Basic Probability Practice #1

1. If a bag contains four black and six white marbles: ●●●●○○○○○○

    a) what is the probability that a random draw will be a black marble?

   b) what is the probability that a random draw will be a red marble?

2. Mark likes take-aways. During the last month this is what he what he ate for dinner:

Pizza	Fish & chips	KFC	Subway	Other	Total
5	2	7	10	--	30

    a) For a random day in the month, what is the probability that he had pizza?

    b) On any day during the month what is the probability that he did not have KFC?

    c) If he didn't eat Subway, what is the probability that he ate Pizza?

3. A spinner dial divided into uneven sections is shown:

    a) What is the probability that a spin lands on white?

    b) What is the probability that a spin lands on dark grey?

    c) What is the probability a spin is on either white or light grey?

    d) What is the probability that with two spins **both** are black?
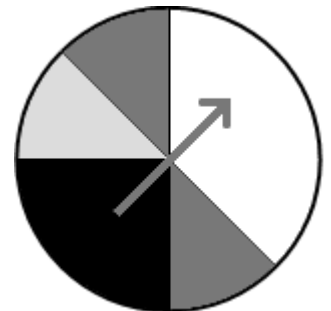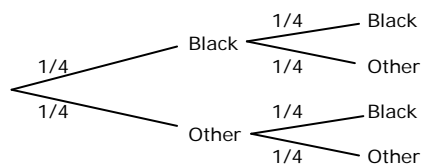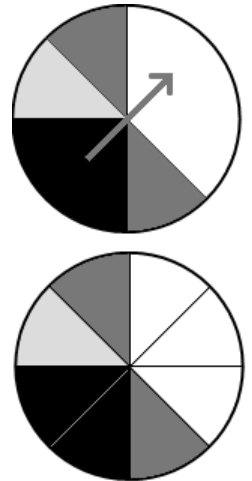

4. Explain why the following are not good ways to answer the questions posed:

    a) Bill is asked to find the probability of Year 9 boys playing Rugby in NZ, so he uses the number of Year 9s in his school who play rugby.

    b) Ciara wants to find the probability that National will win the seat of Hamilton East in the next election, so he finds out how often they have won it in the past and uses that to calculate his probability.

    c) Sandy wants to find the proportion of electric cars on the road in NZ. So she finds how many electric or hybrid have been sold in the last ten years compared to how many cards sold in total.

    d) James wants to see if a dice is "fair" or not. So he rolls it 120 times and sees that it rolls a six 24 times in those trials. He says this shows the dice is biased as it should only roll 20 sixes out of 120 rolls.

Answers: Basic Probability Practice #1

1.   a)   4 out of 10 = $^4/_{10}$ = **0.4** = **40%** (answer can be in any form)

     b)   0 out of 10, since there are no red marbles = **0** (or 0%)

2.   a)   five days out of the thirty = $\frac{5}{30}$ ($= \frac{1}{6}$ = **0.167** = **16.7%**)

     b)   not seven days out of the thirty = $1 - \frac{7}{30} = \frac{23}{30}$ (= **0.767** = **76.7%**)

     c)   5 days out of the 20 (30 less the 10 days he ate Subway) = $\frac{5}{20} = \frac{1}{4}$ = **0.25** = **25%**

3.   The key is to make the sections all the same size – in this case
     each is $\frac{1}{8}$, and then count the number of equal areas.

     a)   Three equal sections are white, so = $\frac{3}{8}$

     b)   Two (separated) sections are dark grey, so = $\frac{2}{8}$ ($= \frac{1}{4}$ = **25%**)

     c)   Three white sections and one light grey = $\frac{4}{8}$ = $\frac{1}{2}$

     d)   Black is $^1/_4$ of the area . For the probability of an event
          followed by another event we multiply = $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$

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                              1/4 ──── Black
                 Black ┌─
          1/4 ╱        1/4 ──── Other
         ╱
        ╱
     ╲ 1/4          1/4 ──── Black
         ╲   Other ┌─
                     1/4 ──── Other
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4.   a)   The school might be one where rugby is very popular – perhaps a boy's school with
          a lot of Polynesians – or could be one with under-represented – say an inner-city
          school where soccer is popular. He would need to find a much more representative
          sample, including all the types of schools in the right amounts.

     b)   What has happened in the past is not necessarily a good predictor of what might
          happen in the future, as situations change.

     c)   As electric cars tend to be new, going back ten years will over-represent the sample
          with old petrol cars. Plus some cars from that time will no longer still be running.
          She might better do something like finding the registration details, on the fairly
          good assumption that cars are only registered if they are still being used.

     d)   The expected result of 120 rolls is 20 sixes. However there is always some
          experimental variation, so that each time a slightly different number of sixes is
          likely. He would need to do a lot more than 120 rolls before he could be certain that
          the dice was not fair.