What If We Have Multi-level Relevance Judgments?

Relevance level: r=1 (non-relevant) , 2 (marginally relevant), 3 (very relevant)

Gain	Cumulative Gain	Discounted Cumulative Gain	
D1 3	3	3	
D2 2	3+2	3+2/log 2	Normalized DCG=?
D3 1	3+2+1	3+2/log 2+1/log 3	
D4 1	3+2+1+1		$\dfrac{DCG@10}{IdealDCG@10}$
D5 3		. . .	
D6 1			
D7 1	. . .		
D8 2		**DCG@10 = 3+2/log 2+1/log 3 +…+ 1/log 10**	
D9 1		**IdealDCG@10 = 3+3/log 2+3/log 3 +…+ 3/log 9+ 2/log 10**	

D Assume: there are 9 documents rated "3" in total in the collection

3