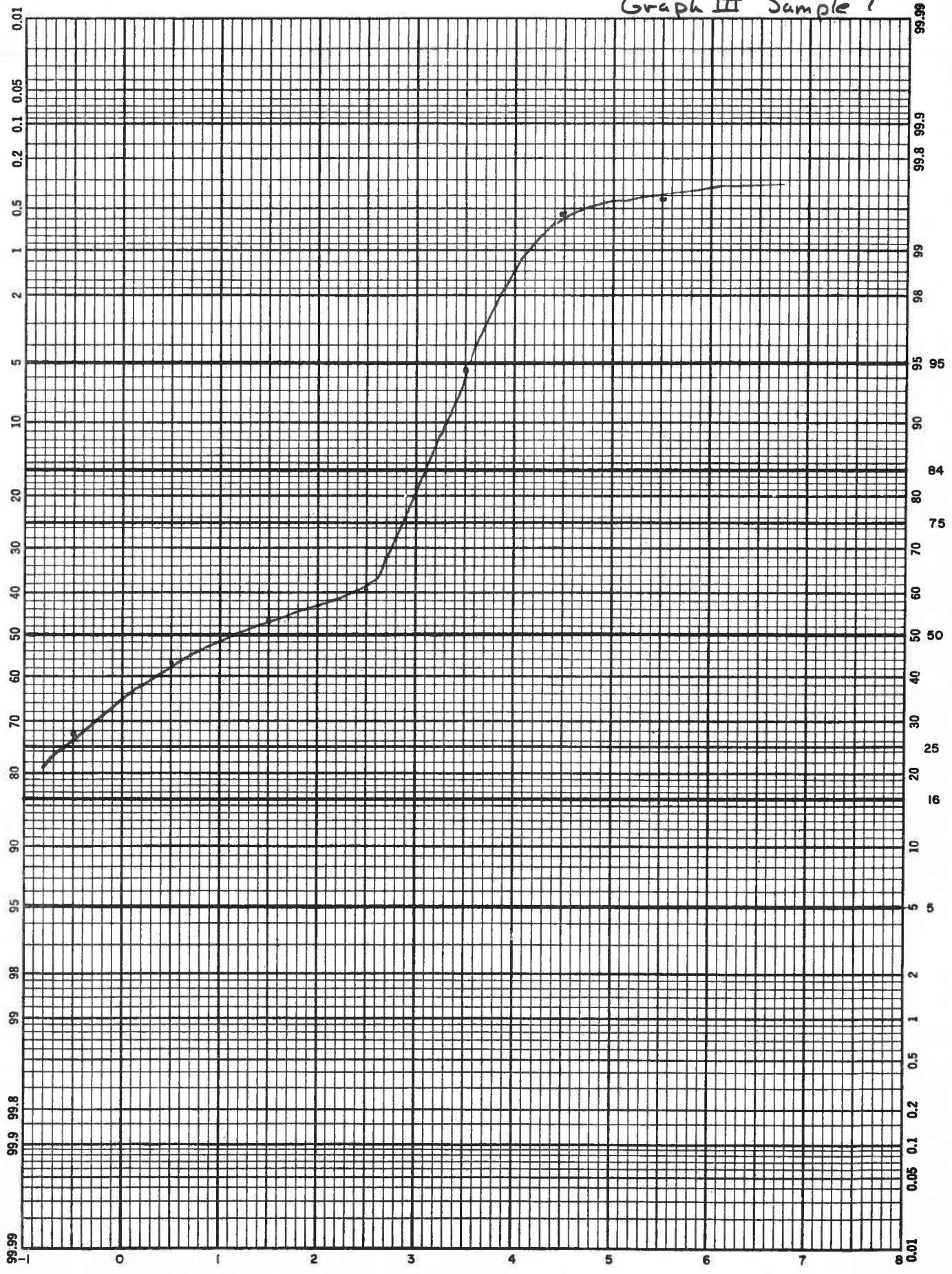
Graph III Sample 4

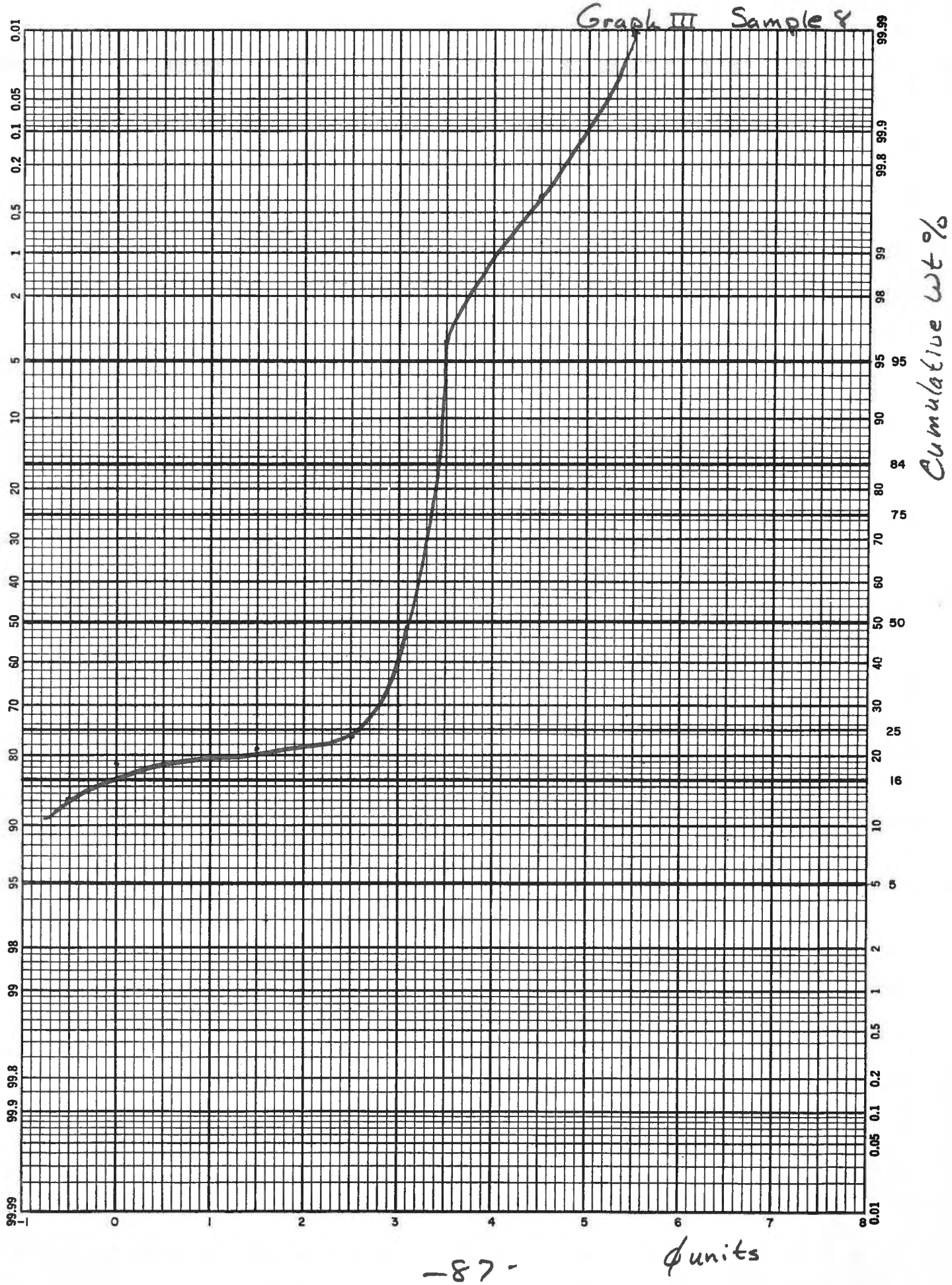


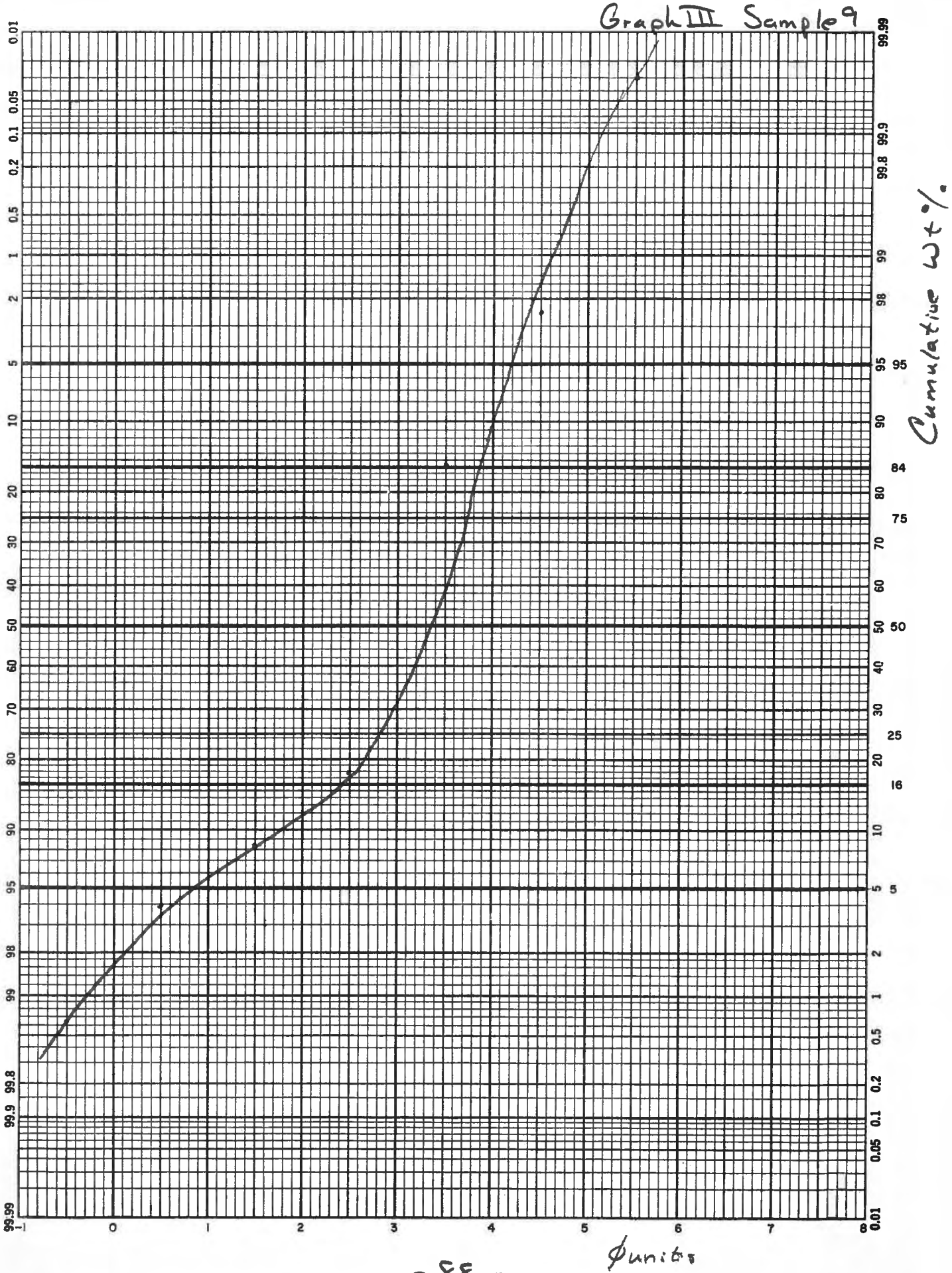

Graph III Sample 5
Cumulative Wt %
99.99
99.9
99.8
99
98
95
90
84
75
70
60
50
40
30
25
20
16
10
5
2
1
0.5
0.2
0.1
0.05
0.01
99.99
99.9
99.8
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.05
0.01
-1
0
1
2
3
4
5
6
7
8
ϕ units


Graph III Sample 6
Cumulative Wt %
ϕ units
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
−1
0
1
2
3
4
5
6
7
8
99.99
99.9
99.8
99
98
95
90
84
80
75
70
60
50
40
30
25
20
16
10
5
2
1
0.5
0.2
0.1
0.05
0.01

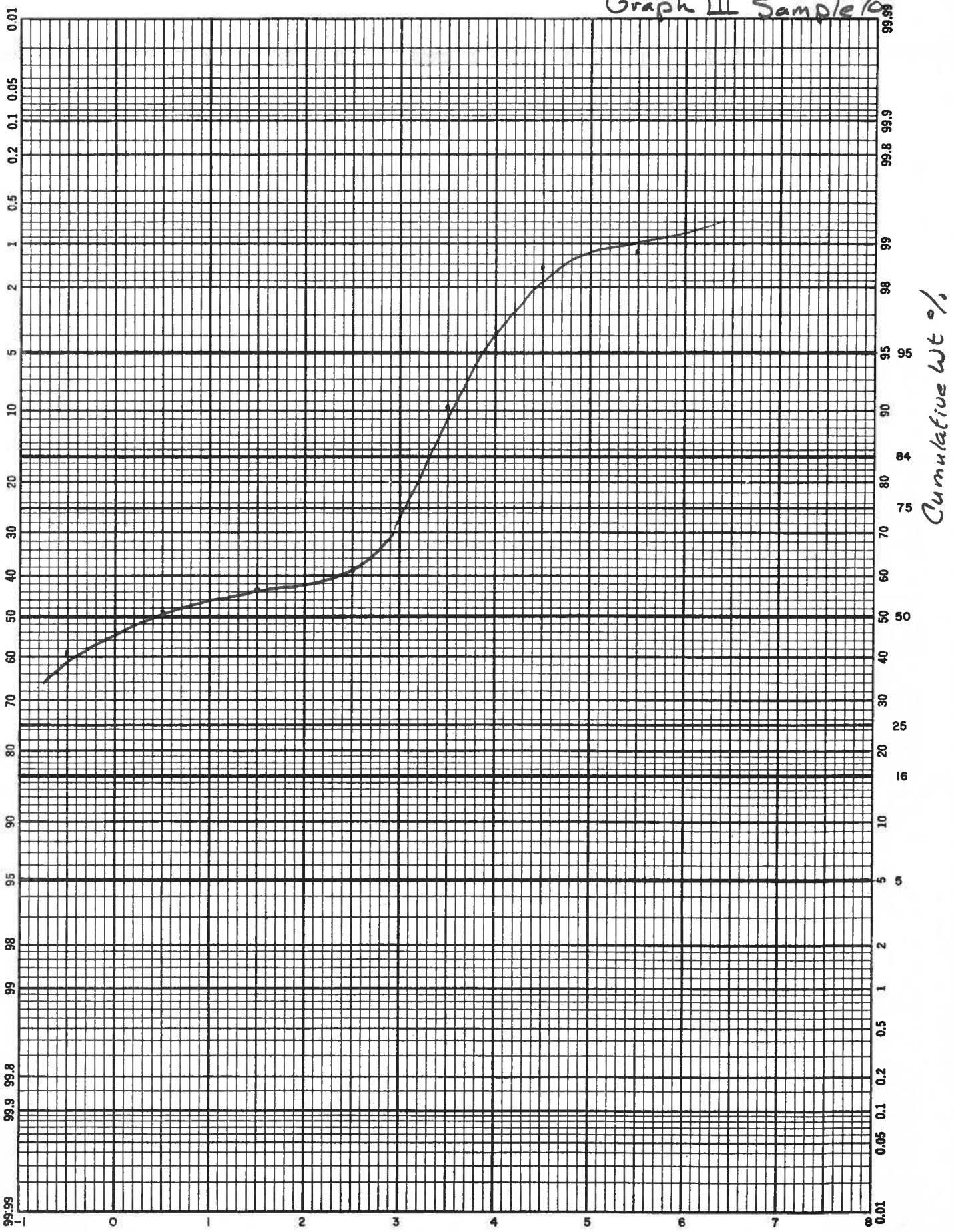
Graph III Sample 7



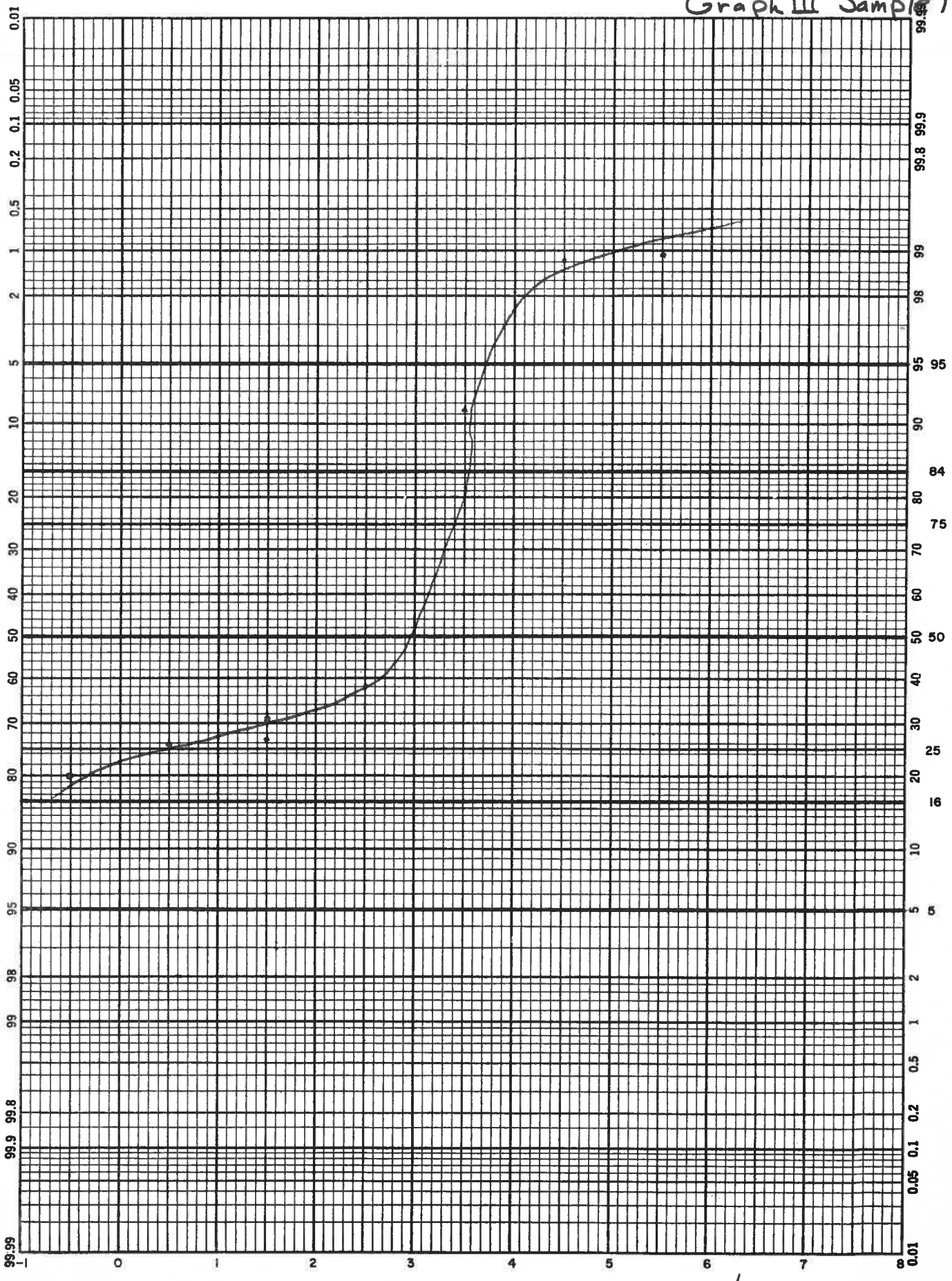

Graph III Sample 8
Cumulative Wt %
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
99.99
99.9
99.8
99
98
95
90
84
80
75
70
60
50
40
30
25
20
16
10
5
2
1
0.5
0.2
0.1
0.05
0.01
-1
0
1
2
3
4
5
6
7
8
ϕ units

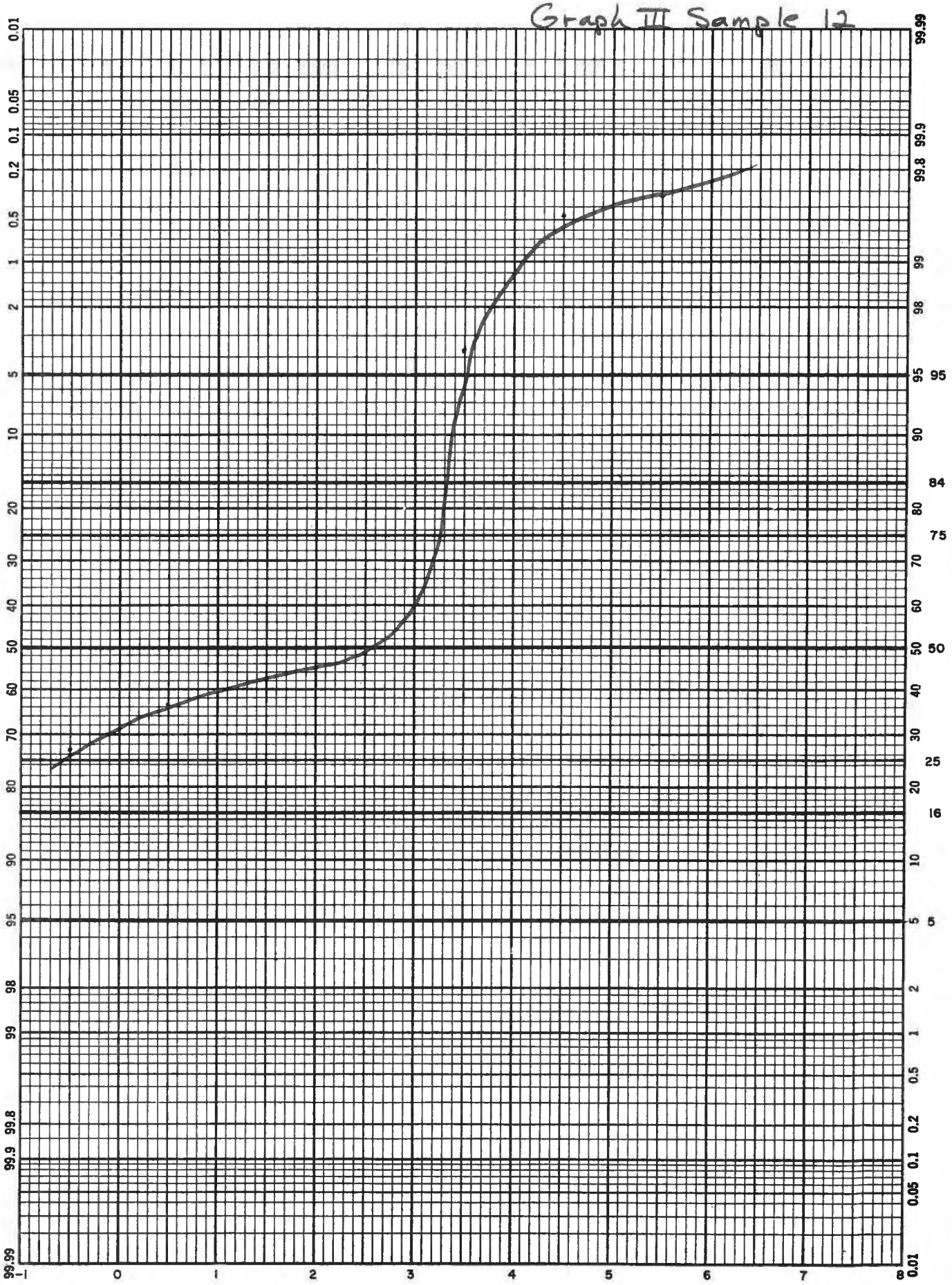

Graph III Sample 9
Cumulative Wt %
φ units
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
99.99
99.9
99.8
99
98
95
90
84
80
75
70
60
50
40
30
25
20
16
10
5
2
1
0.5
0.2
0.1
0.05
0.01
-1
0
1
2
3
4
5
6
7
8

Graph III Sample 10

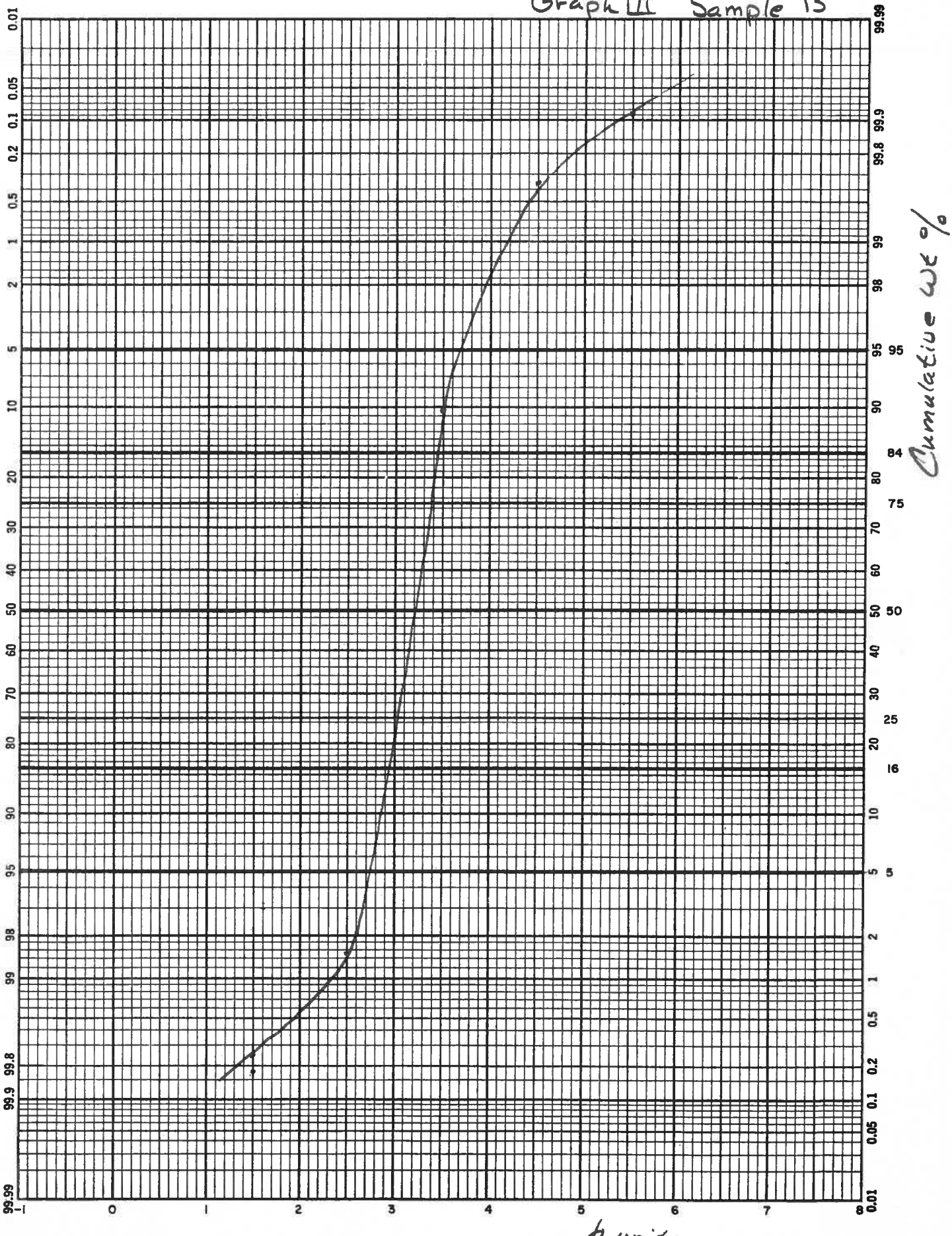


Graph III Sample 11

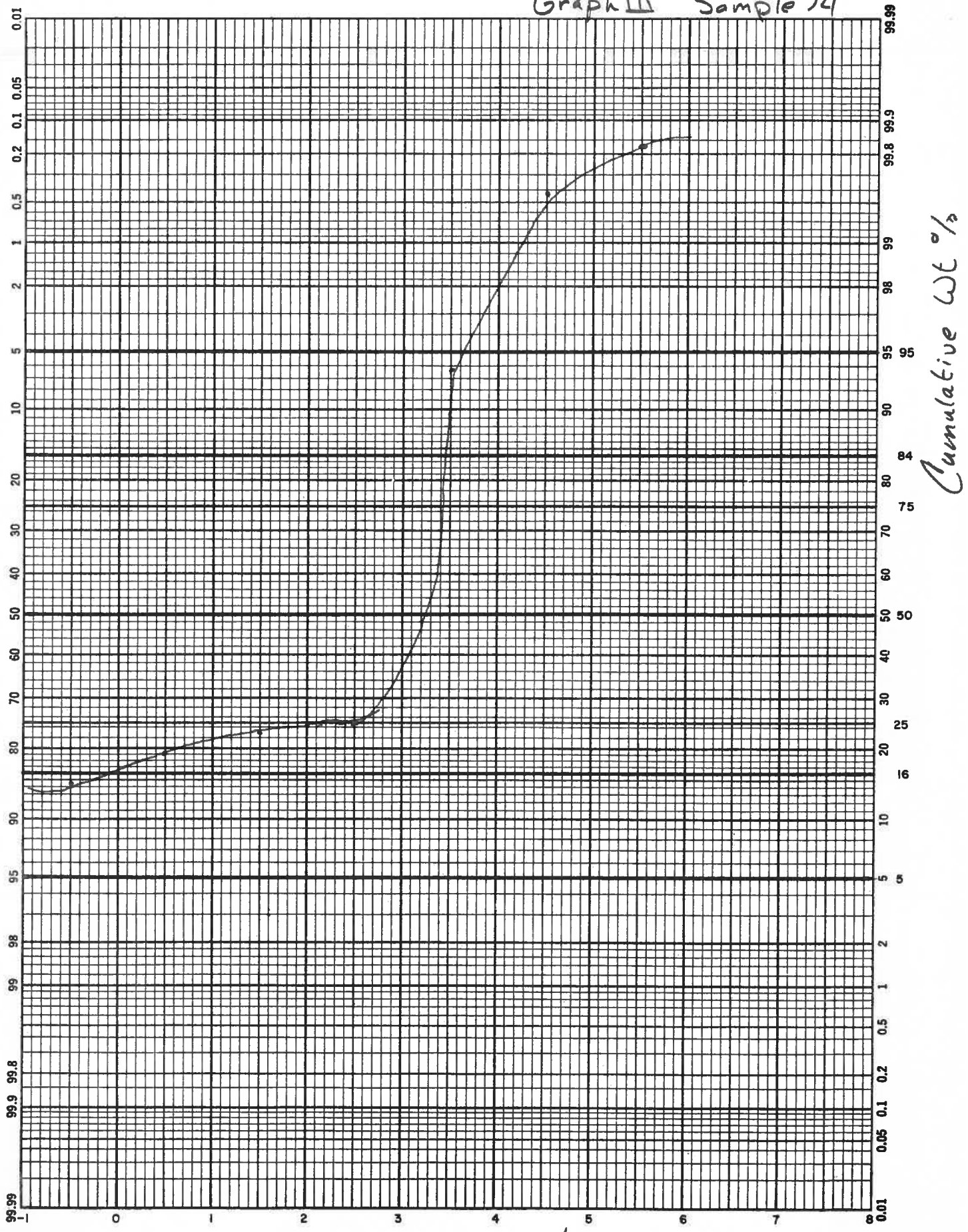


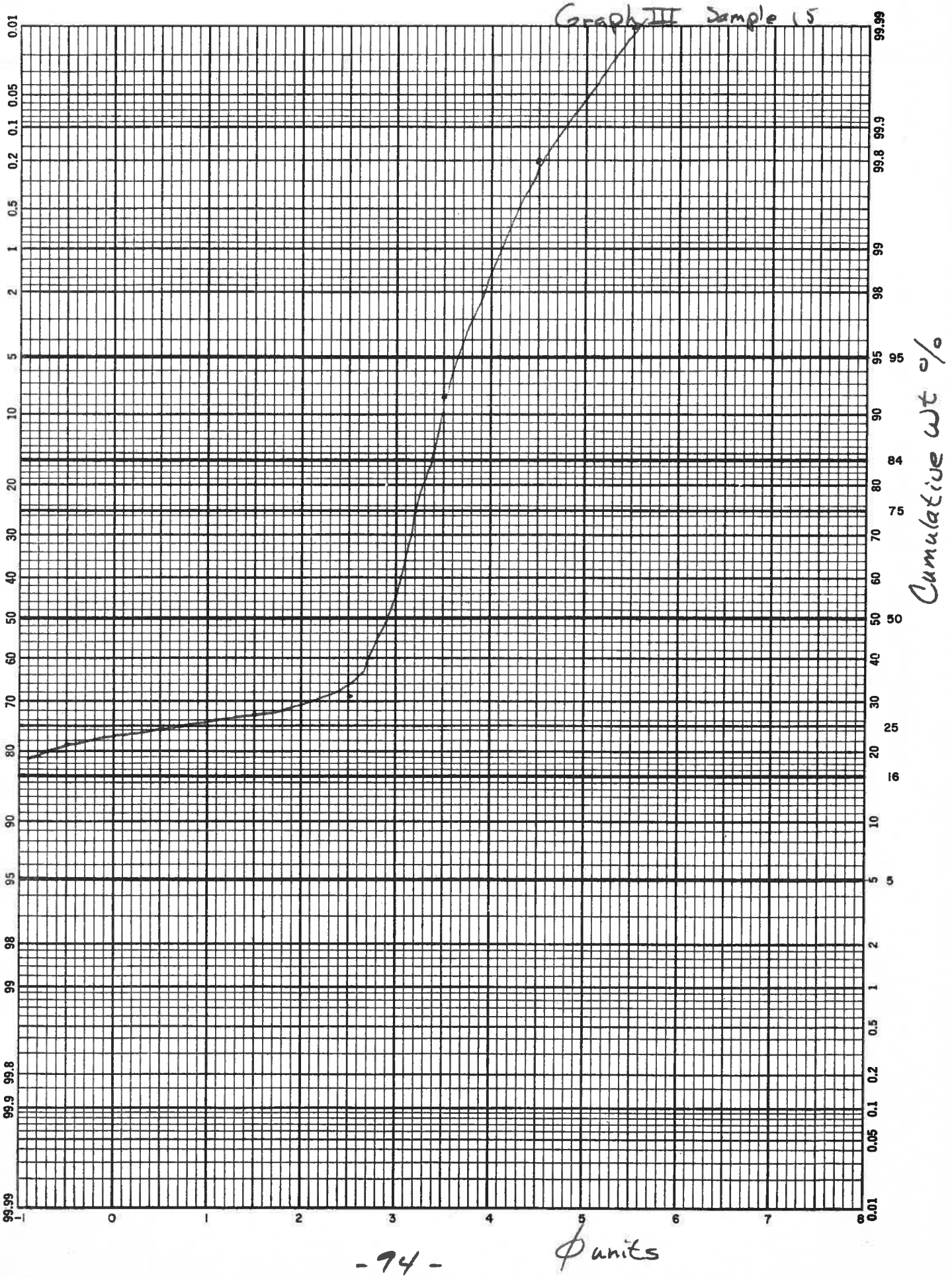

Graph II Sample 12
Cumulative Wt %
φ units
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
99.99
99.9
99.8
99
98
95
90
84
80
75
70
60
50
50
40
30
25
20
16
10
5
5
2
1
0.5
0.2
0.1
0.05
0.01
-1
0
1
2
3
4
5
6
7
8

Graph II Sample 13

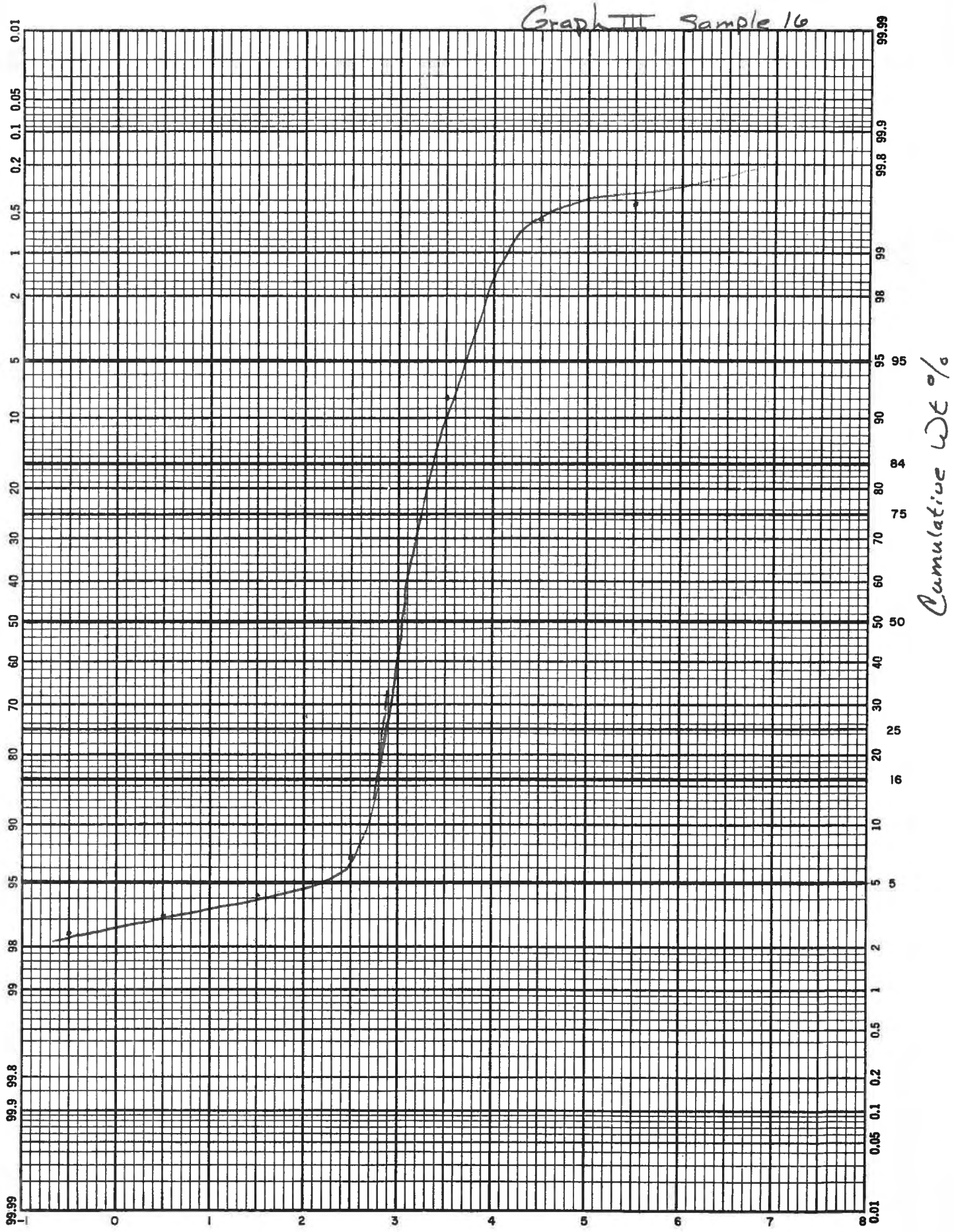


Graph III Sample 14

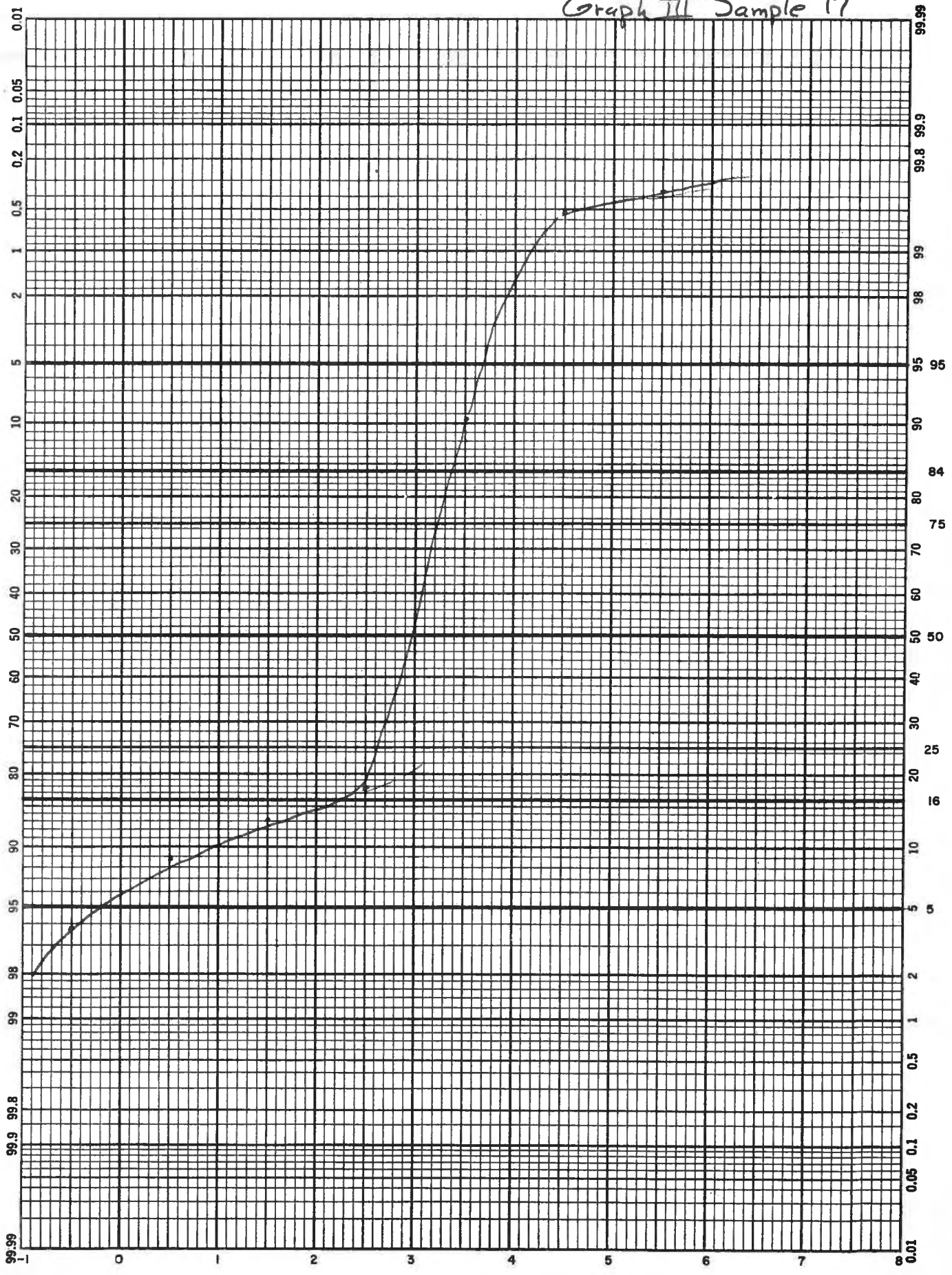



Graph III Sample 15
Cumulative wt %
φ units
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
99.99
99.9
99.8
99
98
95
90
84
80
75
70
60
50
40
30
25
20
16
10
5
2
1
0.5
0.2
0.1
0.05
0.01
-1
0
1
2
3
4
5
6
7
8

Graph III Sample 16



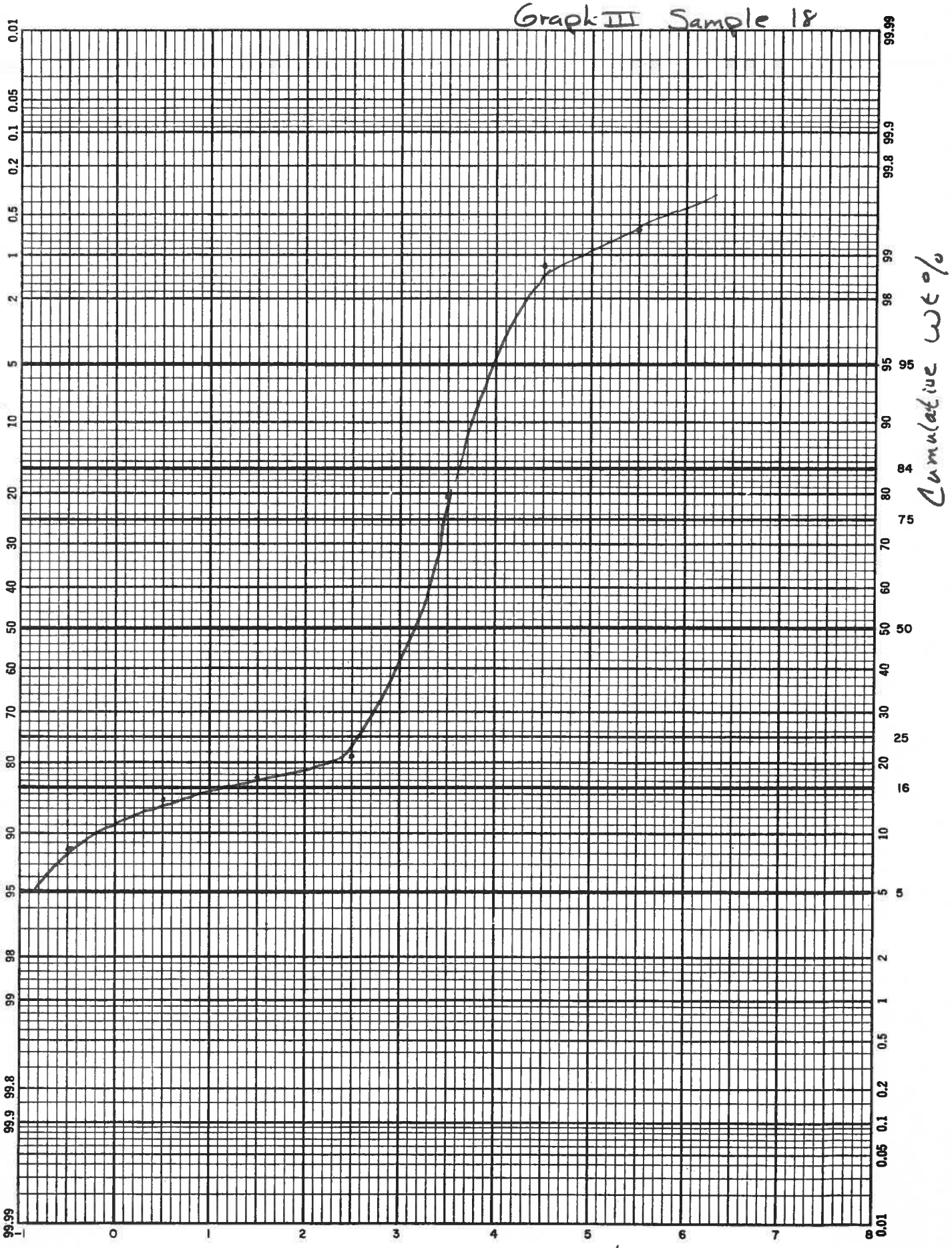
Graph III Sample 17



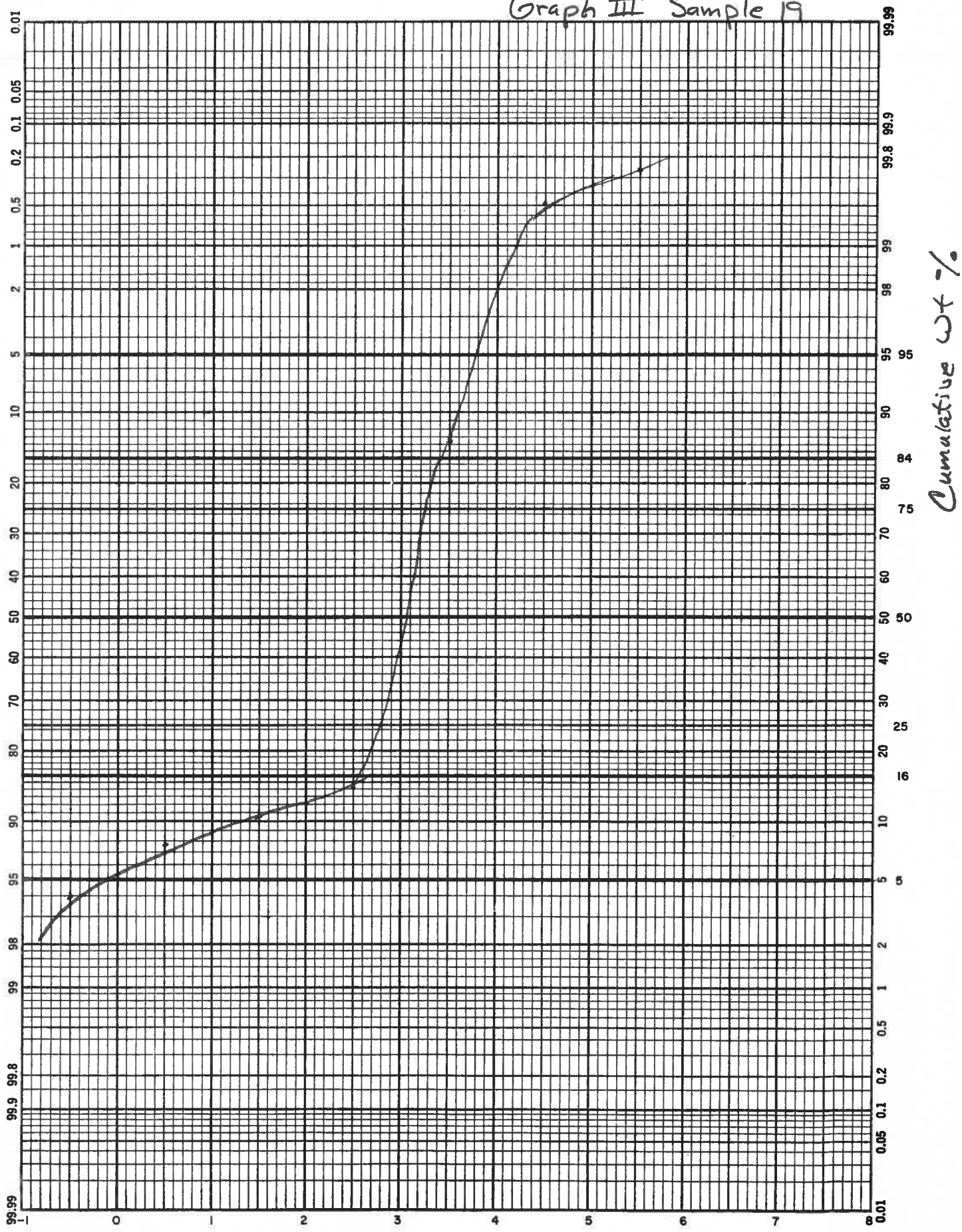
Cumulative wt %

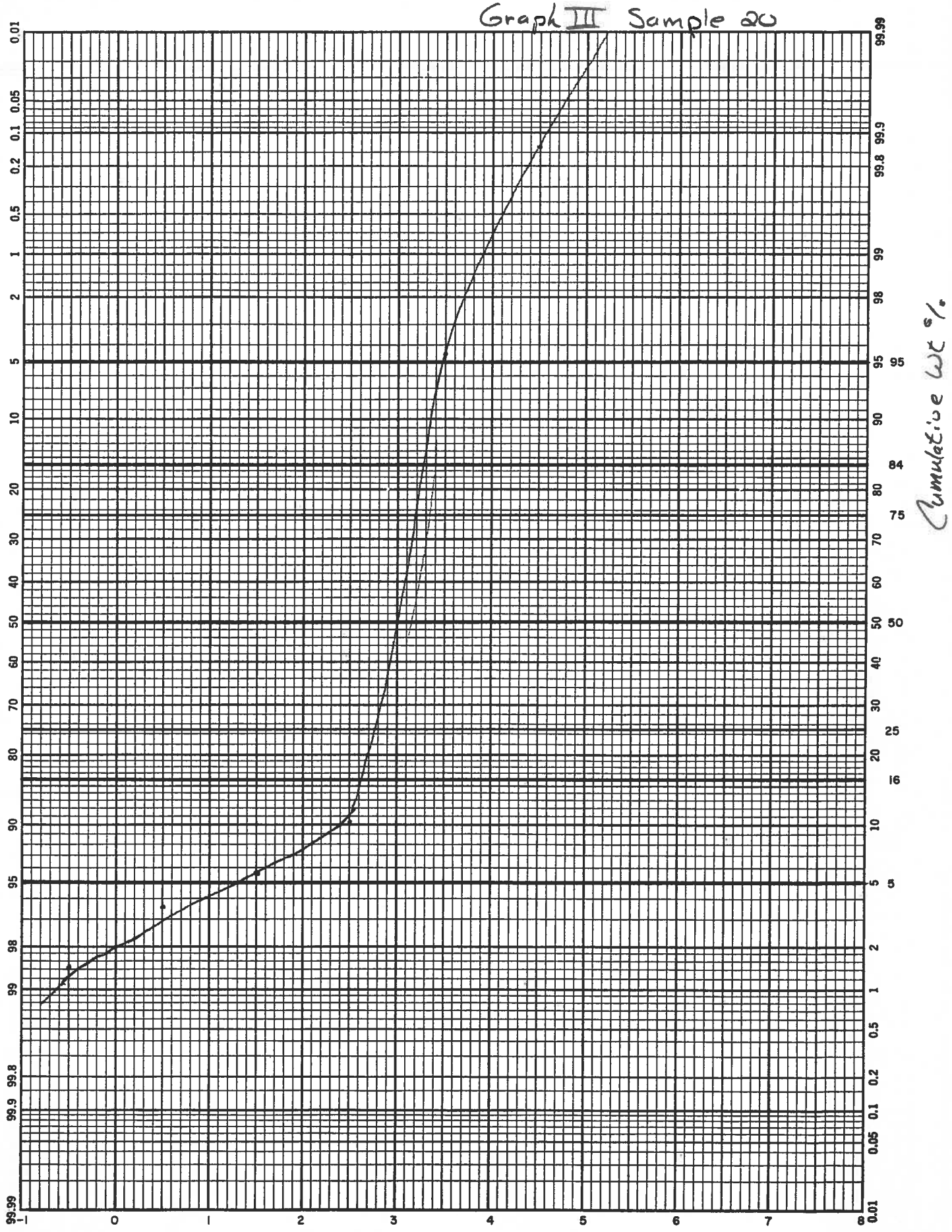
ϕ unit

Graph III Sample 18

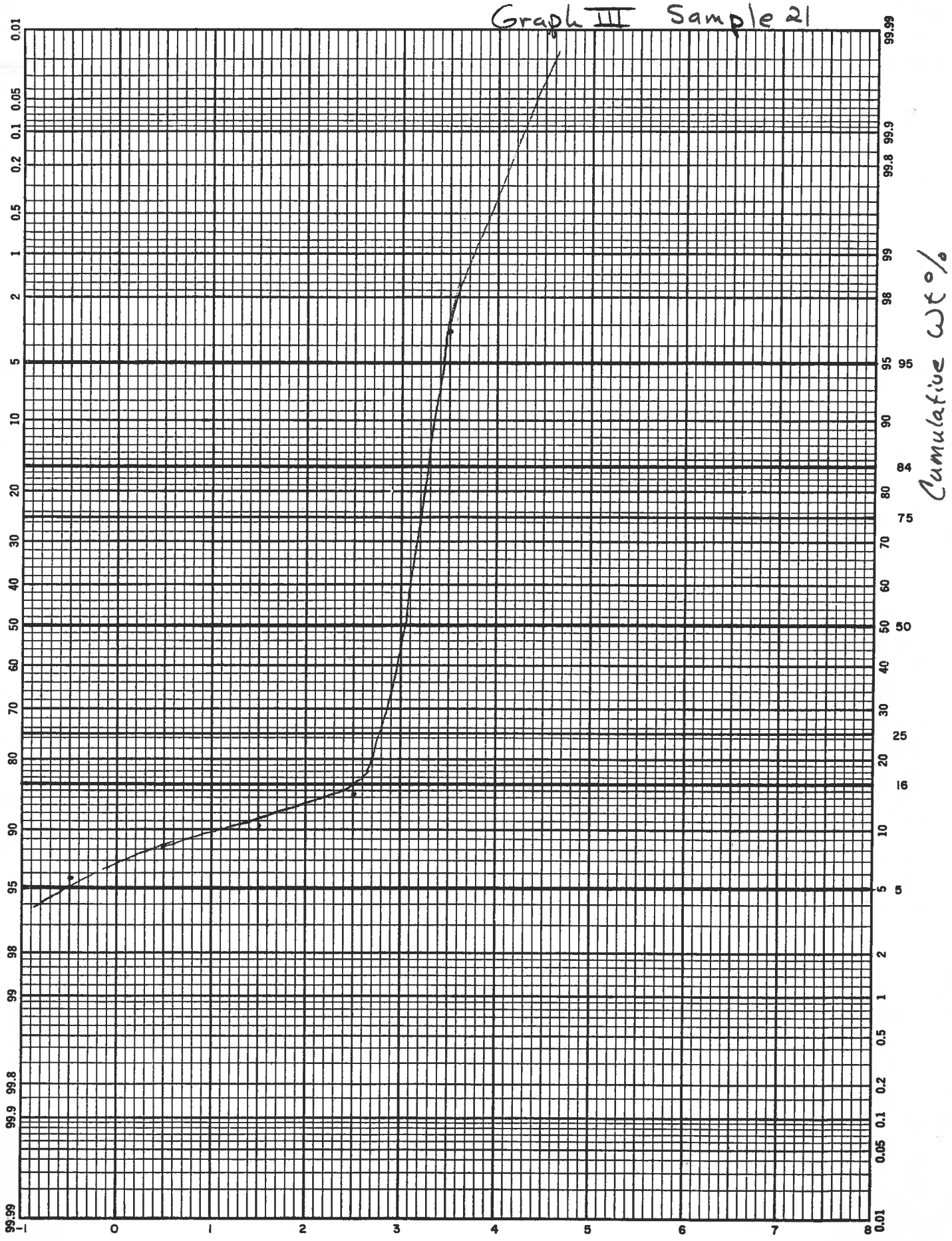


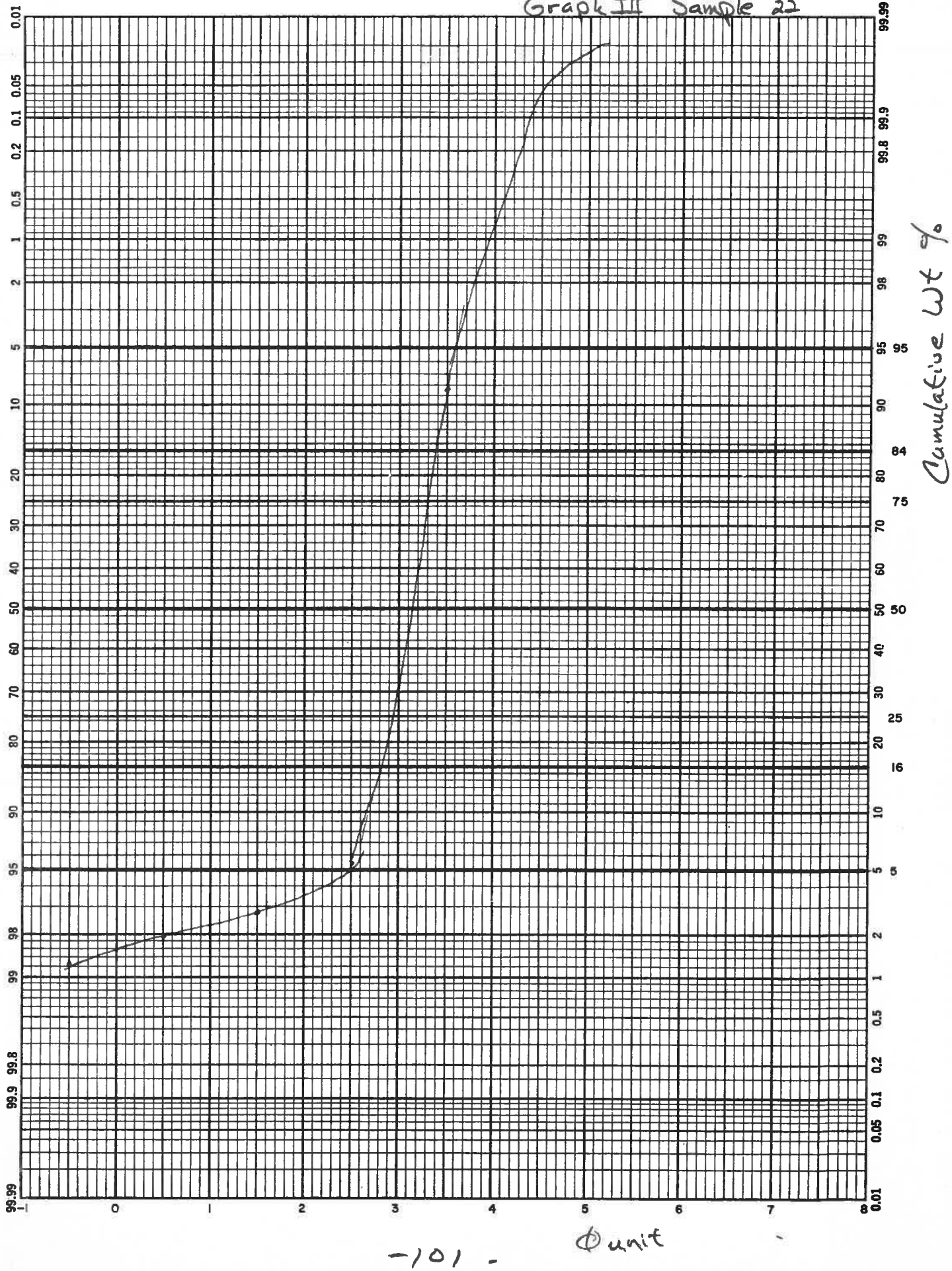
Graph III Sample 19

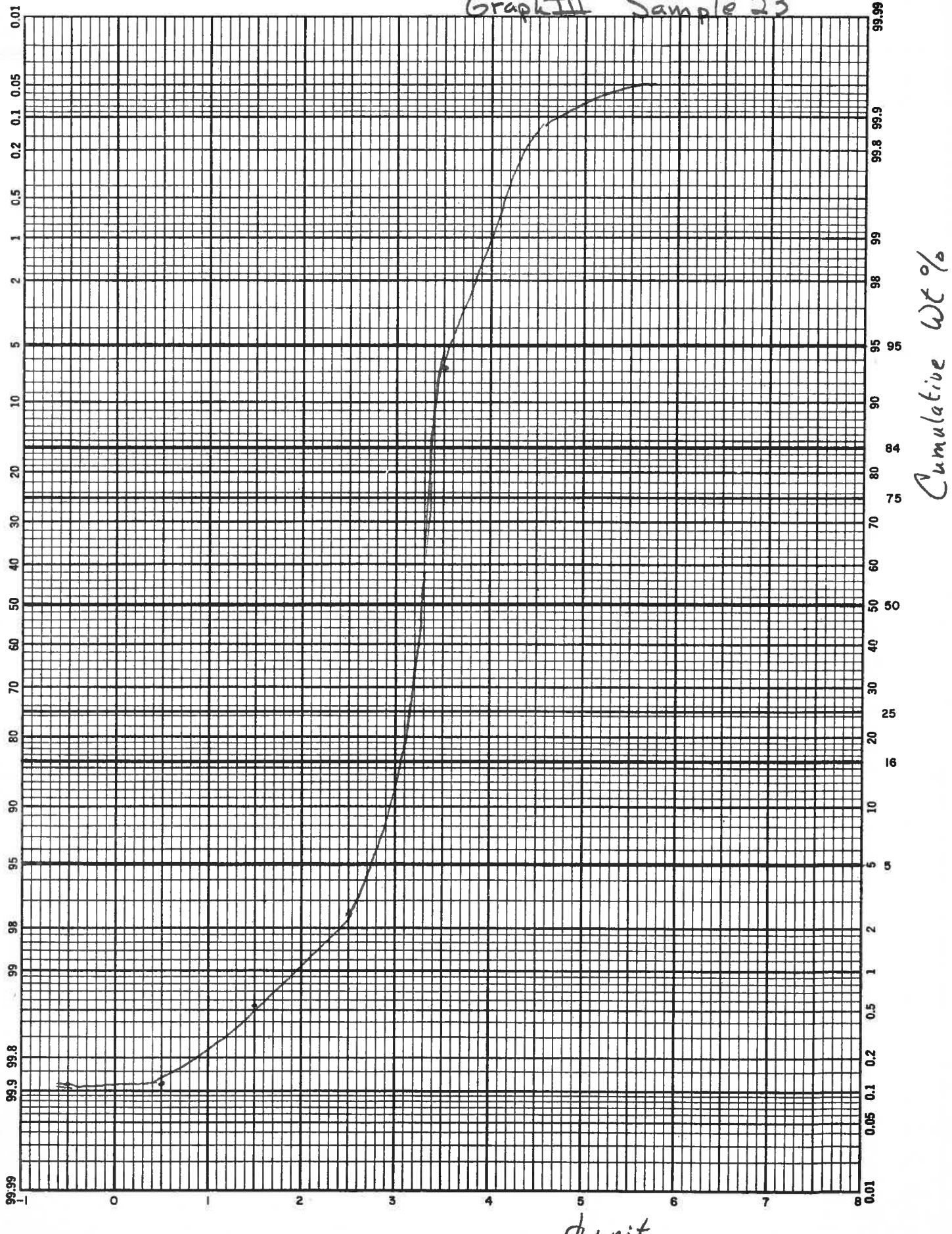



Graph II Sample 20
Cumulative wt %
φ unit
-99-
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
84
75
25
16
-1
0
1
2
3
4
5
6
7
8

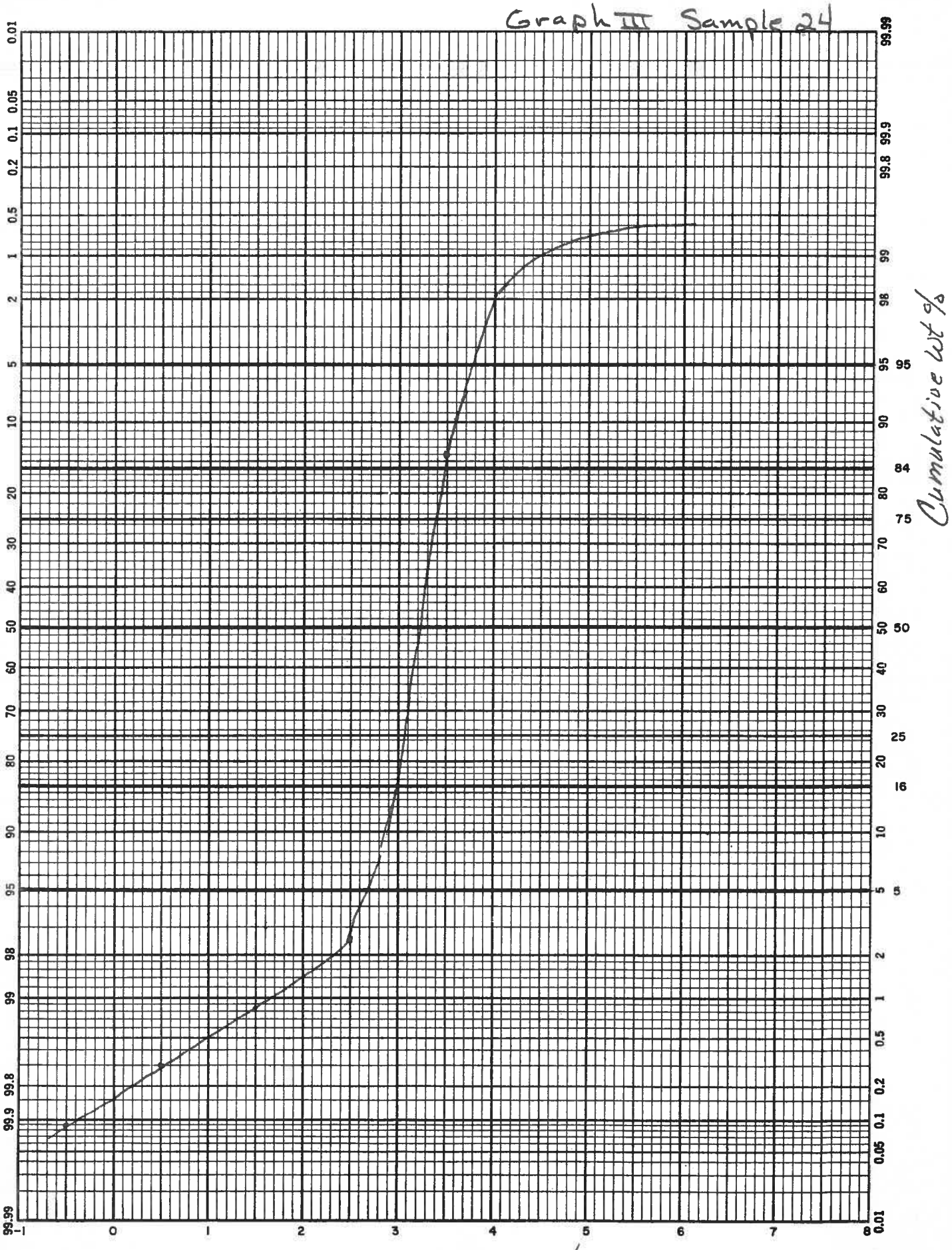
Graph III Sample 21




Graph II Sample 22
Cumulative Wt %
Φ unit
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
-1
0
1
2
3
4
5
6
7
8
99.99
99.9
99.8
99
98
95
90
84
80
75
70
60
50
40
30
25
20
16
10
5
2
1
0.5
0.2
0.1
0.05
0.01


Graph III Sample 23
Cumulative Wt %
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
84
75
25
16
-1
0
1
2
3
4
5
6
7
8
ϕ unit

Graph III Sample 24



Interpretation of Experimental Results

Discussion of Grain Size Analysis:

In my interpretation of the grain size analysis I assume two basic conditions. One, that the area under consideration is in a state of high erosion due to the projected change in current flow path as a result of the Arvida landfill known as Bird Key. And two, that the grains analyzed are predominately of two compositions, namely quartz and the more susceptible carbonate materials in the form of shell fragments. This accumulation of carbonate materials is the result of biologic activity and as we shall see is of great importance in our discussion of the problem inherent in this report.

It is also necessary to point out the fact that here we are dealing with two other environmental variables, also of great importance to our discussion. We are dealing with tidal current, whose oscillation in and out of the bays complicates our analysis. Should the current move in only one direction as in streamflow our analysis would be greatly facilitated, but we must take into consideration the fact that the current in effect moves in two directions in accordance with the prevailing tide.

The distribution of the carbonate materials in the pass, and the size fraction distribution within the individual samples must also be considered to be highly variable due to the susceptibility of the carbonates to mechanical and chemical wear. With this in mind we can safely assume that samples located near the main source of the carbonates, ie. the Gulf of Mexico, will have a higher content of carbonate in the larger size fraction than their counterpart size fraction in samples located in or near the bay area. Thus, the percentage carbonate material in each size fraction is a function of distance from the source, and is the result of chemical and mechanical wear.

To facilitate discussion of the results of the grain size analysis of Big Pass I have divided the area into 6 partitions. Each in my opinion represents an intrinsic difference in energy environment and as such requires individual interpretation.

See Map #III

Area I

Area I is most closely representative of the bay sediments leading into Big Pass. Such samples are to be recognized by their relatively low percentage by weight of the larger size fractions and a high degree of weathering evident in the carbonate materials of which comprise a larger percentage of the smaller size fraction than would be found in areas near the source. Area I can be divided into two subgroups in accordance to the relation of the 3.0-4.0 phi size fraction to current flow. Both samples 1 and 4 were taken from what I prefer to call a secondary flow outlet.

Each of these samples were taken in an area of low turbulence and relatively stable channel configuration. Distribution is highly modal with samples 1 & 4 showing tendencies towards a higher percent material in the smaller size fractions. Carbonate materials are relatively scarce and highly weathered. Depth of the sample location varied from 10 to 18 ft.

Area II

This area is of special interest because it represents in my opinion a region of high turbulence as a result of the intermixing of the three flow paths into the pass. (Reference to flow diagram) A winnowing effect of the grain size distribution is evident with the carbonates being selectively deposited through a function of larger grain size. Samples 10 & 11 show the effect of portions of the current being "detoured" to another flow path as they meet the rising grade of the sand bar. The result, of course, is high turbulence. Samples 5,8, & 11 also show the effect of the intermixing of the tidal current. Depth of sample ranged from 12 to 21 ft.

Area III

Sediments of this region show a high tendency toward modal distribution and were taken in an area with stable channel configuration and low turbulence.

Area IV

A bimodal distribution is evident in this area

as a result of the increased erosion rate due to Bird Key. The original flow path has been shifted toward Siesta Key effectively increasing the energy potential. Analysis of this area is not dissimilar to that of a horseshoe bend with the higher energy environment located in the deeper waters near the Siesta Key shoreline and selective deposition of smaller size fractions along the sand bar developed to the West of the key. This new potential in erosion has the effect of "scouring" out the more easily transported size fractions leaving the larger heavier materials. Depth to sample ranged from 18 to 26 ft.

Area V

At the mouth of the pass the drop-off from the sand bar increases rapidly approaching a new environment to our discussion, The Gulf of Mexico. Here is another high energy region effected by wave action, though distribution is seem to be modal. The reason for this phenomena is that the well sorted sand particles of quartz from the pass and bar are reaching out toward the Gulf Waters. It should be pointed out here that longshore drift of this area is pointedly North along the coast and that well sorted sediments associated with the new bar developed as a result of a change in channel configuration are drifting northwest along the coast. Samples 18 and 21 deserve seperate interpretation in addition to that which has already been said. Sample 18 was taken near the head of a 2 ft. drop over a distance of 3 ft. near the bar. Water depth was 5 feet and the tendendy toward a bimodal distribution is a result of the scouring action of waters receding over the bar and into the Gulf. Sample 21 was taken behind (on the bay side) of the tower seen near the mouth of the pass in photograph #2. It is of interest to note that not less than 6 years ago my peers and I used this tower as a diving platform. Water depth is now 3-5 ft. making such a stunt now dangerous, but showing that the sand bar is migrating toward the Siesta Key shoreline. Depth to sample ranged from 3 to 5 ft.

Area VI

This area is of particular interest in association with area IV. Distribution is highly modal(to an extreme) and percentage of carbonate material is small. All samples were taken near or on the edge of the developing sand bar and

show the effects of renewed erosion within a high energy area. The tendency of the carbonate materials is planar and adding this to their relatively low specific gravity are easily "screened" from the quartz grains.

A second observation of the photographs supplied will show that within the past 5 years there has been a great change in the configuration of the sand bar. The island located in the NE corner of the bar has to this date been eroded away and a new bar has developed on the Gulf side of the pass. This new deposit has covered an extensive area and will shortly be regarded as part of the original bar system. Grain distribution in this region is highly modal in association with laminar flow of the tidal currents. Depth to sample ranged from 8 to 3 ft.

Conclusions:

Through this exercise I have attempted to correlate functions of energy envrionment with grain size distribution. I have shown that distribution varies with type of flow, turbulent flow leading to a bimodal distribution and laminar flow to modal distribution. Interpretation of flow path can in my opinion be held as a function of grain distribution for this area. Correlations of results from this project with areas of similar environment should prove to be very interesting.

It is my contention that the Arvida landfill of Bird Key has caused the increased erosion rate of the Siesta shoreline and can be carried further to the closing of the channel in the future. Many reasons enter my discussion as a basis for this statement. First, since the longshore drift is North in direction an accumulation of material is developing on the Southern end of Siesta Key near the pass. This material at this point is reaching an equilibrium state as to amount deposited and amount carried off by the main flow channel of the pass. But this is not to exclude the fact that more and more material will accumulate toward the Gulf and narrow the channel even more. Secondly, migration of the sand bar in the direction of Siesta Key is not offset by complimentary erosion of the Southern tip of the key as distinguished on our maps. Residents and city officials are working

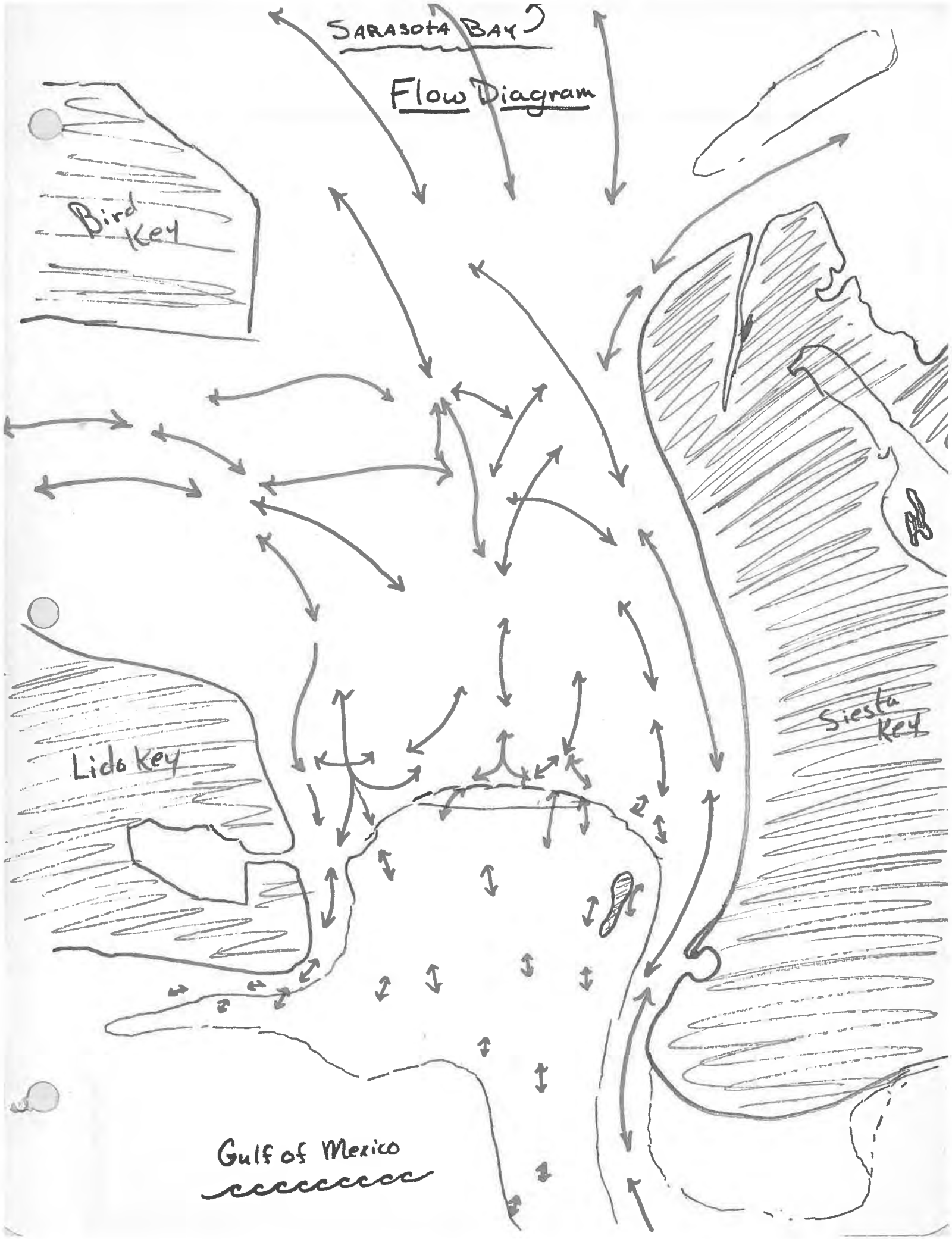
to prevent further loss of land by reinforcing seawalls and adding quantities of resistant rocks to the shoreline. The scouring of the area denoted as area IV will provide adequate sediment for the Eastern edge of the bar to continue migration and"squeeze" the present flow path out of existance.

It has been shown that percentage of carbonate materials is related to distance from source, in this case the Gulf of Mexico. Samples taken from Area I show little carbonate material and what is there is highly weathered, both mechanically and chemically.

It is of my opinion that interest of the subject material compiled here be not held as trivial but of importance in regards to the relationship of not only energy and environment, but man and environment.

And finally, it has been shown that possibilities exist, however minute, for increased enlightenment in the interpretation of ancient sediments using the function of energy environment and grain distribution. We cannot state at this point that what we have shown here is conclusive. On the contrary this report is but fragmential and must be realized as such, but it is a start.

Maps and Flow Analysis


Sarasota Bay
Flow Diagram
Bird Key
Siesta Key
Lido Key
Gulf of Mexico

"Big Pass" – Sarasota, Florida MAP #I

Sample Location – Depth

Bird Key (Arcuda Key)

Sarasota Bay

• 2/17ft.

Sand Bar

• 3/10 ft.

• 1/10ft.

• 5/18 ft.

• 6/13ft.

• 4/14ft.

• 8/10ft.

• 9/15ft.

• 7/21ft.

• 12/15ft.

Lido Key

• 10/18ft.

• 11/15ft.

35ft.

• 14/23ft.

Siesta Key

Sand Bar

• 15/26ft.

• 13/9ft.

• 16/35ft.

• 17/5ft.

• 18/5ft.

• 19/4ft.

• 20/35ft.

• 21/35ft.

35ft.

• 22/35ft.

• 23/21ft.

35ft.

Sand Bar

• 24/4ft.

N

E

W

S

Gulf of Mexico

9 → sample #

15 ft. → depth from mean high

Scale

8" = 1 mile

MAP #II

Big Pass

Avg. depth at mean tide

Bird Key

Sarasota Bay

Shell Key

Lido Key

Sand Bar

Siesta Key

Sand Bars

Gulf of Mexico

Interval → 5'

8" ≅ 1 mile

"Big Pass" Sarasota, Florida

MAP #III

Grain Size Analysis → Size Fraction Wt. %

KE 20 X 20 TO THE INCH
15 X 20 INCHES
KEUFFEL & ESSER CO.
48 5050
MADE IN U.S.A.

BIRD KEY

SARASOTA BAY

SAND BAR

area I

area II

area III

area IV

area V

area VI

LIDO KEY

SAND BAR

SIESTA KEY

SAND BAR

Gulf of Mexico

N W E S

1 .27 1.26 1.01 2.55 1.27 5.49 2.64 75.49 70.00 100.49 27.00 103+30.94

2 0.0 5.27 1.12 1.78 92.01 1.09 0.15

3 0.0 4.40 0.90 2.07 84.50 1.18 2.09

4 0.57 0.38 0.50 1.57 68.70 14.20 0.24

5 29.40 ~~30.70~~ 9.30 7.80 4.96 4.90 44.17 1.38

6 1.27 ~~1.72~~ 1.15 2.21 10.88 82.70 1.34 0.05

7 27.22 15.85 10.30 6.68 34.80 4.59 0.14

8 14.25 4.10 2.27 2.98 72.45 3.58 0.99

9 0.65 3.29 4.34 9.67 66.46 13.10 2.62

10 40.08 10.46 6.29 4.42 29.77 8.00 0.35

11 20.00 6.52 4.65 6.85 53.20 7.50 0.12

12 26.65 9.60 5.93 6.57 47.50 3.27 0.16

13 0.0 0.0 0.25 1.32 88.20 9.87 0.22

14 14.65 4.42 2.27 3.61 68.70 5.94 0.26

15 20.90 3.82 2.77 3.61 60.85 7.85 6.42

16 2.42 0.76 0.99 2.82 85.30 7.24 0.14

17 3.91 5.05 4.21 4.76 72.40 9.15 0.15

18 8.38 5.66 3.50 2.91 59.40 18.95 0.52

19 3.99 3.79 3.00 3.48 71.95 13.30 0.22

20 1.42 2.14 2.14 4.47 85.25 4.44 0.00

21 5.74 2.62 1.84 4.61 81.95 ~~6.76~~ 0.08

22 1.27 0.70 0.84 2.56 86.30 8.40 0.17

23 0.11 0.12 0.54 2.58 89.98 0.82 0.06 0.41

24 0.09 0.21 0.54 1.67 83.50 13.47 0.21

SAMPLE LOCATION + size fraction wt. %

Size Fraction (ϕ units)

−1.0
0.0
1.0
2.0
3.0
4.0
>4.0

Scale
8" = 1 mile