Probability - Practice test 2

16 questions | 39 marks | 55 minutes

A fresh mix of counting, complementary events, compound draws, tables and simulation design.

Equivalent correct methods earn the corresponding marks.

1. A fair die is rolled. Find P(not a 4). [1 mark]

Five of the six outcomes are not 4.

Answer: 5/6

2. An equal three-section spinner is labelled R1, R2, B. It is spun twice independently. Find P(red both times). [2 marks]

Each spin has red probability 2/3.

$2/3 \times 2/3 = 4/9$.

Answer: 4/9

3. A random code uses A, B or C followed by 1, 2, 3 or 4, with all 12 codes equally likely. Find P(letter C and digit greater than 2). [2 marks]

C3 and C4 are two of twelve outcomes.

Answer: 1/6

4. Three fair independent coins are tossed. Find P(exactly two heads). [3 marks]

The eight outcomes are HHH,HHT,HTH,HTT,THH,THT,TTH,TTT.

HHT, HTH and THH are favourable.

Answer: 3/8

5. Two fair independent dice are rolled. Find P(an odd product). [2 marks]

Both dice must be odd.

Each die has odd probability 3/6, so $3/6 \times 3/6 = 1/4$.

Answer: 1/4

6. Two fair independent dice are rolled. Find P(sum no greater than 4). [3 marks]

Sum 2 has one ordered outcome, sum 3 has two and sum 4 has three.

$6/36 = 1/6$.

Answer: 1/6

7. A bag has 2 green and 3 yellow counters. Draw twice at random, replacing and mixing after the first draw. Find P(different colours). [3 marks]

GY: $2/5 \times 3/5 = 6/25$.

YG: $3/5 \times 2/5 = 6/25$.

Add to obtain 12/25.

Answer: 12/25

8. A bag has 2 green and 3 yellow counters. Draw twice at random without replacement. Find P(two yellows). [2 marks]

$3/5 \times 2/4 = 6/20 = 3/10$.

Answer: 3/10

9. Select two different cards at random in order from cards 1,2,3,4, with each remaining card equally likely at each draw. Find P(sum 5). [3 marks]

There are $4 \times 3 = 12$ equally likely ordered pairs.

14,41,23,32 are favourable: $4/12 = 1/3$.

Answer: 1/3

10. One student is chosen at random from the 30 students in the supplied table. [3 marks]

Thirty students' weekly activities

Bike use / dog ownership	Keeps a dog	Does not keep a dog
Rides a bike	6	9
Does not ride a bike	10	5

(a) Find P(rides a bike or keeps a dog), including students who do both. [2 marks]

There are $6 + 9 + 10 = 25$ in at least one category.

$25/30 = 5/6$.

Answer: 5/6

(b) Find P(neither rides a bike nor keeps a dog). [1 mark]

The bottom-right cell has 5; $5/30 = 1/6$.

Answer: 1/6

11. In a group of 25, 10 play chess, 11 play soccer and 4 play both. One student is chosen at random. Find P(exactly one of these activities). [2 marks]

Chess only: $10 - 4 = 6$; soccer only: $11 - 4 = 7$.

$6 + 7 = 13$ meet exactly one condition.

Answer: 13/25

12. The same event occurs 30 times in 100 trials and 42 times in another 200 trials. Find the combined relative frequency. [3 marks]

$30 + 42 = 72$ successes in $100 + 200 = 300$ trials.

$72/300 = 0.24$.

Answer: 0.24

13. Describe a fair die simulation using equally likely random digits 0-9. [3 marks]

Each die face receives one equally likely accepted digit.

Rejecting the other digits keeps the six faces equally likely.

Answer: For digits 0-5, use face = digit + 1. Reject 6-9 and draw again.

14. A without-replacement simulation selects two independent colours using fixed first-draw probabilities. Explain the problem. [2 marks]

Fixed independent probabilities model replacement.

Remove the first selected label within each trial.

Answer: The second draw should use the remaining collection, so its probabilities can change.

15. A coin gives 10 heads in 20 tosses. Does this prove the coin fair? Explain. [2 marks]

A biased coin could also produce ten heads in a short run.

Use more controlled observations and consider variation.

Answer: No. A short sample matching the fair expectation is not proof.

16. Two fair independent dice are rolled. Find P(at least one 6). [3 marks]

P(no 6) is $5/6 \times 5/6 = 25/36$.

Subtract from 1: $1 - 25/36 = 11/36$.

Answer: 11/36