Ex: A die is rolled and a coin is tossed, find the probability that the die shows an odd number and the coin shows a head.

Sol\

Let H be the head and T be the tail of the coin. The sample space S is as follows

$$S = \{(1,\mathrm{H}),(2,\mathrm{H}),(3,\mathrm{H}),(4,\mathrm{H}),(5,\mathrm{H}),(6,\mathrm{H})(1,\mathrm{T}),(2,\mathrm{T}),$$

$$(3,\mathrm{T})(4,\mathrm{T}),(5,\mathrm{T}),(6,\mathrm{T})\}$$

Let E be the event "the die shows an odd number and the coin shows a head". Event E may be described as follows

E= {(1, H), (3, H), (5, H)}

The probability P(E) is given by

P(E) = n(E) / n(S) = 3 / 12 = 1 / 4

Ex: The blood groups of 200 people is distributed as follows: 50 have type A blood, 65 have B blood type, 70 have O blood type and 15 have type AB blood. If a person from this group is selected at random, what is the probability that this person has O blood type?

Sol\

We construct a table of frequencies for the blood groups as follows

group	frequency
A	50
B	65
O	70
AB	15
	200

E= (person has O blood type)

$$p(E) = \frac{70}{200} = 0.35$$

Ex: A problem is given to three students whose chances of solving it are 1/2, 1/3 and 1/4 respectively. What is the probability that the problem will be solved?

Sol\ Let A, B, C be the respective events of solving the problem and A^c, B^c, C^c be the respective events of not solving the problem. Then A, B, C are independent event

$$p(the\ problem\ will\ be\ solved) = 1 - p(none\ solves\ the\ problem)$$

$$\therefore p(none\ solves\ the\ problem) = p(A^c and\ B^c and\ C^c)$$

$$p(A) = \frac{1}{2}, p(B) = \frac{1}{3}, p(C) = \frac{1}{4}$$

$$p(A^c) = \frac{1}{2}, p(B^c) = \frac{2}{3}, p(C^c) = \frac{3}{4}$$

∵ A, B, C are Independent

$$p(A^c \cap B^c \cap C^c) = p(A^c) * p(B^c) * p(C^c)$$

$$= \frac{1}{2} * \frac{2}{3} * \frac{3}{4} = \frac{1}{4}$$

$$p(\text{the problem will be solved}) = 1 - \frac{1}{4} = \frac{3}{4}$$

Ex: Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5?

Sol\ Here, S = {1, 2, 3, 4, ..., 19, 20}.

E = event of getting a multiple of 3 or 5 = {3, 6, 9, 12, 15, 18, 5, 10, 20}.

$$p(E) = \frac{n(E)}{n(S)} = \frac{9}{20}$$

Ex: One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is a face card (Jack, Queen and King only)?

Sol\ Clearly, there are 52 cards, out of which there are 12 face cards.

$$p(getting\ a\ face\ card) = \frac{12}{52} = \frac{3}{13}$$

Ex: Two cards are drawn together from a pack of 52 cards. The probability that one is a spade and one is a heart, is:

Sol\ Let S be the sample space.

Then, n(S) = $\binom{52}{2}$= 1326.

Let E = event of getting 1 spade and 1 heart.

$$p(E) = \frac{\binom{13}{1}\binom{13}{1}}{\binom{52}{2}} = \frac{169}{1326}$$

Ex: From a pack of 52 cards, two cards are drawn together at random. What is the probability of both the cards being kings?

Sol\ Let S be the sample space Then, n(S) = $\binom{52}{2}$ = 1326.

Let E = event of getting 2 kings out of 4.

$$p(E) = \frac{\binom{4}{2}}{\binom{52}{2}} = \frac{6}{1326}$$

Ex: Two brother X and Y appeared for an exam. The probability of selection of X is 1/7 and that of B is 2/9. Find the probability that both of them

Sol\ Let A be the event that X is selected and B is the event that Y is selected.

$$p(A) = \frac{1}{7}\ , p(B) = \frac{2}{9}$$

Let C be the event that both are selected.

P(C) = P(A) × P(B) as A and B are independent events:

$$= \frac{1}{7} * \frac{2}{9} = \frac{2}{63}$$

Ex: In a simultaneous throw of pair of dice. Find the probability of getting the total more than 7.

Sol\ Here n(S) = (6 x 6) = 36

Let E = event of getting a total more than 7

{(2,6), (3,5), (3,6), (4,4), (4,5), (4,6), (5,3), (5,4), (5,5), (5,6), (6,2), (6,3), (6,4), (6,5), (6,6)}

Therefore(E) = n(E)/n(S) = 15/36 = 5/12.