Unit 11 · Probability

WORKSHEET

Full marks 27

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 27

1 Key words [4]

Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

combinations	**complement**	**conditional**	**dependent**	**exhaustive**	**given**	**independent**
multiplication	**mutually exclusive**	**none**				

When the second egg is taken from a tray **without** putting the first back, the two draws are _____.

The chance of B when A is known to have happened is the _____ probability of B _____ A. The _____ law says $P(A \cap B) = P(A)\,P(B \mid A)$ for any two events. Two events are _____ when knowing one leaves the chance of the other unchanged. When a group of r is chosen from n all at once, the number of possible groups is the number of _____, $C(n, r)$. The chance of "at least one" is quickest found as 1 minus the chance of _____, its _____.

2 True or false [3]

Write ✓ for a true statement and ✗ for a false one. Correct the false ones.

i. $P(B \mid A)$ and $P(A \mid B)$ are always equal. ☐

ii. $P(\overline{B} \mid A) = 1 - P(B \mid A)$. ☐

iii. If $P(A \cap B) = P(A)\,P(B \mid A)$, then A and B must be independent. ☐

iv. Drawing 3 balls together gives the same probabilities as drawing them one at a time without putting back. ☐

v. Taking one ticket out of two million hardly changes the chance of the next ticket being a winner. ☐

vi. Two events that can't happen together are independent. ☐

3 Multiple choice [5]

Choose the correct option for each of the following questions.

i. $P(A) = 0.3$ and $P(B \mid A) = 0.5$. Then $P(A \cap B)$ is: [1]

a. 0.15 **b.** 0.6

c. 0.8 **d.** 0.2

ii. Two cards are drawn one after the other from a pack of 52, without putting back. The probability that both are aces is: [1]

a. $\frac{1}{169}$ **b.** $\frac{1}{221}$

c. $\frac{1}{26}$ **d.** $\frac{2}{13}$

iii. A and B are independent, $P(B) > 0$, and $P(A \mid B) = 0.4$. Then $P(A)$ is: **[1]**

a. 0.6 **b.** 0.4

c. 0.16 **d.** It can't be found without $P(B)$.

iv. Three students are chosen by lot from 5 Science students and 3 Management students. The probability that at least one Management student is chosen is: **[1]**

a. $\frac{5}{28}$ **b.** $\frac{3}{8}$

c. $\frac{23}{28}$ **d.** $\frac{15}{28}$

v. $P(A) = 0.5$, $P(B) = 0.4$ and $P(A \mid B) = 0.5$. Which is true? **[1]**

a. $P(B \mid A) = 0.5$

b. $P(B \mid A) = 0.4$, and A and B are independent

c. $P(A \cap B) = 0.25$

d. A and B are mutually exclusive

4 Short answers **[7]**

Write short answers to the following questions.

a. In a class of 40, 25 are boys and 15 play football; 12 of the football players are boys. A student is chosen at random. Find the probability that the student plays football, given that he is a boy, and that the student is a boy, given that the student plays football. **[2]**

b. A tray has 12 eggs, 3 of them cracked. Explain why the chance that the second egg taken is cracked depends on the first, when the first is not put back. **[2]**

c. A bag has 4 red and 6 white balls. Two are drawn one after the other without putting back. Find the probability that: **[3]**

a. the two balls are of different colors;

b. the second is white, given that the first was red.

5 Long answer [5]

Answer the following question. Show your working.

A school quiz team of 4 is chosen by lot from 7 boys and 5 girls.

a. Find the probability that the team has exactly 2 girls. [2]

b. Find the probability that it has at least one girl. [1]

c. Given that the team has at least one girl, find the probability that it has exactly 2 girls. [2]

Answer: _____

6 Think [3]

A raffle has 30 folded tickets in a box and one prize. The 30 people take turns to draw a ticket, without putting back. Swastika wants to draw first, "before the prize is gone"; Ujwal wants to draw last, "when the chances are better". Who is right? Find the chance of the second person winning to support your answer.

7 Activity: Knowing changes the chance (not marked)

You need: two dice of different colors. Throw them 72 times. Write down each throw where **at least one die shows a 6**, and whether its sum is 10 or more.

What you count	Number of throws
all throws	72
sum 10 or more	
at least one 6	
at least one 6 **and** sum 10 or more	

Find the fraction of all throws with sum 10 or more, and the fraction of the "at least one 6" throws with sum 10 or more. Compare them with $\frac{1}{6}$ and $\frac{5}{11}$.