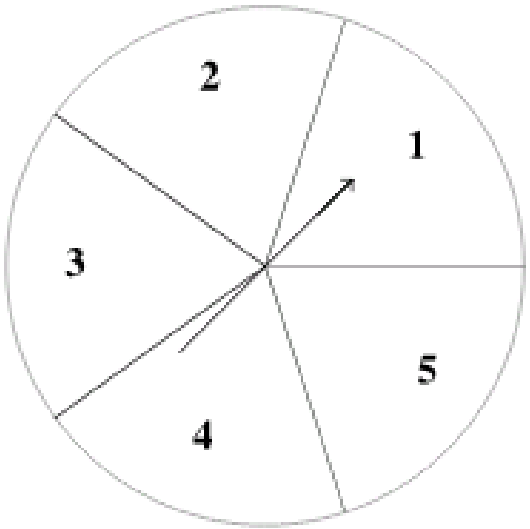
Exercise 1

What are your chances of winning a raffle in which 325 tickets have been sold, if you have one ticket?

Exercise 2

A cursor is spun on a disc divided into five equal sectors as shown below. The position of the pointer is noted. (If it is on a line the cursor is spun again.)



Let A be the event 'pointer is in the first sector' and B the event 'pointer is in the 2nd or 4th sector'.
Find $P(A)$, $P(B)$.

Exercise 3

Three tulip bulbs are planted in a window box. Find the probability that at least one will flower if the probability that all will fail to flower is $\frac{1}{8}$.

Sometimes calculations are made easier by using complementary events.

Exercise 4

A number is selected at random from the integers 2 to 25. Find the probability that it is:

(a) a perfect square;

(b) a prime number;

(c) a prime number or perfect square.

Exercise 5

A maths class consists of 14 women and 16 men. Of these, 12 of the men and half of the women study computer science. A person is chosen at random from the class. Find the probability that the person selected is:

(a) a woman

(b) studying computer science;

(c) a woman who is studying computer science;

(d) a woman or is taking computer science.

Exercise 6

A bag of marbles contains 23 Tiger's Eyes, 17 Rainbows and 5 Pearls.
One marble is drawn at random.
Denote by:
T the event 'a Tiger's Eye is drawn';
R the event 'a Rainbow is drawn';
P the event 'a Pearl is drawn'.
Describe the following events in words and find their probabilities:

(a) $R \cup T$,

(b) $R \cap T$,

(c) $T \cup \overline{P}$,

(d) $T \cup (R \cap P)$,

(e) $\overline{R} \cap (P \cup R \cup T)$.

Exercise 7

In the example above, find

$P(\text{female} \mid \text{nurse}), \qquad P(\text{doctor} \mid \text{male}), \qquad P(\text{male} \mid \text{doctor}).$

Note that the order matters here: $P(A \mid B)$ is not the same as $P(B \mid A)$.

Exercise 8

A couple has two children. Let A be the event 'they have one boy and one girl' and B the event 'they have at most one boy'. Are A and B independent?

Exercise 9

Two different missiles are shot simultaneiously at a practice target. If the probability of the first one hitting the target is $\frac{1}{4}$ and of the second one hitting is $\frac{2}{5}$, what is the probability that

(a) both missiles will hit,

(b) at least one will hit?

Exercise 10

Can two events A and B, ever be both mutually exclusive and independent?