Numbers & Operations/Analysis & Probability: Test Engineer

Micron Technology, Inc.

Job Description: Develop wafer level test strategies and test programs. Provide failure analysis reporting. Monitor device yields, failure rates, and repair rates. Interact with various engineering and product groups to optimize device yields and minimize costs.

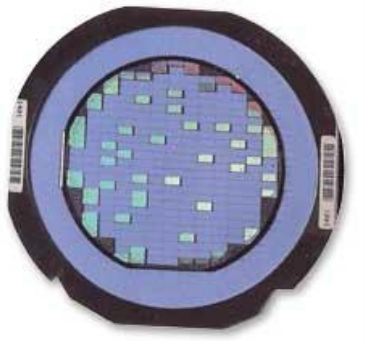
Problem:

Following the fabrication process of memory chips, wafers are tested for functionality. "Yield" refers to the number or percentage of acceptable units produced on each wafer compared to the maximum possible.

Backend yields examples:

Test1 => 95%		Test2 => 90%		Test3 => 98%		Test4 => 99%	
In	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**
1000	950	950	855	855	838	838	830
1500							
1750							
2150							
500							

1. Given the number of parts sent into the first test and the yield of this test, calculate the number of parts out of test one. (Round to the nearest whole part.)



2. Calculate the number of parts out after the 2nd, 3rd and last tests.

3. What is the % yield of all 4 tests together?

4. How many parts do I need to send into the 1st test to get 1000 after the last test?

5. Calculate the yield for each test. Compare the yields of process A with those of process B. Which is better? Which test saw the biggest difference?

	Test1			Test2			Test3			Test4		
Process	**In**	**Out**	**Yield**	**In**	**Out**	**Yield**	**In**	**Out**	**Yield**	**In**	**Out**	**Yield**
A	500	415		415	403		403	395		395	392	
B	450	385		385	312		312	309		309	306	

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See problem for details.

Solution:

Backend yields examples:

1. Given the number of parts sent into the first test and the yield of this test, calculate the number of parts out of test one. (Round to the nearest whole part.)

Test1 => 95%	
In	Out
1000 • .95	950
1500 • .95	1425
1750 • .95	1663
2150 • .95	2043
500 • .95	475

Test1 => 95%		Test2 => 90%		Test3 => 98%		Test4 => 99%	
In	Out	In	Out	In	Out	In	Out
1000	950 ->	950 • .9	855 ->	855 • .98	838 ->	838 • .99	830
1500	1425 ->	1425 • .9	1283 ->	1283 • .98	1227->	1257 • .99	1244
1750	1663 ->	1663 • .9	1497 ->	1497 • .98	1467->	1467 • .99	1452
2150	2043 ->	2043 • .9	1839 ->	1839 • .98	1802->	1802 • .99	1784
500	475 ->	475 • .9	428 ->	428 • .98	419->	419 • .99	415

2. Calculate the number of parts out after the 2nd, 3rd and last tests. (Answers in the above solution.)

3. What is the % yield of all 4 tests together?
.95 x .90 x .98 x .99 = .8295 = 82.95%

4. How many parts do I need to send into the 1st test to get 1000 after the last test?
1000 parts 82.95% = 1206 parts

5. Calculate the yield for each test. Out ÷ In = %Yield

	Test1			Test2			Test3			Test4		
Process	In	Out	Yield	In	Out	Yield	In	Out	Yield	In	Out	Yield
A	500	415	83%	415	403	97%	403	395	98%	395	392	99%
B	450	385	86%	385	312	81%	312	309	99%	309	306	99%

Compare the yields of process A with those of process B. Which is better? Process A:
Process A: = Out (Test4) ÷ In (Test1) = 392 ÷ 500 = 78.4%
Process B: = Out (Test4) ÷ In (Test1) = 306 ÷ 450 = 68%

Which test saw the biggest difference?
Test 2: from 97% to 81%