Theoretical Probability

Quick Facts

Dice

- There are 6 sides on a fair regular dice
- It shows numbers 1, 2, 3, 4, 5 and 6
- The numbers opposite each other on a dice should add to 7 (1&6, 2&5, 3&4)

Cards

- There are 52 cards in a regular deck
- There are 26 red and 26 black
- There are 4 suits; diamonds (red), hearts (red), clubs (black) and spades (black)
- There are 13 cards from each suite; A, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K
- The 'face' cards are the Jack, Queen and King for each suit

To calculate probability we use the fraction:

$$\frac{\textit{how many there are of what we are looking for}}{\textit{how many there are altogether}}$$

We write this as: $P(A) = \frac{A}{\sum x}$

The 'complement' of an event is the probability that is does NOT happen

We write this as P(A')

As all probabilities should equal 1, to find the probability of something ***NOT*** happening we can simply do 1 - P(A)

For each of the following trials, calculate the probabilities

1. A far coin is flipped

   a. P(heads) = _____

   b. P(tails) = _____

2. A fair 6-sided dice is rolled

   a. P(1) = _____

   b. P(7) = _____

   c. P(even number) = _____

   d. P(number > 3) = _____

   e. P(prime number) = _____

3. A card is draw from a regular deck

   a. P(red) = _____

   b. P(spade) = _____

   c. P(5) = _____

   d. P(face card) = _____

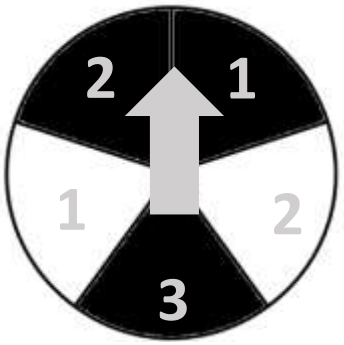
   e. P(4 hearts) = _____

4. This spinner is spun

   a. P(white) = _____

   b. P(3) = _____

   c. P(black 2) = _____



Solutions

1. A far coin is flipped

   a. P(heads) = 0.5

   b. P(tails) = 0.5

2. A fair 6-sided dice is rolled

   a. P(1) = 1/6

   b. P(7) = 0

   c. P(even number) = 0.5

   d. P(number > 3) = 0.5

   e. P(prime number) = 0.5

3. A card is draw from a regular deck

   a. P(red) = 0.5

   b. P(spade) = 0.25

   c. P(5) = 1/13

   d. P(face card) = 3/13

   e. P(4 hearts) = 1/52

4. This spinner is spun

   a. P(white) = 0.4

   b. P(3) = 0.2

   c. P(black 2) = 0.2