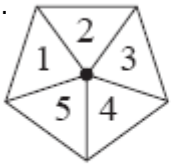
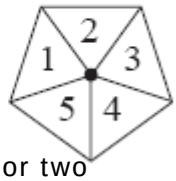
Basic Probability Practice #6

1. Two spinners with five equal sides, as shown, are spun together.



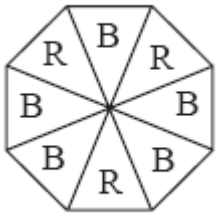


   a) How many different results are possible?

   b) How many different ways can a total of 4 be scored?

   c) Bill says that there are two ways of getting a total of four (either a 3 and a 1 or two 2s) and also two ways of getting a total of five (either a 1 and a 4 or a 2 and a 3), so they are equally likely to happen. Explain why it is more likely that a total of five will be scored on any two spins added together than a total of four.

2. A spinner is made with the shape shown on the right.



   a) Find the probability of getting a B with one spin.

   b) Find the probability of getting a B twice with two spins?

3. According to the U.S. Census Bureau, the U.S. population crossed the 300 Million mark in the year 2006. In that year,

   - One out of four were not considered “White” (that is belonged to minority groups).
   - Children under 18 made up approximately one quarter of the population.
   - Males and females were equally distributed.

   a) In a room full of a hundred people randomly chosen from the U.S. 2006 population, how many of them would you expect to be white?

   b) Of *those*, how many would you expect to be children?

   c) Of *those*, how many would you expect to be boys?

   d) So, what is the probability that a randomly chosen person in the U.S. in 2006 was a white boy?

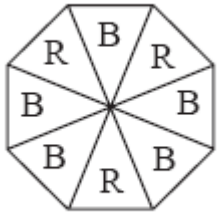
   e) What assumption—not necessarily true, and not stated in the problem—do you have to make in order to believe your answer to part (d) is accurate?

Answers: Basic Probability Practice #6

1. a) There are 5 × 5 = **25 possible results**.

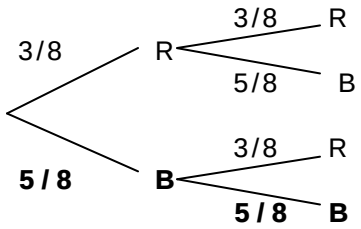
   b) There are **three**. (1 + 3, 2 + 2, 3 + 1)

   c) You need to distinguish the two dice as different. There are four ways of getting a total of five = 1 + 4, 2 + 3, 3 + 2 and 4 + 1 if we take care to distinguish them, so the probability of getting a total of 5 is 4/25. But the probability of getting a total of 4 is 3/25 as there is only one way of getting 2 + 2, but two ways of 3 and 1.



2. a) 5 out of 8 results are B = $\frac{5}{8}$ = **0.625** = **62.5%**

   b) As each result is not equally likely we need a tree:



   We are only interested in the bottom result (B followed by B)

   = $\frac{5}{8}$ × $\frac{5}{8}$ = $\frac{25}{64}$ **= 0.3906** = **39.1%**

3. a) 3 out of 4, so ¾ × 100 = **75 people**

   b) ¼ of 75 = 18.75 **19 white children**

   (The expected number is a real world concept and must be suitably rounded.)

   c) ½ of 18.75 = 9.375 **9 boys** (also accept **9 or 10 boys**)

   (When working we carry any decimals over and only round at the end, which is why we divide 18.75 not 19 by two here).

   d) **9.375 % (0.09375)**

   (A probability, like a mean, is a statistical measure and can be a decimal amount.)

   e) You have to **assume** that the chances of being a male, white and a child are **independent**. That is, not just that ¼ of all people are under 18, but ¼ of all whites are. This is unlikely to be true, different races have different amounts of children, so it might be that whites have proportionately less children.