

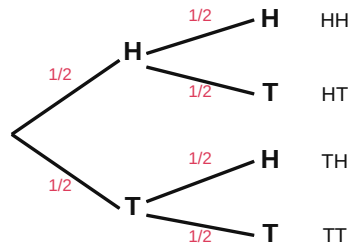
Boost Free Lessons - Year 10 Maths

Lesson 20: Probability Tree Diagrams

Name: _____ Grade: _____ Date: _____

Worked Example 1

A coin is tossed twice. Use a tree diagram to find the probability of two heads.



1. Each toss has two equally likely outcomes, H and T, each with probability $\frac{1}{2}$.
2. The first toss gives two branches, and each splits into two more, giving 4 outcomes.
3. To find the probability of a path, **multiply** along its branches.
4. $P(HH) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$.

$P(\text{two heads}) = \frac{1}{4}$

Worked Example 2

A bag holds 3 red and 2 blue marbles. One is drawn, replaced, then another is drawn. Find $P(\text{both red})$.

1. Because the marble is replaced, the bag is the same for the second draw.
2. $P(\text{red}) = \frac{3}{5}$ on each draw.
3. Multiply along the branches: $\frac{3}{5} \times \frac{3}{5}$.
4. $= \frac{9}{25}$.

$P(\text{both red}) = \frac{9}{25}$

Remember: **Multiply** along the branches to find the probability of one path, and **add** the paths when more than one outcome satisfies the event. All the final probabilities must add to 1.



Question 1: Find each probability, drawing a tree diagram to help.

1. Two coins: $P(\text{two tails})$

2. Two coins: $P(\text{one head and one tail})$

3. Two coins: $P(\text{at least one head})$

4. Three coins: $P(\text{three heads})$

5. A die then a coin: $P(\text{a 6 and a head})$

6. Two dice: $P(\text{both show 6})$

7. Two coins: $P(\text{no heads})$

8. Three coins: $P(\text{at least one tail})$



Question 2: A bag holds 4 red and 6 blue marbles. One is drawn, replaced, then another is drawn. Find each probability.

1. $P(\text{both red})$

2. $P(\text{both blue})$

3. $P(\text{red then blue})$

4. $P(\text{one of each colour})$

5. $P(\text{no red})$

6. $P(\text{at least one red})$



Question 3: Answer the following questions.

1. A bag holds 5 green and 3 yellow counters. One is drawn and replaced, then another is drawn. Find $P(\text{both green})$.
2. Using the same bag, find $P(\text{both yellow})$.
3. Using the same bag, find $P(\text{at least one green})$.
4. A spinner has three equal sections A, B and C. It is spun twice. Find $P(\text{the same letter twice})$.
5. Explain why the probabilities of all the final outcomes on a tree diagram must add to 1.





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Answers: Probability Tree Diagrams**Question 1**

1. $\frac{1}{4}$

2. $\frac{1}{2}$

3. $\frac{3}{4}$

4. $\frac{1}{8}$

5. $\frac{1}{12}$

6. $\frac{1}{36}$

7. $\frac{1}{4}$

8. $\frac{7}{8}$

Question 2

1. $\frac{4}{25}$

2. $\frac{9}{25}$

3. $\frac{6}{25}$

4. $\frac{12}{25}$

5. $\frac{9}{25}$

6. $\frac{16}{25}$

Question 3

1. $\frac{25}{64}$

2. $\frac{9}{64}$

3. $\frac{55}{64}$

4. $\frac{1}{3}$

5. They cover every possible outcome, and one of them must happen.

