Year 11 Probability Practice #2

1. What is the probability a four sided dice rolls higher than a six sided dice?

2. A darts player has a 20% chance of hitting the bulls-eye. If he throws five times, what is the probability that he misses it every time?

3. When one is conducting a probability experiment, what are the two things that have to be true for the result to be reasonably accurate?

4. A poker player is dealt 8, 8, 5, 5, Ace. (It is a normal full pack with no Jokers, and he does not know what any other cards are).

   a) The player discards the ace and draws a new card at random. What is the probability that he gets a full house? (Three of one number + two of another)

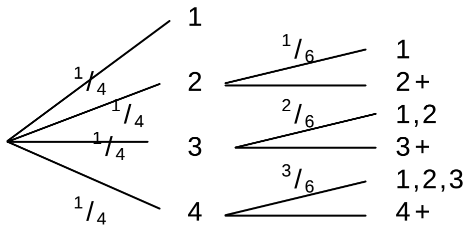
   b) If instead he kept the Ace and two 8s and threw away the two 5s, what is the probability he would get another Ace with one of his two draws? (Getting a much better two pair hand)

   c) If he kept the Ace and two 8s and threw away the two 5s, what is the probability he would get a hand better than two pairs? (He could get another two Aces for a full house; or an 8 and an Ace for a full house; or two more 8s for four-of-a-kind.)

5. Explain why if six dice are thrown that it is unlikely that they will all have different faces showing i.e. a single side each with 1, 2, 3, 4, 5 and 6? (All dice are six-sided and fair)

Answers: Year 11 Probability Practice #2

1. 4-sided 6-sided



$^1/_4 \times ^1/_6 = ^1/_{24}$

$^1/_4 \times ^2/_6 = ^1/_{12}$

$^1/_4 \times ^3/_6 = ^1/_8$

	1	2	3	4
1		✓	✓	✓
2			✓	✓
3				✓
4				
5				
6				

So P(4 sided higher) = $^1/_4$ $^1/_{24} + ^1/_{12} + ^1/_8 = ^1/_4$ or $^6/_{24} = ^1/_4$

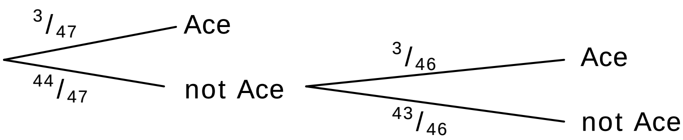
2. P(hit with one throw) = 20%, so P(miss with one throw) = 80% = 0.8.
P(5 misses in a row) = 0.8 × 0.8 × 0.8 × 0.8 × 0.8 = **0.32768** = **32.8%**

3. The experiment must be **unbiased** – the probabilities being examined must not be affected by outside influences or faulty equipment.

   Enough trials must be conducted so that the final result is very unlikely to occur just by luck from a small amount of trials.

4. a) There are 52 – 5 = 47 cards that he could be dealt. Of those four will give a full house (two are 8s and two are 5s) $= \mathbf{\frac{4}{47}} =$ **0.0851 = 8.5%**

   b) There are 52 – 5 = 47 cards to draw from. Of those three are Aces. Each extra card reduces the number of cards by one. Ignoring the chances of two aces:



   P(at least one ace) = $\frac{3}{47} + \frac{44}{47} \times \frac{3}{46} = \mathbf{\frac{135}{1081}}$ = **0.125** = **12.5%**

   c) The probability of A – A is $\frac{3}{47} \times \frac{2}{46} = \frac{6}{2162}$ and the probability of 8 – 8 is $\frac{2}{47} \times \frac{1}{46} = \frac{3}{2162}$
   The probability of A – 8 is $\frac{3}{47} \times \frac{2}{46} = \frac{6}{2162}$ and of 8 – A is $\frac{2}{47} \times \frac{3}{46} = \frac{6}{2162}$
   Adding these together gives $= \mathbf{\frac{21}{2162}}$ = **0.0097** = **0.97%**

5. The first dice rolls a number. The next dice will be different to the first in $\frac{6}{6} \times \frac{5}{6} = \frac{30}{36}$ cases. The next dice will be different to the first two 4 times out of 6, so $\frac{6}{6} \times \frac{5}{6} \times \frac{4}{6} = \frac{120}{216}$ cases. For six dice to all be different the chance is $\frac{6}{6} \times \frac{5}{6} \times \frac{4}{6} \times \frac{3}{6} \times \frac{2}{6} \times \frac{1}{6} = \frac{720}{46656}$. Which is **1.54%** of the time. One time in 65 is unlikely.