Your notes

GCSE Maths: revision notes

Tree diagrams and combined events

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Independent events

- Events are independent if one does not affect the other, such as flipping a coin and rolling a dice.
- For **independent events**, P(A and B) = P(A) × P(B). P(head and a six) = ½ × 1/6 = 1/12.

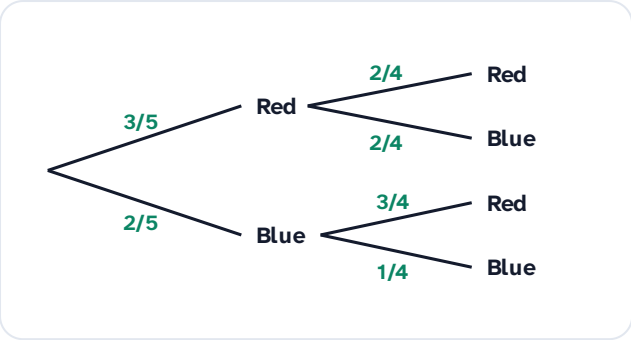
Tree diagrams

- Each set of **branches** shows the outcomes of one event. The probabilities on each set of **branches** add up to 1.
- Multiply along the **branches** for 'and'. Add the results of different routes for 'or'.
- A bag has 3 red and 2 blue counters. One is taken and replaced, then another is taken. P(both red) = 3/5 × 3/5 = 9/25.



Without replacement

- If the first item is not put back, the probabilities on the second set of **branches** change: there is one fewer item.
- 3 red and 2 blue counters, taken **without replacement**: P(both red) = 3/5 × 2/4 = 6/20 = 3/10.

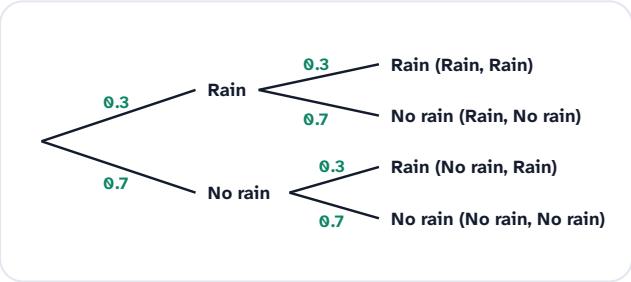


At least one

- P(at least one) = 1 – P(none).
- P(at least one six in two rolls) = 1 – 5/6 × 5/6 = 1 – 25/36 = 11/36.

Worked examples

The probability it rains on any day is 0.3. Find the probability it rains on exactly one of the next two days.



There are two ways: rain then dry, or dry then rain. P(dry) = 1 – 0.3 = 0.7.

Rain then dry: multiply along the branches. **0.3 × 0.7 = 0.21**

Dry then rain. **0.7 × 0.3 = 0.21**

Add the two ways. **0.21 + 0.21 = 0.42**

Answer: 0.42

Key terms

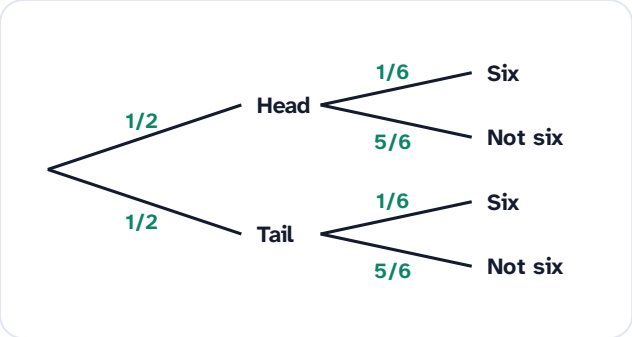
Independent events	Events where one does not affect the other.
Tree diagram	A diagram with branches showing the outcomes of events and their probabilities.
Branch	One line on a tree diagram, showing one outcome.
With replacement	The first item is put back before the next is chosen.
Without replacement	The first item is not put back, so the probabilities change.

Quick questions

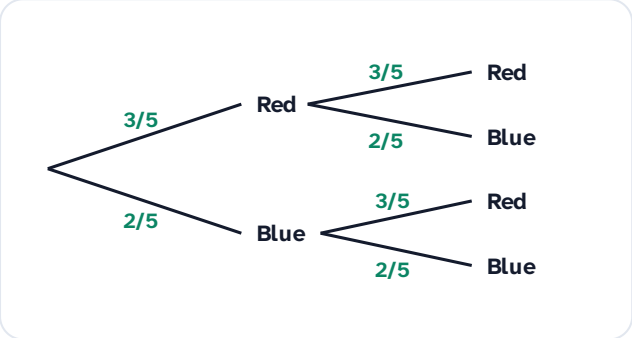
Cover the answers and test yourself: remembering is what makes it stick.

Your notes

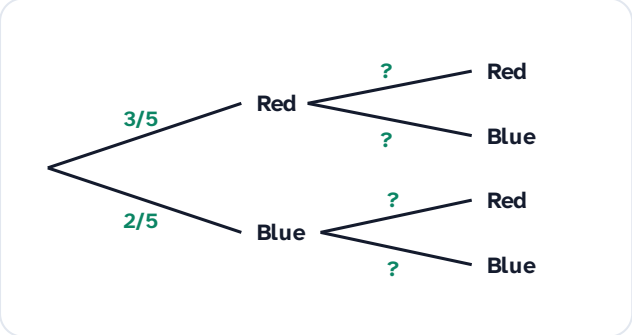
1. A coin is flipped and a dice is rolled. What is the probability of a head and a six?



2. On a tree diagram, how do you find P(A and B)?
3. What must the probabilities on each set of branches add up to?
4. A bag has 3 red and 2 blue counters. One is taken and replaced, then another is taken. What is the probability that both are red?



5. A bag has 3 red and 2 blue counters. Two are taken without replacement. What is the probability that both are red?



6. What does independent mean?
7. Two fair coins are flipped. What is the probability of two heads?
8. Two fair coins are flipped. What is the probability of one head and one tail?

Answers

1. 1/12
2. Multiply along the branches
3. 1
4. 9/25
5. 3/10
6. One event does not affect the other
7. 1/4
8. 1/2

Your notes

What to do next

Practise 12 questions on this topic

Try 7 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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