

NCEA Level 2 Mathematics (Homework)

22. Probability and Risk

Reading

Go and watch... (basic probability)

<https://www.youtube.com/watch?v=Kgudt4PXs28>

Go and watch... (relative risk)

<https://www.youtube.com/watch?v=felIAwyaGFM>

Questions

1. Watch the first video above. I have six tetrahedral dice. I roll them 1000 times. How many times should I expect to get six of the same number (six 1's, six 2's, six 3's, or six 4's) in a roll?
2. Watch the second video above. Consider the following two tables, which show data from two groups of New Zealander males over the age of fifty.

A	Heart disease	None	Total	B	Heart disease	None	Total
Overweight	24	142	166	Smoker	12	65	77
Not overwt	14	1706	184	Non-smoker	9	84	93
Total	38	312	350	Total	21	149	170

- (a) Discuss the following statement (is it correct? why?): The *absolute risk* of heart disease in group A was $38/350 = 0.109$, while the absolute risk of heart disease in group B was much greater: 0.124. Thus, smoking is more problematic than obesity when it comes to risks of heart disease.
- (b) **Important lesson:** it is not the *risk* that matters when comparing probabilities, it is the *relative risk*. In other words, we don't care about the probability that a person gets heart disease given that they are overweight — we care about whether this probability is higher than the probability that they get heart disease given that they are not overweight.
 - i. Suppose a person from group A is known to be overweight. What is the risk that they develop a heart disease?
 - ii. Suppose a person from group A is known to be not overweight. What is the risk that they develop a heart disease?
 - iii. How much more likely is a person from group A to get heart disease if they are overweight?
- (c) According to this study, a 50-year-old male is 60% more likely to develop heart disease if they are a smoker than if they are a non-smoker. Does the evidence support this statement?