

4.4 Probability

Question Paper

Course	DPIB Maths
Section	4. Statistics & Probability
Topic	4.4 Probability
Difficulty	Medium

Time allowed: 60
Score: /46
Percentage: /100

Question 1

The lengths, in cm, of 120 adult platypuses are recorded in the following table:

Length, l (cm)	Frequency (female)	Frequency (male)
$39 \leq l < 42$	14	0
$42 \leq l < 45$	29	0
$45 \leq l < 48$	12	7
$48 \leq l < 51$	6	21
$51 \leq l < 54$	3	19
$54 \leq l < 57$	1	5
$57 \leq l < 60$	0	2
$60 \leq l < 63$	0	1

One platypus is chosen at random. Find the probability that the platypus is:

- (i) male
- (ii) less than 51 cm long
- (iii) a male less than 45 cm long
- (iv) a female between 45 and 54 cm long.

[4 marks]

Question 2

Two fair spinners each have three sectors numbered 1 to 3. The two spinners are spun together and then the product of the numbers indicated on each spinner is recorded.

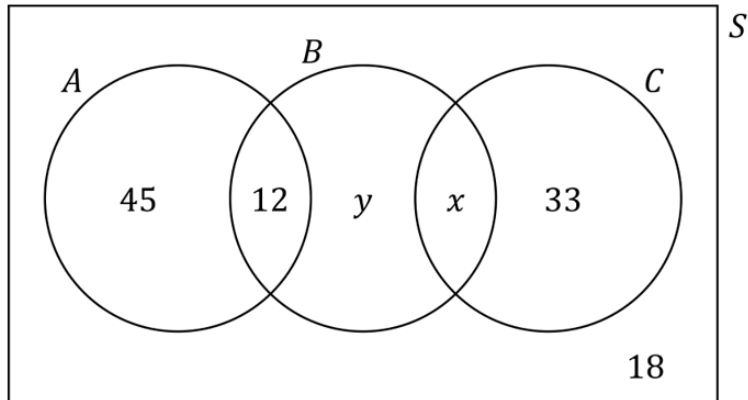
Find the probability of the product indicated by the spinners being

- (i) exactly 6
- (ii) less than 4
- (iii) an odd number.

[4 marks]

Question 3a

The Venn diagram below shows the number of members of an amateur Elizabethan dramatic society who have been involved with productions of the following three plays by Ben Jonson: *The Alchemist* (A), *Bartholomew Fayre* (B) and *Chloridia* (C).



There are 150 members of the society in total.

Given that the probability of a member having been involved with a production of *Chloridia* is $\frac{8}{25}$,

(a) determine the values of

- (i) x
- (ii) y .

[4 marks]

Question 3b

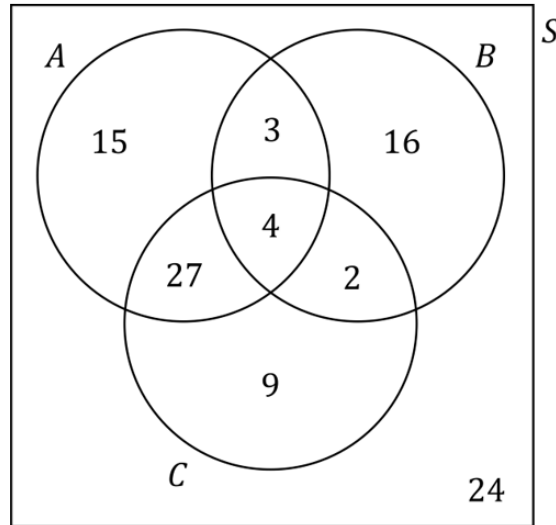
(b) Determine the probability that a member of the society

- (i) has been involved with a production of at least one of the three plays
- (ii) has been involved with a production of exactly one of the three plays.

[2 marks]

Question 4a

The following Venn diagram shows the number of adults in a poll who said they enjoy watching action films (A), Bollywood musicals (B), and crime thrillers (C). 100 adults were polled in total.



(a) One of the adults who was polled is selected at random. Given that the adult chosen enjoys watching at least one of those three genres of film, find the probability that the adult enjoys watching:

- (i) Bollywood musicals
- (ii) only one of the three genres of film
- (iii) exactly two of the three genres of film.

[3 marks]

Question 4b

(b) Find the following probabilities:

(i) $P(A \cap C)$

(ii) $P(A \cup C)$

(iii) $P(C|B)$

(iv) $P(B')$

[4 marks]

Question 5

On any given day the probability that Radigast has a lichen smoothie with his lunch is 0.4, and the probability that he has a wild mushroom wrap is 0.8. Given that the probability of him having both those items is 0.35, find the probability that Radigast has:

(i) a wild mushroom wrap but not a lichen smoothie

(ii) neither a wild mushroom wrap nor a lichen smoothie.

[4 marks]

Question 6a

- (a) A and B are two events such that $P(A) = 0.35$, $P(B) = 0.25$ and $P(A \cup B) = 0.6$. State, with a reason, whether A and B are mutually exclusive.

[2 marks]

Question 6b

- (b) C and D are two events such that $P(C) = 0.2$, $P(D) = 0.4$ and $P(C \cap D) = 0.18$. State, with a reason, whether C and D are independent.

[2 marks]

Question 7a

A bag contains 13 yellow tokens and 7 green tokens. Two tokens are drawn from the bag without replacement.

- (a) Draw a tree diagram to represent this experiment.

[3 marks]

Question 7b

(b) Find the probability that the two tokens drawn are the same colour.

[3 marks]

Question 8a

Ichabod is a keen chess player who plays one game of chess online every night before going to bed. In any one of those games, the probabilities of Ichabod winning, drawing, or losing are 0.4, 0.27 and 0.33 respectively. Following each game, the probabilities of Ichabod sleeping well after winning, drawing or losing are 0.7, 0.9 and 0.2 respectively.

(a) Draw a tree diagram to represent this information.

[3 marks]

Question 8b

(b) Find the probability that on a randomly chosen night

- (i) Ichabod loses his chess game and sleeps well
- (ii) Ichabod sleeps well.

[4 marks]

Question 8c

(c) Given that Ichabod sleeps well, find the probability that his chess game did not end in a draw.

[4 marks]