

Probability — Class 10 Summary

One formula, careful counting, reliable marks · NCERT Chapter 14 · CBSE Unit VII

$$P(E) = \text{favourable outcomes} / \text{total outcomes} \triangleright 0 \leq P(E) \leq 1 \triangleright P(E) + P(\text{not } E) = 1$$

Three rules, and what each one is worth

Rule	What it says	What it does in the exam
The formula	$P(E) = \text{favourable} / \text{total}$, when the outcomes are equally likely	Every question in the chapter. Check "equally likely" before you use it
The range	$0 \leq P(E) \leq 1$; impossible = 0, sure = 1	A free sanity check. A negative answer or one above 1 means recount
The complement	$P(\text{not } E) = 1 - P(E)$	Usually the shortest route, and often the method the question intends

Count the sample space first — this is where the marks are lost

Experiment	Total outcomes	Why
One coin tossed	2	H, T
Two coins tossed (or one coin twice)	4	HH, HT, TH, TT — HT and TH are different
One die thrown	6	1 to 6
A die thrown twice (or two dice)	36	6×6 , not 12
One card from a well-shuffled deck	52	4 suits $\times$ 13 ranks
A bag or box of objects	every object	Count objects, not colours: 5 red + 8 white + 4 green = 17

The deck of 52, learned once

Card questions are only hard because the deck is unfamiliar. Learn these six numbers and the whole family of questions becomes counting.

52 cards · **4 suits** of 13 (spades & clubs black, hearts & diamonds red) · **26 red** and **26 black** · **12 face cards** — jack, queen, king in each suit · **4 cards** of every rank · **13 cards** in every suit.

Two traps: an **ace is not a face card**, and "a red king" is **2** cards, not 4.

Where this sits in NCERT and CBSE

NCERT: Probability is **Chapter 14**, the last chapter, and it is short — the theoretical-probability section, one exercise and the summary. **Exercise 14.1 has 25 questions**, and the older **optional exercise was removed** in the rationalisation. A textbook or website still offering an "Exercise 14.2" here, or numbering the chapter 15, is a pre-2023 edition.

CBSE: the syllabus gives this chapter one line — "*Classical definition of probability. Simple problems on finding the probability of an event.*" Read it as a limit: nothing examinable needs more than counting outcomes and dividing.

Marks: Unit VII Statistics and Probability is **11 of the 80** theory marks, shared with Statistics. The seven units run $6 \cdot 20 \cdot 6 \cdot 15 \cdot 12 \cdot 10 \cdot 11 = 80$. CBSE sets marks **by unit, never by chapter** — chapter-wise percentage tables online are unofficial estimates.

Key takeaways

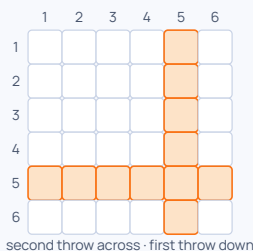
- ▶ One formula runs the chapter: **favourable over total**, provided the outcomes are equally likely.
- ▶ **Count the total first.** Two coins are 4 outcomes, a die thrown twice is 36 — never 3 and never 12.
- ▶ **$P(\text{not } E) = 1 - P(E)$** turns "at least one" questions into one subtraction.
- ▶ Any answer outside **0 to 1** is a miscount, not a probability. Recount rather than hand it in.
- ▶ **Write the two counts down.** "Total = 36, favourable = 11" is where the method mark sits.
- ▶ Almost every lost mark here is a **counting or question-reading** slip, not a formula one.

Counting done properly, three ways

NCERT Exercise 14.1 — the die, the deck, and the one-mark trap

NCERT Ex 14.1 Q24 · 3 marks

A die is thrown **twice**. Find the probability that (i) 5 will **not** come up either time, and (ii) 5 will come up **at least once**.



All 36 outcomes. The 11 shaded ones contain a 5.

Step 1 — total outcomes. Each throw has 6 possibilities and the throws are independent, so the sample space is $6 \times 6 = 36$. Not 12.

Step 2 — count what (i) asks for. Neither throw is a 5, so each throw has 5 choices: $5 \times 5 = 25$ outcomes.

Step 3 — (i). $P(5 \text{ not either time}) = 25/36$.

Step 4 — (ii) by the complement. "At least once" is the opposite of "not at all", so $P(\text{at least one } 5) = 1 - 25/36 = 11/36$.

Check: $25/36 + 11/36 = 36/36 = 1$, and the shaded band above is one full row plus one full column minus the shared cell — $6 + 6 - 1 = 11$. Both counts agree.

NCERT Ex 14.1 Q14 · the deck

One card is drawn from a well-shuffled deck of 52. Total outcomes = **52** every time; only the favourable count changes.

Event	Favourable	Probability
A king of red colour	2 (hearts, diamonds)	$2/52 = 1/26$
A face card	12 (J, Q, K $\times$ 4 suits)	$12/52 = 3/13$
A red face card	6 (J, Q, K in 2 red suits)	$6/52 = 3/26$
A spade	13	$13/52 = 1/4$

NCERT Ex 14.1 Q25 · 1 mark · spot the error

A student argues: "Two coins are tossed. The outcomes are two heads, two tails or one of each — three outcomes — so $P(\text{two heads}) = 1/3$." Is the argument correct?

No. The three *results* are not three **equally likely outcomes**. Listing the coins separately gives **HH, HT, TH, TT** — four equally likely outcomes, and "one of each" covers two of them. So $P(\text{two heads}) = 1/4$, and $P(\text{one of each}) = 2/4 = 1/2$.

Check: $1/4 + 1/2 + 1/4 = 1$. The bad list gives $1/3 + 1/3 + 1/3 = 1$ too — which is why summing to 1 alone never proves a sample space is right.

Where the marks actually go

Writing only the final fraction	The counts are the method mark: write "total = 36, favourable = 11".
Using the formula on outcomes that are not equally likely	Split them until they are: count each ball, coin or card separately.
Answering a near-miss event	Underline the event before counting: <i>at least, not, either</i> .
Leaving an unsimplified fraction	Reduce it. $12/52$ answered as $3/13$ reads as finished work.

Now try these two

(a) A die is thrown once. Find $P(\text{a prime number})$ and $P(\text{an odd number})$. (b) A piggy bank holds 100 fifty-paise coins, 50 one-rupee coins, 20 two-rupee coins and 10 five-rupee coins. One coin falls out. Find $P(\text{it is a fifty-paise coin})$ and $P(\text{it is not a five-rupee coin})$.

(a) primes are 2, 3, 5 so $3/6 = 1/2$; odds are 1, 3, 5 so $1/2$. (b) total = $100 + 50 + 20 + 10 = 180$; $100/180 = 5/9$; not five-rupee = $170/180 = 17/18$. **Check:** $10/180 + 170/180 = 1$.

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