Example

1 Find the probability of each of the following:

(a) Obtaining a tail by tossing a fair coin

(b) Obtaining a prime number by tossing a six-sided fair die

(c) Choosing randomly a correct answer from a 4-choice question

Solution: (a) $S = \{\text{Tail, Head}\}$

$$P(\text{tail}) = \frac{n(\text{tails})}{n(S)}$$

$$= \frac{1}{2}$$

(b) $S = \{1, 2, 3, 4, 5, 6\}$

$$P(\text{prime number}) = \frac{n(\text{prime numbers})}{n(S)}$$

$$= \frac{3}{6}$$

$$= \frac{1}{2}$$

(c) $S = \{A, B, C, D\}$

$$P(\text{correct answer}) = \frac{n(\text{correct answers})}{n(S)}$$

$$= \frac{1}{4}$$

Example 2

From a survey in a hospital, it is found that 1050 out of 1680 newborn babies in 2015 were girls. If a newborn baby was chosen at random from this hospital in 2015, what is the probability that the newborn baby chosen was a boy?

Solution: $\text{P (boy)} = \dfrac{\text{n (boys)}}{\text{n (newborn babies)}}$

$= \dfrac{1680 - 1050}{1680}$

$= \dfrac{630}{1680}$

$= \dfrac{3}{8}$

Example 3

Each digit of a telephone number "1800-98765432" is written on a card. These twelve cards are then well shuffled and placed down on a table. If a card is turned over, find the probability that the card shows

(a) an even number,

(b) a natural number,

(c) a multiple of 2 and 3.

Solution: (a) $\text{n (S)} = 12$

Even number : $\{8, 0, 0, 8, 6, 4, 2\}$

$\text{P (even number)} = \dfrac{\text{n (even numbers)}}{\text{n (S)}}$

$= \dfrac{7}{12}$

(b) Natural number : $\{1, 8, 9, 8, 7, 6, 5, 4, 3, 2\}$

$\text{P (natural number)} = \dfrac{\text{n (natural numbers)}}{\text{n (S)}}$

$= \dfrac{10}{12}$

$= \dfrac{5}{6}$

(c) Multiple of 2 and 3 : $\{6\}$

$\text{P (multiple of 2 and 3)} = \dfrac{\text{n (multiple of 2 and 3)}}{\text{n (S)}}$

$= \dfrac{1}{12}$

Example 4

A ball is chosen randomly from a bag containing 4 blue balls, 7 yellow balls and 5 red balls. Find the probability of picking

(a) a yellow ball,

(b) a ball which is not in red colour,

(c) a white ball.

Solution:

$$n(\text{blue}) = 4$$
$$n(\text{yellow}) = 7$$
$$n(\text{red}) = 5$$
$$n(S) = 4 + 7 + 5 = 16$$

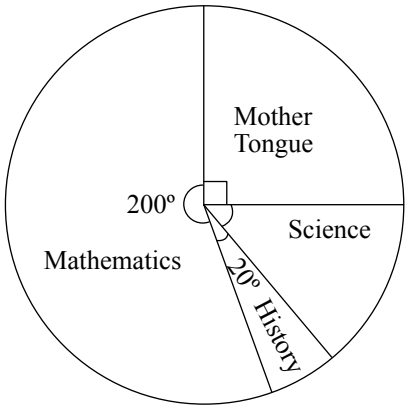
(a) $$P(\text{yellow}) = \frac{n(\text{yellow})}{n(S)} = \frac{7}{16}$$

(b) $$P(\text{not red}) = 1 - P(\text{red}) = 1 - \frac{5}{16} = \frac{11}{16}$$

(c) $$P(\text{white}) = \frac{n(\text{white})}{n(S)} = 0$$

Example 5

The pie chart shows the proportions of the favourite subjects of 180 students in Secondary Two of a school. It is given that the students can choose one favourite subject only.



(a) Find the fraction of students in Secondary Two whose favourite subject is History. If a student is chosen at random from Secondary Two, find the probability of choosing a student whose favourite subject is

(b) Mother Tongue,

(c) Geography,

(d) Mathematics or Science.

Solution: (a) $\text{Fraction (History)} = \dfrac{\text{n (History)}}{\text{n (S)}}$

$= \dfrac{20^\circ}{360^\circ}$

$= \dfrac{1}{18}$

(b) $\text{P (Mother Tongue)} = \dfrac{\text{n (Mother Tongue)}}{\text{n (S)}}$

$= \dfrac{90^\circ}{360^\circ}$

$= \dfrac{1}{4}$

(c) $\text{P (Geography)} = \dfrac{\text{n (Geography)}}{\text{n (S)}}$

$= 0$

(d) $\text{P (Maths or Science)} = \dfrac{\text{n (Maths or Science)}}{\text{n (S)}}$

$= \dfrac{360^\circ - 90^\circ - 20^\circ}{360^\circ}$

$= \dfrac{25}{36}$