



Temasek Junior College (IP)

2025 Year 4 Mathematics Structured Remedial

Session 5 – Probability (IM)

- 1 Two rugby teams, A and B , play a series of three matches. The probability that team A wins any given match is $\frac{1}{2}$ while the probability that team B wins any given match is $\frac{2}{5}$. Calculate the probability that
 - (i) all three matches are drawn
 - (ii) that the teams are level after two matches.

- 2 Two men A and B throw a fair die in turn with A throwing first. The man who first throws a “five” or “six” is the winner. Calculate the probability that
 - (i) B wins at his first throw
 - (ii) A wins at his second throw
 - (iii) A wins on or before his third throw

- 3 Two bags, A and B , each contain 10 balls. Bag A contains 7 black and 3 white balls; bag B contains 5 black and 5 white balls.

A man wishes to pick 2 balls from the bag. He tosses an unbiased coin to decide which bag to select and then picks two balls at random, without replacement, from the bag. Find the probability that he selects

 - (i) two black balls,
 - (ii) two balls of different colours.

- 4 X denotes the score of a biased die. The probability that the die, when tossed, showing a particular score is tabulated below, where p is a constant.

x	1	2	3	4	5	6
$P(X = x)$	$6p$	$5p$	$4p$	$3p$	$2p$	p

- (i) Find the value of p .
- (ii) The die is thrown twice. Show the probability that the sum of the two scores being 8 is $\frac{5}{63}$.
- (iii) Two players, Armani and Bossini, take turns to throw the biased die twice. The player who first gets a total score of 8 is the winner, and the game ends. Armani starts first. Find the probability that the winner wins the game on the second turn.
- 5 Let A and B be events such that $P(A) = \frac{3}{5}$, $P(B) = \frac{1}{3}$ and $P(A' \cup B') = \frac{9}{10}$.
- (i) Determine whether A and B are independent events.
- (ii) State whether A and B are mutually exclusive events. Justify your answer.
- (iii) Find $P(A' \cap B')$.
- 6 Two fair dice are thrown. Calculate the probability that
- (i) exactly one of the dice shows an even score,
- (ii) the sum of the scores is greater than 5,
- (iii) the product of the scores is a multiple of 5.
- (iv) the product of the scores is a multiple of 3 but not 6.

- 7 Tom attends lessons at a Junior College which gives its students the option of wearing their school ties to school each day. The probability that Tom wears a tie to school is 0.7, independent of any other day.

Assuming that the college is closed on Saturdays and Sundays, find the probability, that, on a particular week

- (i) Tom wears a tie on alternate days,
 - (ii) Tom wears a tie on exactly four consecutive days,
 - (iii) Tom wears a tie at least once within the first two days of the week.
- 8 In a game played by two people A and B , the players extend their hands simultaneously to indicate one of the three objects: 'scissors', 'paper' or 'stone'. 'Scissors' beats 'paper', 'paper' beats 'stone' and 'stone' beats 'scissors'; if the objects are the same, the result is a draw.

At any one game, A indicates 'scissors', 'paper' and 'stone' with probability 0.3, 0.3 and 0.4 respectively, while the corresponding probability for B are 0.25, 0.5 and 0.25 respectively.

- (i) Show that the probability of a draw is 0.325.
 - (ii) Two games are played. Find the probability that B wins both games.
 - (iii) Two games are played. Find the probability that both players win exactly one game.
- 9 (a) A universal set ε is defined by $\varepsilon = \{x : x \text{ is a positive integer and } x \leq 10\}$.

Its subsets are $A = \{x : x \text{ is a multiple of 2 and } x < 10\}$ and
 $B = \{x : x \text{ is a multiple of 3 and } x < 10\}$.

One number is randomly chosen from ε . Show that the event of choosing a number from A is not independent of the event of choosing a number from B .

- (b) A box contains red, green, blue and white balls. There are 27 green balls and blue balls altogether. One ball is selected at random from the box. The probability of drawing a white ball is twice the probability of drawing a green ball. The probability of drawing a green ball is twice the probability of drawing a blue ball. The probability of drawing a red ball is $\frac{4}{25}$.

(i) Show that the probability of randomly drawing a green ball is $\frac{6}{25}$.

(ii) Find the total number of balls in the bag.

[2015/NJC Year 4/EOY/P2]

Answers

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|---|---------|--------------------|------|------------------|
| 1 | (i) | $\frac{1}{1000}$ | (ii) | $\frac{41}{100}$ |
| 2 | (i) | $\frac{2}{9}$ | (ii) | $\frac{4}{27}$ |
| | (iii) | $\frac{133}{243}$ | | |
| 3 | (i) | $\frac{31}{90}$ | (ii) | $\frac{23}{45}$ |
| 4 | (i) | $p = \frac{1}{21}$ | (ii) | $\frac{5}{63}$ |
| | (iii) | 0.129 (3 s.f.) | | |
| 5 | (iii) | $\frac{1}{6}$ | | |
| 6 | (i) | $\frac{1}{2}$ | (ii) | $\frac{13}{18}$ |
| | (iii) | $\frac{11}{36}$ | (iv) | $\frac{5}{36}$ |
| 7 | (i) | 0.0441 | (ii) | 0.144 (3 s.f.) |
| | (iii) | 0.91 | | |
| 8 | (i) | 0.325 | (ii) | 0.1225 |
| | (iii) | 0.2275 | | |
| 9 | (b)(ii) | 75 | | |