Your notes

GCSE Statistics: revision notes

Combined events and conditional probability

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Mutually exclusive and independent events

- **Mutually exclusive events** can't happen at the same time, such as rolling a 2 and a 5 on one dice. P(A or B) = P(A) + P(B).
- **Independent events** don't affect each other, such as flipping a coin and rolling a dice. P(A and B) = P(A) × P(B).
- For events that are not mutually exclusive, P(A or B) = P(A) + P(B) – P(A and B). With P(A) = 0.4, P(B) = 0.5 and P(A and B) = 0.2, P(A or B) = 0.7.

Tree diagrams

- **Tree diagrams** show combined events. Each set of branches adds up to 1.
- Multiply along the branches to find the probability of a route. Add the probabilities of routes that give the outcome you want.
- With replacement: the probabilities stay the same. A bag has 3 red and 2 blue balls; P(red, red) = 3/5 × 3/5 = 9/25.
- **Without replacement**: the second probabilities change. P(red, red) = 3/5 × 2/4 = 6/20 = 3/10.

Venn diagrams and conditional probability

- **Venn diagrams** show events as overlapping circles. The overlap is "A and B", and the region outside the circles is "neither".
- **Conditional probability** is the probability of B given that A has happened: P(B given A) = P(A and B) ÷ P(A).
- Example: 30 students play sport and 12 of them play piano. P(plays piano given plays sport) = 12 ÷ 30 = 0.4.
- If P(B given A) = P(B), the events are independent.

Key terms

Mutually exclusive events	Events that can't happen at the same time.
Independent events	Events where one doesn't affect the other.
Tree diagram	A diagram showing the outcomes of combined events on branches.
Conditional probability	The probability of an event given that another has happened.
Venn diagram	A diagram of overlapping circles showing events.
Without replacement	When an item is not put back, so probabilities change.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What are mutually exclusive events?
2. For independent events, how do you find P(A and B)?
3. P(A) = 0.3 and P(B) = 0.4, and they are mutually exclusive. What is P(A or B)?
4. P(A) = 0.4, P(B) = 0.5 and P(A and B) = 0.2. What is P(A or B)?
5. A bag has 3 red and 2 blue balls. One is taken and replaced, then another. What is P(both red)?
6. A bag has 3 red and 2 blue balls. Two are taken without replacement. What is P(both red)?
7. On a tree diagram, what do you do along the branches?
8. 30 students play sport and 12 of them play piano. What is P(piano given sport)?

Answers

1. Events that can't happen at the same time
2. P(A) times P(B)
3. 0.7
4. 0.7
5. 9/25
6. 3/10
7. Multiply the probabilities
8. 0.4

What to do next

Practise 10 questions on this topic

Try 3 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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