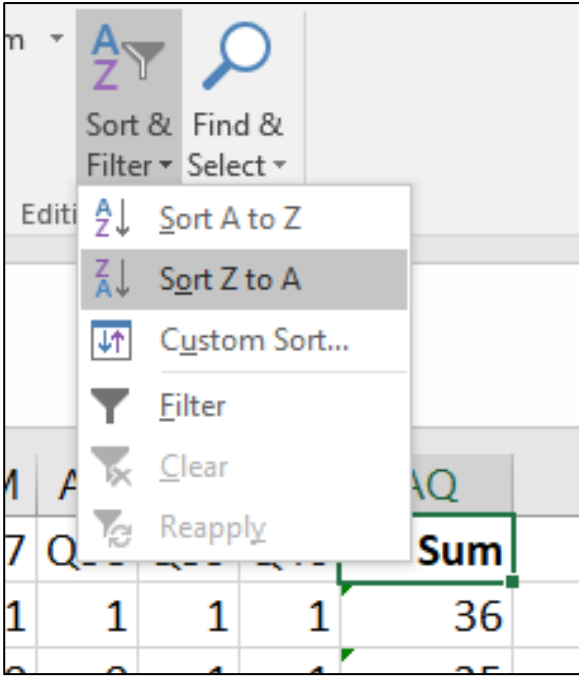


- Click on the Sum column and Sort Data from Z to A (Highest to Lowest).



- Once the total scores have been sorted from highest to lowest, identify the top 50% of scores as the High Group and the bottom 50% of scores as the Low Group. If there are an uneven number of scores, use your judgement as to whether the median should be in the High or Low Group. In this example, the median was placed in the High Group because all other high scores were also in the thirties.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ		
1		Student ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40	Sum		
2		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	36	
3		10	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	34
4	High Group	6	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	33	
5	High Group	4	1	1	1	1	1	0	1	1	1	1	0	1	1	1	0	0	0	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	32	
6		9	1	1	1	1	1	1	0	0	1	1	1	1	0	1	0	1	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	32		
7		11	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	0	0	1	1	0	0	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	30	
8		7	0	1	1	1	1	1	1	1	0	1	1	0	1	1	0	0	0	0	1	0	0	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	28	
9	Low Group	2	1	1	1	0	1	1	1	1	0	0	1	0	1	1	1	1	0	0	1	1	1	0	1	1	0	0	0	1	1	0	0	1	1	1	1	0	0	1	1	1	1	25	
10		5	1	0	1	0	1	0	1	0	0	1	1	0	0	1	1	0	0	0	1	1	0	0	0	0	1	0	1	0	0	1	0	1	1	1	1	0	0	1	0	1	0	19	
11		3	1	1	0	0	1	1	1	1	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1	1	1	1	0	0	1	0	1	0	18	
12		8	0	1	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	11	

- Insert some rows between the High and Low Groups. Calculate SH using the formula =SUM(C2:C7). Copy and paste the formula to apply the calculation for each question.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	
1		Student ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40	Sum	
2		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	36
3		10	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	0	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	34
4	High Group	6	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	33
5	High Group	4	1	1	1	1	1	0	1	1	1	1	0	1	1	1	0	0	0	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	32
6		9	1	1	1	1	1	1	0	0	1	1	1	1	0	1	0	1	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	32
7		11	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	0	0	0	1	0	0	0	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	30
8		SH	6	6	5	5	5	5	5	5	5	6	5	6	3	6	3	2	1	5	5	4	4	1	5	6	4	5	5	5	5	5	5	6	6	6	6	6	5	6	6	6	6	6

S_H = Number of students in the High Group who answered the question correctly

7. Calculate SL using the formula =SUM(C10:C14). Copy and paste the formula to apply the calculation for each question.

1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ			
2		Student ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40	Sum			
3		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	36	
4		10	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
5		6	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	33
6		4	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	0	0	0	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	32
7		9	1	1	1	1	1	1	1	0	0	1	1	1	0	1	0	1	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	32
8		11	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	0	0	1	0	0	0	0	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	30
9		S _H	6	6	6	5	5	5	5	5	5	6	5	6	3	6	3	2	1	5	5	4	4	1	5	6	4	5	5	5	5	5	5	6	6	6	6	6	5	6	6	6	6	6		
10		7	0	1	1	1	1	1	1	1	1	0	1	1	0	1	1	0	0	0	0	1	0	0	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	28
11		2	1	1	1	0	1	1	1	1	0	0	1	0	1	1	1	1	1	0	0	1	0	1	1	1	0	1	1	0	0	0	1	1	0	0	1	1	1	0	0	1	1	0	1	25
12		5	1	0	1	0	1	0	1	0	0	1	1	0	0	1	1	0	0	0	1	1	0	0	0	0	1	0	1	0	0	1	0	1	1	1	1	1	1	0	0	1	0	1	0	19
13		3	1	1	0	0	1	1	1	1	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	0	0	1	0	1	0	1	18
14		8	0	1	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	11
15		S _L	3	4	4	2	5	3	4	3	1	2	4	0	3	4	2	2	0	0	3	2	2	3	2	1	3	3	2	0	0	3	2	3	4	5	4	4	1	2	3	3	3	3		
16																																														
17																																														

S_L = Number of students in the High Group who answered the question correctly

Calculating Difficulty and Discrimination Indices

1. Set up an Excel Spreadsheet with question numbers (items), S_H, S_L, D_f, and d in columns A-E, respectively, and a cell where the total number of students who answered the question can be added. In this example, the 11 students who took the exam was added to cell H5. Items Q1-Q19 of a 40-question exam are visible, but column A contains Q1-Q40.

	A	B	C	D	E	F	G	H
1	S_H #students in the High group who answered the question correctly							
2	S_L #students in the Low group who answered the question correctly							
3	Difficulty Index (D_f) = (S_H + S_L) / number of students							
4	Discrimination Index (d) = S_H - S_L / (.5 * number of students)							
5	Total number of students who answered the question (n) =							11
6								
7	Item	S_H	S_L	D_f	d			
8	Q1							
9	Q2							
10	Q3							
11	Q4							
12	Q5							
13	Q6							
14	Q7							
15	Q8							
16	Q9							
17	Q10							
18	Q11							
19	Q12							
20	Q13							
21	Q14							
22	Q15							
23	Q16							
24	Q17							
25	Q18							
26	Q19...							

2. From your High and Low Group spreadsheet in Excel, copy and transpose paste the SH and SL values using Paste Special into the Item Analysis spreadsheet.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ		
1		Student #	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40	Sum		
2		2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	36	
3		11	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	0	0	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	34	
4		7	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	33	
5		5	1	1	1	1	0	1	1	1	1	0	1	1	1	0	0	0	0	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	32	
6		10	1	1	1	1	1	0	0	1	1	1	0	1	1	0	1	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	32	
7		12	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	0	0	1	0	0	0	0	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	30	
8		S _H	6	6	6	5	5	5	5	5	5	6	5	6	3	6	3	2	1	5	5	4	4	1	5	6	4	5	5	5	5	5	5	6	6	6	6	6	5	6	6	6	6		
9																																													
10		8	0	1	1	1	1	1	1	1	0	1	1	0	1	1	0	0	0	0	1	0	0	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	28	
11		3	1	1	1	0	1	1	1	0	0	1	0	1	1	1	1	0	0	1	0	1	1	0	1	0	1	1	0	0	0	1	0	0	1	1	1	1	0	0	1	1	1	25	
12		6	1	0	1	0	1	0	1	0	0	1	0	0	1	1	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	1	1	1	0	0	1	0	0	1	0	19	
13		4	1	1	0	0	1	1	1	1	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	1	1	1	0	0	1	0	0	1	0	18	
14		9	0	1	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	11
15		S _L	3	4	4	2	5	3	4	3	1	2	4	0	3	4	2	2	0	0	3	2	2	3	2	1	3	3	2	0	0	3	2	3	4	5	4	4	1	2	3	3			

The screenshot shows the Excel interface with the 'Paste Special' dialog box open. The 'Values' option is selected under 'Paste', and the 'Transpose' checkbox is checked. The background shows a table for Item Analysis with columns for Item, S_H, S_L, Df, and d.

Item	S _H	S _L	Df	d
Q1	6	3	0.82	0.55
Q2	6	4	0.91	0.36
Q3	6	4	0.91	0.36
Q4	5	2	0.64	0.55
Q5	5	5	0.91	0.00
Q6	5	3	0.73	0.36
Q7	5	4	0.82	0.18
Q8	5	3	0.73	0.36
Q9	5	1	0.55	0.73
Q10	6	2	0.73	0.73
Q11	5	4	0.82	0.18
Q12	6	0	0.55	1.09
Q13	3	3	0.55	0.00
Q14	6	4	0.91	0.36
Q15	3	2	0.45	0.18
Q16	2	2	0.36	0.00
Q17	1	0	0.09	0.18

3. Calculate the Difficulty Index, Df, using the formula $= (B8+C8)/\$H\5 . Copy and paste the formula to apply the calculations for each question (item).

	A	B	C	D	E	F	G	H
1		S_H #students in the High group who answered the question correctly						
2		S_L #students in the High group who answered the question correctly						
3		Difficulty Index (Df) = (S_H + S_L) / number of students						
4		Discrimination Index (d) = S_H - S_L / (.5*number of students)						
5		Total number of students who answered the question (n) = 11						
6								
7		Item	S_H	S_L	Df	d		
8		Q1	6	3	$= (B8+C8)/\$H\5			
9		Q2	6	4				
10		Q3	6	4				

4. Calculate the Difficulty Index, Df, using the formula $= (B8-C8)/(0.5*\$H\$5)$. Copy and paste the formula to apply the calculations for each question (item).

	A	B	C	D	E	F	G	H
1		S_H #students in the High group who answered the question correctly						
2		S_L #students in the High group who answered the question correctly						
3		Difficulty Index (Df) = (S_H + S_L) / number of students						
4		Discrimination Index (d) = S_H - S_L / (.5*number of students)						
5		Total number of students who answered the question (n) = 11						
6								
7		Item	S_H	S_L	Df	d		
8		Q1	6	3	$= (B8-C8)/(0.5*\$H\$5)$			
9		Q2	6	4				
10		Q3	6	4				

Data Interpretation

Difficulty Index (Df)

Ideally, if 50% of the students are the high group, and 50% are in the low group, then the difficulty index should ideally be 50%, meaning half got it right and half got it wrong. Ideally as well, the top 50% scorers are the ones who got it right. The more the difficulty index differs from 50%, the more poorly the item discriminates. Indices higher than 50% suggest that the item may be too easy. Indices lower than 50% suggest that the item may be too hard.

Discrimination Index (d)

Similar to a correlation coefficient, d ranges from 0.0 to ± 1.0 , where 0.0 indicates no discrimination and 1.0 indicates perfect discrimination. When d is positive and closer to 1.0, more students in the high group got the item correct, so the item is discriminating like it is supposed to. When d is negative and closer to -1.0, more and more students in the low group got the item correct, so the item is not doing what it is supposed to do.