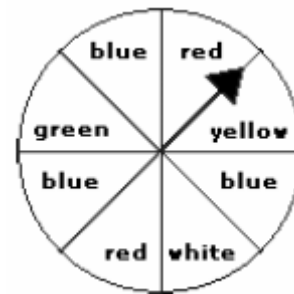1) Assuming all sections are equal in size, what is the probability of the spinner below stopping on a blue section? Write the probability as a fraction.

2) A bag contains 3 red marbles, 4 blue marbles, and 2 green marbles. If John picks a marble from the bag without looking, what is the probability it will be red or blue? Write the probability as a fraction.

3) A bag contains some marbles, all of the same size. Eight of them are black, and the rest are red. The probability of drawing a red marble from the bag is 2/3. How many red marbles are in the bag?

4) How many people must be present in a room in order to be 100% certain that two people in the room celebrate their birthdays in the same month?

5) The pages of a book are numbered consecutively from 1 through 177 inclusive. If a page is chosen at random, what is the probability that the page number will contain the digit "1" ?

6) Two 12-sided dice, each numbered from 1 through 12, are rolled. What is the probability that the product of the numbers shown on the dice will be an odd number?

7) The pie chart shows the results of a parking lot survey at a mall on car color. If this survey was based on a sample size of 500 cars, about how many of them were either a red or a black car?
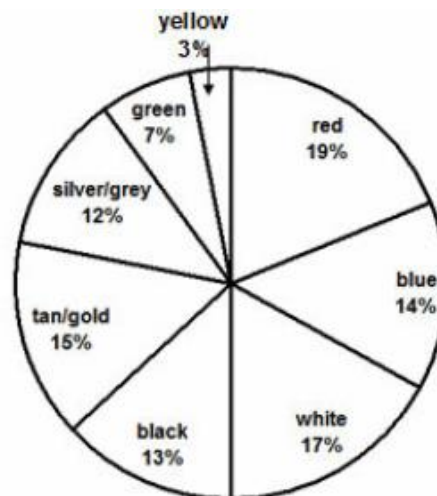
8) There are three flavors of fruit chews in a bag: strawberry, orange and lemon. There are 4 strawberry chews. If you choose a fruit chew randomly from the bag, the probability of getting orange is 3/7, and the probability of getting lemon is 2/7. How many fruit chews are in the bag?

BONUS PROBLEMS

9) If you roll two dice, what is the probability that the sum of the dice will be 8 or more? Express your answer as a reduced fraction.

10) What is the probability that a randomly selected 2 digit number is divisible by 8? Answer as a common fraction.

11) If you were to draw a single card from a deck of 52 cards, what is the probability of getting a card with a prime number on it? Answer as a reduced fraction.

12) The ratio of boys to girls at this math contest is 4:3. If each student has an equal chance of winning, what are the odds that the winner will be a girl? Express your answer as a reduced fraction.

Solutions

1) There are eight sections, each with an equal chance. Three of the sections are blue. Therefore the probability is 3/8.
   Answer: 3/8

2) There are 9 marbles in the bag, each with an equal chance of between chosen. 7 of the marbles are either red or blue. Therefore the probability is 7/9.
   Answer: 7/9

3) If the probability of drawing a red marble is 2/3, then 2/3 of the marbles in the bag must be red. Therefore 1/3 of the marbles must be black. Since there are 8 black marbles, there must be a total of 24 marbles in the bag. So there are 16 red marbles.
   Answer: 16 red marbles

4) If there were 12 people in the room, then it is possible for them each to have a different birthday month. Add one more person to the room, and that last person will be forced to share a birthday month with one of the other 12 people.
   Answer: 13 people

5) Numbers from 1 to 177 that contain the digit "1":

1	1 number
10-19	10 numbers
21, 31, 41, 51, 61, 71, 81, 91	8 numbers
100-177	78 numbers

   There are a total of 97 numbers that contain the digit "1", out of a total of 177 numbers. Therefore the probability is 97/177.
   Answer: 97/177

6) The product of two numbers can only be an odd number if both of the original numbers are also odd. The probability of rolling an odd number on the first dice is ½, and the probability of rolling an odd number on the second dice is also ½. The probability of both events occurring (both dice rolling an odd number) is ½ × ½.
   Answer: 1/4

7) 19% of the cars are red, and 13% of the cars are black. So a total of 32% of the cars are either red or black. Since there are 500 cars total, and 32% of them are red or black:

   32% x 500 = 0.32 x 500 = 160
   Answer: 160 cars

8) The probability of choosing a strawberry chew at random is:

1 – (probability of orange chew) – (probability of lemon chew) =

$$1 - \frac{3}{7} - \frac{2}{7} =$$

$$\frac{2}{7}$$

So the probability of choosing a strawberry chew is 2/7, and there are 4 strawberry chews in the bag. Let T be the total number of chews in the bag. Then,

$$\frac{2}{7} \times T = 4$$

$$T = 4 \times \frac{7}{2}$$

$$T = 14$$

Answer: 14 fruit chews

9) Possible combinations for the two dice are:

Die 2

	1	2	3	4	5	6
1	1 & 1	1 & 2	1 & 3	1 & 4	1 & 5	1 & 6
2	2 & 1	2 & 2	2 & 3	2 & 4	2 & 5	**2 & 6**
3	3 & 1	3 & 2	3 & 3	3 & 4	**3 & 5**	**3 & 6**
4	4 & 1	4 & 2	4 & 3	**4 & 4**	**4 & 5**	**4 & 6**
5	5 & 1	5 & 2	**5 & 3**	**5 & 4**	**5 & 5**	**5 & 6**
6	6 & 1	**6 & 2**	**6 & 3**	**6 & 4**	**6 & 5**	**6 & 6**

(row labels at left under **Die 1**)

Of the 36 possibilities, 15 add up to 8 or more. 15/36 reduces to 5/12.

Answer: 5/12

10) There are 90 two digit numbers. Looking at the multiples of 8 (16, 24, 32, 40, 48, 56, 64, 72, 80, 88 and 96), we find 11 two digit numbers that are divisible by 8. Therefore, the probability is 11/90.

Answer: 11/90

11) Cards with prime numbers include 2, 3, 5, and 7. Each deck contains 4 of each card, so there would be 16 prime cards out of 52 total. 16/52 reduces to 4/13.

Answer: 4/13

12) A ratio of 4:3 means that for every 7 kids, 4 will be boys and 3 will be girls. The chance that the winner will be a girl is 3/7.

Answer: 3/7