

Name _____

Date _____

Unit 13 · Probability — revision sheet

Everything you need from every section. Read it before the end-of-unit test.

13.1 The probability scale

- Every probability lies between **0 and 1**. Nothing is less likely than impossible or more likely than certain.
- **0 = impossible**, **1/2 = even chance**, **1 = certain**.
- A probability can be written as a **fraction, a decimal or a percentage** — all three mean the same thing.
- $0.2 = 1/5 = 20\%$. Convert to one form before comparing.
- Words like “probably” mean different things to different people; a number does not.
- An **outcome** is one possible result; an **event** is the outcome or outcomes you care about.
- An event and its opposite have probabilities that **add to 1**.
- A probability of $1/2$ does not promise that exactly half of any set of trials will succeed.

Key words: probability · impossible · certain · even chance · outcome · event · probability scale

0 impossible
1/4 unlikely
1/2 even chance
3/4 likely
1 certain
 $1/5 = 0.2 = 20\%$
 $1/2 = 0.5 = 50\%$

13.2 Calculating probabilities

- When outcomes are **equally likely**: $P = \text{favourable outcomes} \div \text{total outcomes}$.
- Count the total carefully — it is the denominator of every answer in the question.
- The probabilities of all possible outcomes **add to 1**, because something must happen.
- So $P(\text{not } A) = 1 - P(A)$. This is often much quicker than counting.
- Two events are **mutually exclusive** if they cannot both happen.
- For mutually exclusive events, $P(A \text{ or } B) = P(A) + P(B)$ — no outcome gets counted twice.
- Give the answer as a fraction in its simplest form unless the question says otherwise.
- The formula only applies when the outcomes really are equally likely: a drawing pin is not a fair coin.

Key words: *equally likely · favourable outcome · complement · mutually exclusive · trial · random*

dice, event “even”
 favourable: 2, 4, 6 → 3
 total: 1 to 6 → 6
 $P = 3/6 = 1/2$
 4 red + 5 blue + 3 green
 total = 12
 every answer will be something over 12

13.3 Experiments and expected results

- **Theoretical** probability is what *should* happen: favourable ÷ total.
- **Experimental** probability is what *did* happen: successes ÷ trials.
- **Expected number = probability × number of trials.**
- The expected number is an average, not a promise. Getting 8 sixes in 60 rolls instead of 10 is perfectly normal.
- As the number of trials grows, experimental probability usually moves **closer** to the theoretical value.
- A small difference is ordinary variation; a large, persistent one suggests **bias**.
- When outcomes are **not** equally likely — a drawing pin, a weighted spinner — only an experiment can give the probability.
- This is the same idea as sample size in Unit 6: more trials, more trustworthy.

Key words: *experimental probability · theoretical probability · trial · expected number · bias*

fair dice, $P(\text{six})$ theoretical = $1/6$
 60 rolls gave 8 sixes
 experimental = $8/60 = 2/15$
 $P = 1/6$, trials = 60
 expected = $1/6 \times 60 = 10$
 actual might be 8, or 13
 10 tosses: 7 heads → 70%