COMBINED EVENTS

MYSTERY OF THE SCIENCE

Combined Events

Combined Events helps to calculate the chance of a certain event happening. Probability is based on combinatorics.

QUICK REVISION

In many countries games are played with playing cards.

An ordinary pack consists of 52 cards.

Cards are in four different suits; hearts, clubs, diamonds, and spades.

In each suit there are 13 cards, labelled Ace, 2, 3, 4, ..., 10, Jack, Queen, and King.

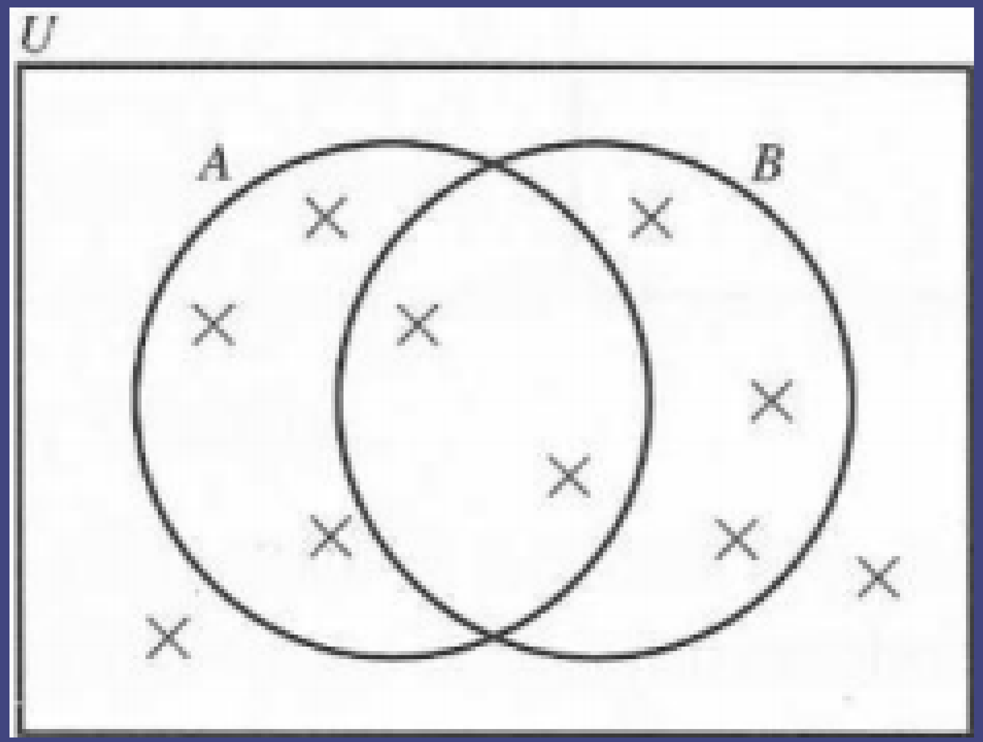
A typical suit of hearts is illustrated.

The diamonds and hearts are usually coloured red, and the clubs and spades are coloured black.

TIPS

∩ means the intersection of two sets.

U means the union of two sets.



This is called a Venn diagram, from its inventor, the English logician John Venn (1834-1923).

From elementary set theory, you know that

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$

So:

$P(A \cup B) = P(A) + P(B) - (A \cap B)$

Exercise 1

A card is selected at random from an ordinary pack of 52 cards. Find the probability that the card is

a) a king

b) a heart

c) the king of hearts

d) either a king or a heart

$$P(A \cup B) = P(A) + P(B) - (A \cap B)$$

$$P(A) = A/\Omega$$

A-the number of favorable events

Ω- the number of all possible events

a) $P(K)=4/52=$**1/13**

b) $P(H)=13/52=$**1/4**

c) The event 'choosing the king of hearts' is written as $K \cap H$.

So: $P(K \cap H)=$**1/52**

There is only one king of hearts in the pack.

d) Choosing the king or a heart is denoted by the event $K \cup H$,

$P(K \cup H)=P(K)+P(H)-P(K \cap H)$

$P(K \cup H)= 4/52 + 13/52 - 1/52 =$ **4/13**

Exercise 2

A card is selected at random from a pack of 52 cards. Find the probability that the card is

a) black

b) an honour [aces, kings, queens and jacks are honours]

c) a black honour

d) either black or an honour

$$P(A \cup B) = P(A) + P(B) - (A \cap B)$$

$$P(A) = A/\Omega$$

A-is the number of favorable events

Ω-is the number of all possible events

a) n(A)=52:2=26

P(A)= n(A)n(U)=26/52=**1/2**

b) n(A)=4•4=16

P(A)= n(A)/n(U)=16/52=**4/13**

c) P(A)=8/52 = **2/13**

d) black –> **26**   an honour-> **16**

black and honour ->**8**

P(A)= 26/52 +16/52–8/52= **17/32**

Exercise 3

In a bag are 100 discs numbered 1 to 100. A disc is selected at random from the bag. Find the probability that the number on the selected disc is

a) even

b) a multiple of five

c) a multiple of ten

d) either even or a multiple of five

$$P(A \cup B) = P(A) + P(B) - (A \cap B)$$

$$P(A) = A/\Omega$$

A-is the number of favorable events

Ω-is the number of all possible events

a) n(A)=**50**

P(A)=n(A)/n(U)=50/100=**1/**

2

b) n(A)=20

P(A)= n(A)/n(U)=20/100=**1/5**

c) n(A)=**10**

P(A)= n(A)/n(U)=10/100=**1/10**

d) even -> **50** multiple of five –> **20**

Even and multiple of five -> **10**

P(A)= 50/100 +20/100–10/100= **3/5**

Thank you for joining today's class