

GCSE Maths: Independent events: the AND rule and the OR rule (Higher): answers

GCSE Maths - Probability - Higher - Lesson 23.5

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/independent-events-the-and-rule-and-the-or-rule/

Exercise 23F Independent events: AND and OR

Non-calculator

1 A fair coin is tossed and a fair die is rolled. Find the probability of...

(a) heads and a 3

Answer: $\frac{1}{12}$

(b) tails and an even number

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

(c) heads and a number bigger than 4

Answer: $\frac{1}{6}$

2 A fair die is rolled twice. Find the probability of a 6 both times.

Answer: $\frac{1}{36}$

3 A and B are independent events. Work out $P(A \text{ and } B)$.

(a) $P(A) = 0.3$, $P(B) = 0.5$

Answer: 0.15

(b) $P(A) = 0.6$, $P(B) = 0.2$

Answer: 0.12

(c) $P(A) = 0.9$, $P(B) = 0.9$

Answer: 0.81

(d) $P(A) = 0.04$, $P(B) = 0.5$

Answer: 0.02

4 A and B are mutually exclusive events. Work out $P(A \text{ or } B)$.

(a) $P(A) = 0.3$, $P(B) = 0.5$

Answer: 0.8

(b) $P(A) = 0.15$, $P(B) = 0.25$

Answer: 0.4

(c) $P(A) = 0.07$, $P(B) = 0.4$

Answer: 0.47

5 A fair die is rolled once. Find the probability of...

(a) a 1 or a 6

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

(b) a 2, a 3 or a 4

Answer: $\frac{1}{2}$

6 Pat takes a bus and then a train to work. The probability that the bus is late is 0.2 and the probability that the train is late is 0.1. The two are independent. Find the probability that...

(a) both are late

Answer: 0.02

(b) neither is late

Answer: 0.72

(c) at least one is late

Answer: 0.28

7 Find the probability of getting at least one...

(a) head when two fair coins are tossed

Answer: $\frac{3}{4}$

(b) head when three fair coins are tossed

Answer: $\frac{7}{8}$

(c) 6 when a fair die is rolled twice

Answer: $\frac{11}{36}$

8 A fair spinner has the numbers 1 to 5 on equal sections. It is spun and a fair coin is tossed. Find the probability of a number bigger than 3 and tails.

Answer: $\frac{1}{5}$

9 The probability that a seed germinates is 0.8. Two seeds are planted and they grow independently. Find the probability that exactly one of them germinates.

Answer: 0.32

10 Ali says: "The probability of getting a 6 on both of two rolls is $\frac{1}{6} + \frac{1}{6} = \frac{1}{3}$." Explain his mistake and give the correct answer.

Answer: $\frac{1}{36}$

11 Dan says: "P(rain on Saturday) = 0.3 and P(rain on Sunday) = 0.4, so P(rain on both days) = $0.3 + 0.4 = 0.7$." Explain why Dan cannot be correct without working out the answer.

Answer: Both days must be less likely than one day; 0.7 is bigger than 0.3

12 For each pair of events say whether they are mutually exclusive. Give a reason. A fair die is rolled once.

- (a) A: the score is even. B: the score is 6.

Answer: No

- (b) A: the score is even. B: the score is 5.

Answer: Yes

- 13** Find the probability of getting at least one 6 when a fair die is rolled 3 times. Give your answer as a fraction.

Answer: $\frac{91}{216}$

- 14** A component is made by three independent machines. Each machine is faulty with probability 0.05. Find the probability that all three machines are working. Give your answer to 3 decimal places.

Answer: 0.857

- 15** A fair die is rolled 4 times. Show that the probability of getting at least one 6 is greater than $\frac{1}{2}$.

Answer: $\frac{671}{1296}$ is greater than $\frac{1}{2}$

- 16** $P(A) = 0.5$, $P(B) = 0.4$ and $P(A \text{ and } B) = 0.2$. Show that A and B are independent.

Answer: $0.5 \times 0.4 = 0.2 = P(A \text{ and } B)$