Probability

Standard difficulty · 20 questions · 40 marks · Time: 36 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. How many outcomes are in the sample space when a coin is tossed 4 times?

(a) 8 **(b)** 32 **(c)** 22 **(d)** 16

2. If P(A) = 19/40, P(B) = 11/20 and P(A ∩ B) = 1/4, then P(A ∪ B) is:

(a) 31/40 **(b)** 41/40 **(c)** 51/40 **(d)** 209/800

3. If P(A) = 1/9, then P(not A) is:

(a) 1/18 **(b)** 1/8 **(c)** 4/9 **(d)** 8/9

4. A die is thrown. A: getting an odd number; B: getting a number greater than 4. Events A and B are:

(a) exhaustive but not mutually exclusive
(b) mutually exclusive and exhaustive
(c) mutually exclusive but not exhaustive
(d) neither mutually exclusive nor exhaustive

5. The set of all possible outcomes of a random experiment is called the:

(a) trial **(b)** event **(c)** sample space **(d)** probability

6. Two dice are thrown. The probability that the sum is greater than 6 is:

(a) 11/18 **(b)** 7/12 **(c)** 7/4 **(d)** 5/12

7. A card is drawn from a pack of 52. The probability that it is an ace or a black card is:

(a) 1/2 **(b)** 15/26 **(c)** 1/26 **(d)** 7/13

8. Assertion (A): If P(A) = 3/10, P(B) = 1/2 and P(A ∩ B) = 1/5, then P(A ∪ B) = 3/5.
Reason (R): P(A ∪ B) = P(A) + P(B) for any two events.

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

Section B — Short answer — 8 × 2 = 16 marks

9. A coin is tossed three times. Write the sample space. What is the probability of more tails than heads?

10. If P(A) = 3/10, P(A ∩ B) = 1/10 and P(A ∪ B) = 17/30, find P(B).

11. A die is thrown. A: an odd number; B: a factor of 6. Find $A \cup B$, $A \cap B$ and A', and their probabilities.

12. A committee of 3 is chosen at random from 7 men and 7 women. What is the probability that all of them are women?

13. 3 cards are drawn at random from a pack of 52. What is the probability that all of them are aces?

14. In a class, 57% of students passed in Mathematics, 51% in English and 21% in both. What percentage passed in at least one subject? What percentage failed in both? What is the probability that a student chosen at random passed in exactly one?

15. Two dice are thrown. Find the probability that the first die shows more than the second.

16. A coin is tossed 5 times. Find the probability of (a) at least one tail, (b) no tail.

Section C — Word problems — 4 × 4 = 16 marks

17. A team of 3 is chosen at random from 8 boys and 7 girls. Find the probability that the team has (a) exactly one girl, (b) no girls, (c) at least one girl.

18. Two dice are thrown. A: the sum is 6; B: the first die shows more than 4. Find P(A), P(B), $P(A \cap B)$ and $P(A \cup B)$. Are A and B mutually exclusive?

19. 2 cards are drawn at random from a pack of 52. Find the probability that (a) all are hearts, (b) all are number cards (2 to 10), (c) none is a jack.

20. In a survey of 75 people, 44 read newspaper H, 28 read newspaper T and 9 read both. A person is chosen at random. Find the probability that the person reads (a) at least one newspaper, (b) neither, (c) exactly one, (d) H but not T.

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Answer key

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Q	Answer	Working
1	**(d) 16**	—
2	**(a) 31/40**	P(A) + P(B) − P(A ∩ B)
3	**(d) 8/9**	1 − P(A)
4	**(d) neither mutually exclusive nor exhaustive**	A = {1, 3, 5}, B = {5, 6}
5	**(c) sample space**	—
6	**(b) 7/12**	21 favourable outcomes out of 36
7	**(d) 7/13**	(4 + 26 − 2) ÷ 52
8	**(c) A is true, but R is false.**	A is true: 3/10 + 1/2 − 1/5 = 3/5. R is false.
9	**S = {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}; 1/2**	—
10	**11/30**	P(A ∪ B) = P(A) + P(B) − P(A ∩ B)
11	**A ∪ B = {1, 2, 3, 5, 6} (5/6); A ∩ B = {1, 3} (1/3); A′ = {2, 4, 6} (1/2)**	A = {1, 3, 5}, B = {1, 2, 3, 6}
12	**5/52**	C(7, 3) ÷ C(14, 3) = 35 ÷ 364
13	**1/5525**	C(4, 3) ÷ C(52, 3) = 4 ÷ 22,100
14	**87%; 13%; 33/50**	P(M ∪ E) = P(M) + P(E) − P(M ∩ E)
15	**5/12**	15 of the 36 outcomes
16	**(a) 31/32; (b) 1/32**	P(no tail) = $(1/2)^5$; at least one = 1 − that
17	**(a) 28/65; (b) 8/65; (c) 57/65**	total C(15, 3) = 455
18	**P(A) = 5/36, P(B) = 1/3, P(A ∩ B) = 1/36, P(A ∪ B) = 4/9; not mutually exclusive**	A ∩ B = {(5, 1)}
19	**(a) 1/17; (b) 105/221; (c) 188/221**	total C(52, 2) = 1,326
20	**(a) 21/25; (b) 4/25; (c) 18/25; (d) 7/15**	n(H ∪ T) = 44 + 28 − 9 = 63

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