

GCSE Maths: Tree diagrams: with and without replacement (Higher): answers

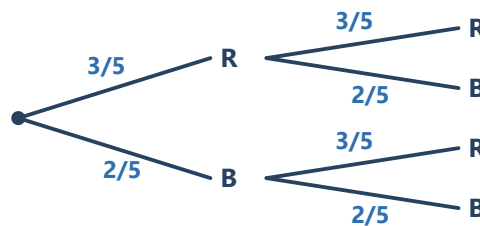
GCSE Maths - Probability - Higher - Lesson 23.6

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch23-probability/higher/tree-diagrams-with-and-without-replacement/

Exercise 23G Tree diagrams: independent events and replacement

Non-calculator

- 1 A bag has 3 red counters and 2 blue counters. A counter is picked at random, its colour is noted and it is put back. A second counter is then picked. Find the probability that...



- (a) both counters are red

Answer: $\frac{9}{25}$

- (b) both counters are blue

Answer: $\frac{4}{25}$

- (c) the counters are different colours

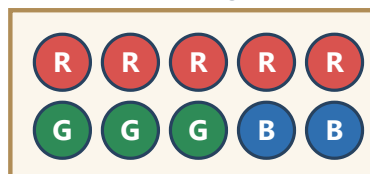
Answer: $\frac{12}{25}$

- (d) at least one counter is red

Answer: $\frac{21}{25}$

- 2 A bag has 5 red, 3 green and 2 blue counters. A counter is picked, replaced, and a second counter is picked. Find the probability that...

The bag



- (a) both counters are red

Answer: $\frac{1}{4}$

- (b) both counters are the same colour

Answer: $\frac{19}{50}$

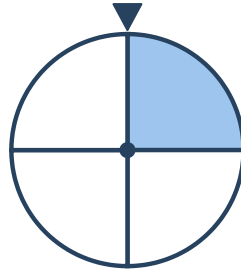
- (c) the first is green and the second is blue

Answer: $\frac{3}{50}$

- (d) neither counter is red

Answer: $\frac{1}{4}$

- 3 A fair spinner has 4 equal sections and one of them is shaded. It is spun twice. Find the probability that the shaded section comes up...



- (a) both times

Answer: $\frac{1}{16}$

- (b) exactly once

Answer: $\frac{3}{8}$

- (c) at least once

Answer: $\frac{7}{16}$

- 4 The probability of rain on any day is 0.4. Two days are independent. Draw a tree diagram and find the probability of...

- (a) rain on both days

Answer: 0.16

- (b) no rain on either day

Answer: 0.36

- (c) rain on exactly one day

Answer: 0.48

- 5 In a game, Zara takes two free throws. The probability that she scores each throw is 0.7, independently. Find the probability that she scores...

- (a) both throws

Answer: 0.49

- (b) exactly one throw

Answer: 0.42

- (c) at least one throw

Answer: 0.91

- 6 To get a licence, Rav must pass a theory test and a practical test. The probability that he passes the theory test is 0.85 and the probability that he passes the practical test is 0.9. The two tests are independent. Draw a tree diagram and find the probability that he...

- (a) passes both tests

Answer: 0.765

- (b) passes exactly one test

Answer: 0.22

- (c) fails both tests

Answer: 0.015

- 7 A biased coin lands on heads with probability 0.6. The coin is tossed twice. Show that the probability of getting exactly one head is 0.48.

Answer: 0.48

- 8 Maria says: "The probabilities on the branches of a tree diagram that leave the same point always add up to 1." Explain why she is right.

Answer: One of the outcomes must happen

- 9 A bag has 10 counters. Four are red and the rest are blue. A counter is picked at random, replaced, and another is picked. Find the probability that the counters are different colours.

Answer: $\frac{12}{25}$

- 10 A bag has 2 red, 1 blue and 1 green counter. A counter is picked, replaced, then another is picked. Find the probability that the two counters are the same colour.

Answer: $\frac{3}{8}$

- 11 A biased coin lands on heads with probability 0.6. It is tossed three times. Find the probability of getting...

- (a) three heads

Answer: 0.216

- (b) exactly two heads

Answer: 0.432

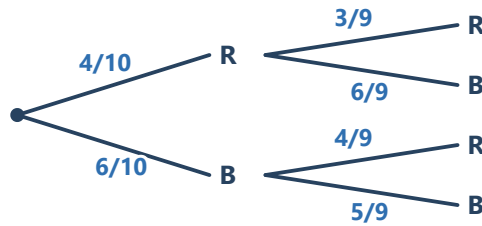
- (c) at least one tail

Answer: 0.784

Exercise 23H Tree diagrams: dependent events and no replacement

Non-calculator

- 1 A bag has 4 red counters and 6 blue counters. Two counters are taken at random **without replacement**. Find the probability that...



- (a) both counters are red

Answer: $\frac{2}{15}$

- (b) both counters are blue

Answer: $\frac{1}{3}$

- (c) the counters are the same colour

Answer: $\frac{7}{15}$

- (d) the counters are different colours

Answer: $\frac{8}{15}$

- (e) at least one counter is red

Answer: $\frac{2}{3}$

- 2 A bag has 5 red, 3 green and 2 yellow counters. Two counters are taken without replacement. Find the probability that...

The bag



- (a) both are red

Answer: $\frac{2}{9}$

- (b) the first is green and the second is yellow

Answer: $\frac{1}{15}$

- (c) both are the same colour

Answer: $\frac{14}{45}$

- (d) neither is red

Answer: $\frac{2}{9}$

- 3 A box has 5 milk and 3 dark chocolates. Maya eats two chocolates at random. Find the probability that she eats...

- (a) two dark chocolates

Answer: $\frac{3}{28}$

- (b) one of each type

Answer: $\frac{15}{28}$

- (c) at least one dark chocolate

Answer: $\frac{9}{14}$

- 4 A drawer holds 6 black socks and 4 white socks. Without looking, Tom takes out two socks. Find the probability that he gets a matching pair.

Answer: $\frac{7}{15}$

- 5 A class has 7 girls and 5 boys. Two students are chosen at random to give out books. Find the probability that...

- (a) both are boys

Answer: $\frac{5}{33}$

- (b) one is a girl and one is a boy

Answer: $\frac{35}{66}$

- 6 A raffle has 20 tickets. Jo has 5 of them. First prize and second prize are drawn at random (a ticket cannot win twice). Find the probability that Jo wins...

- (a) both prizes

Answer: $\frac{1}{19}$

- (b) at least one prize

Answer: $\frac{17}{38}$

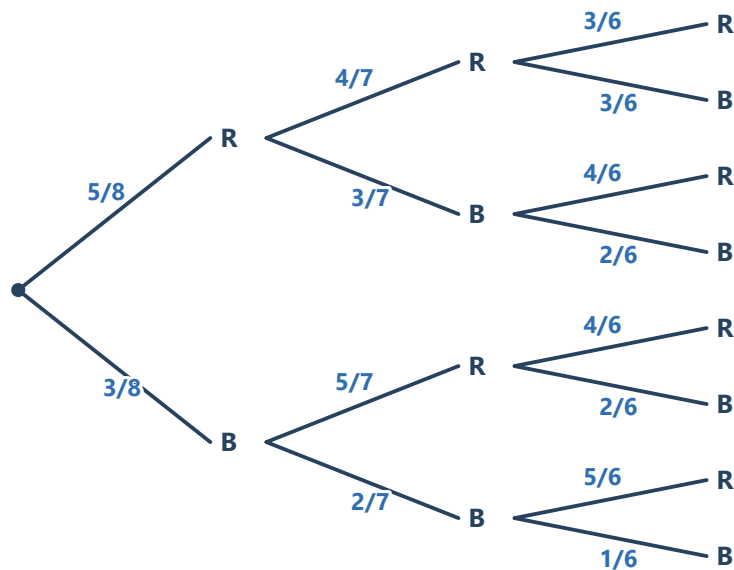
- 7 Sam says: "A bag has 3 red and 2 blue counters. Two counters are taken without replacement. $P(\text{both red}) = \frac{3}{5} \times \frac{3}{5} = \frac{9}{25}$." Explain Sam's mistake and find the correct probability.

Answer: $\frac{3}{10}$

- 8 In a bag there are 4 red and 6 blue counters. Show that, when two counters are taken without replacement, the probability of red then blue is the same as the probability of blue then red.

Answer: Both are $\frac{4}{15}$

- 9 A bag has 5 red and 3 blue counters. Three counters are taken without replacement. Find the probability that...



- (a) all three are red

Answer: $\frac{5}{28}$

- (b) exactly two are red

Answer: $\frac{15}{28}$

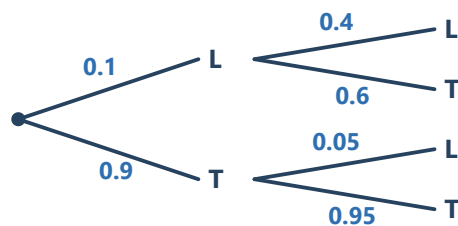
- (c) at least one is blue

Answer: $\frac{23}{28}$

- 10 A box contains 8 pens, of which 3 are faulty. Two pens are tested without replacement. Find the probability that at least one of them is faulty.

Answer: $\frac{9}{14}$

- 11 The tree diagram shows the probability that Kim is late on Monday and Tuesday.



- (a) Find the probability that she is late on both days

Answer: 0.04

- (b) Find the probability that she is late on Tuesday

Answer: 0.085

- (c) Find the probability that she is late on exactly one of the two days

Answer: 0.105

