# Unit 12 · Data Analysis and Probability Cheat Sheet

**Unit 12 focus:** frequency tables, histograms, box plots and stem-and-leaf plots

## 1 CHOOSING A DISPLAY

| Display | Shows |
|---|---|
| Frequency table / line plot | how often each value occurs |
| Histogram | frequencies in equal intervals |
| Box-and-whisker plot | five-number summary |
| Stem-and-leaf plot | every value, grouped by tens |

## 2 BOX-AND-WHISKER PLOT

Find the minimum, Q1, median, Q3, maximum.

**Example:** 3, 5, 6, 8, 9, 11, 14
**Median:** 8
**Q1, Q3:** 5 and 11

**Answer: 3, 5, 8, 11, 14**

## 3 STEM-AND-LEAF PLOT

Stem = tens digit, leaf = ones digit. Include a key.

**Example:** Stems 2 | 1 4 7 and 3 | 0 5: median?
**Values:** 21, 24, 27, 30, 35

**Answer: 27**

## 4 KEY VOCABULARY

| | | |
|---|---|---|
| **outcome** | One possible result. | rolling a 4 |
| **sample space** | All possible outcomes. | {1, 2, 3, 4, 5, 6} |
| **theoretical probability** | Expected chance from counting. | $P(4) = \frac{1}{6}$ |
| **experimental probability** | Results of trials. | 9 heads in 20 flips |

## 5 COUNTING OUTCOMES

Multiply the number of choices for each step.

**Example:** 4 shirts, 3 pants, 2 shoes: outfits?
**Multiply:** 4 · 3 · 2

**Answer: 24 outfits**

## 6 QUICK REMINDERS & COMMON MISTAKES

**✔ Do remember**

- Histogram bars touch; bar graph bars do not.
- Include a key on stem-and-leaf plots.
- Experimental probability approaches theoretical with many trials.

**✘ Common mistakes**

- Median without ordering: order first
- P = favorable ÷ unfavorable: favorable ÷ total
- Adding choices to count outcomes: multiply

# Unit 12 · Data Analysis and Probability Cheat Sheet

**More practice:** probability, independent and dependent events, counting and sampling

## 1 INDEPENDENT EVENTS

P(A and B) = P(A) · P(B).

**Example:** Flip a coin and roll a die: P(heads and 6)?
**Multiply:** $\frac{1}{2} \cdot \frac{1}{6}$
**Answer:** $\frac{1}{12}$

## 2 DEPENDENT EVENTS

The first draw changes the second (no replacement).

**Example:** 3 red, 2 blue marbles. P(red, then red)?
**Multiply:** $\frac{3}{5} \cdot \frac{2}{4}$
**Answer:** $\frac{3}{10}$

## 3 PERMUTATIONS AND COMBINATIONS

| Type | Example |
|---|---|
| Permutation (order matters) | ${}_5P_2 = 5 \cdot 4 = 20$ |
| Combination (order does not) | ${}_5C_2 = \frac{20}{2} = 10$ |

Ranking or arranging → permutation. Choosing a group → combination.

## 4 EXPERIMENTAL PROBABILITY

$$\frac{\text{times it happened}}{\text{total trials}}$$

**Example:** A spinner lands on red 18 times in 60 spins.
**Divide:** $\frac{18}{60}$
**Answer: 0.3 (30%)**

## 5 RANDOM SAMPLES AND SURVEYS

| | |
|---|---|
| Survey every 10th student entering school | **random (systematic)** |
| Ask only the soccer team about favorite sports | **biased** |
| Draw names from a hat | **random** |

## 6 CHECK YOURSELF

- Did the first event change the second?
- Does order matter?
- Is my probability between 0 and 1?
- Is my sample random and representative?