Unit 16 · Probability

WORKSHEET

Full marks 35

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 35

1 Key words [3]

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

certain	dependent	equally likely	exhaustive	independent	mutually exclusive	relative frequency	sample space

The set of all the outcomes of a random experiment is its _____. The classical definition of probability needs cases that are exhaustive, mutually exclusive and _____. Events that can't happen together are _____; events that together cover every outcome are _____. Two events are _____ when one happening doesn't change the chance of the other. The empirical probability of an event is the limit of its _____ as the number of trials grows.

2 True or false [3]

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

i. $P(\overline{E}) = 1 - P(E)$ for every event E. ☐

ii. Two mutually exclusive events, each with a chance more than 0, are independent. ☐

iii. If the odds in favor of an event are $2 : 3$, its probability is $\frac{2}{5}$. ☐

iv. A seed either sprouts or doesn't, so the probability that it sprouts is $\frac{1}{2}$. ☐

v. For any two events, $P(A \cup B) = P(A) + P(B)$. ☐

vi. If A and B are independent, so are $\overline{A}$ and $\overline{B}$. ☐

3 Multiple choice [6]

Choose the correct option for each of the following questions.

i. The probability of an impossible event is: [1]

a. 0 **b.** 1

c. -1 **d.** $\frac{1}{2}$

ii. A fair die is thrown. The probability that it shows a prime number is: [1]

a. $\frac{1}{2}$ **b.** $\frac{2}{3}$

c. $\frac{1}{3}$ **d.** $\frac{5}{6}$

iii. A and B are mutually exclusive, $P(A) = 0.5$ and $P(B) = 0.3$. Then $P(A \cup B)$ is: [1]

a. 0.8 **b.** 0.65

c. 0.15 **d.** 0.2

iv. A card is drawn from a pack of 52. The probability that it is a king or a queen is: [1]

a. $\frac{2}{13}$ **b.** $\frac{1}{13}$

c. $\frac{1}{169}$ **d.** $\frac{4}{13}$

v. Two fair dice are thrown. The probability that the sum is a multiple of 4 is: [1]

a. $\frac{1}{4}$ **b.** $\frac{3}{11}$

c. $\frac{1}{3}$ **d.** $\frac{5}{36}$

vi. A and B are independent, $P(A) = 0.4$ and $P(A \cup B) = 0.7$. Then $P(B)$ is: [1]

a. 0.5 **b.** 0.3

c. 0.75 **d.** 0.28

4 Short answer [2]

Write a short answer to the following question.

Kapil tossed a coin 50 times and got 29 heads. He says: "$\frac{29}{50} = 0.58$, not 0.5, so the coin is unfair."

Is his reasoning sound? Explain.

5 Short questions [10]

Answer the following questions. Show your working.

a. A leap year is chosen at random. Find the probability that it has 53 Mondays or 53 Tuesdays. [2] [5]

b. A number is chosen at random from 1 to 30. Find the probability that it is a multiple of 3 or of 5. [3]

Answer:

b. Maize seed sprouts with probability 0.8, each seed independently. Two seeds are sown in a spot. Find the probability that: **[5]**

a. both sprout [1]
b. exactly one sprouts [2]
c. the spot stays empty [1]
d. at least one sprouts [1]

Answer: _____

6 Long question **[8]**

Answer the following question. Show your working.

Two fair dice are thrown.

a. Find the probability that the sum is 9. [2]
b. A: the sum is even. B: the first die shows an odd number. Show that A and B are independent. [3]
c. C: the sum is 10 or more. D: both dice show the same number. Find $P(C \cup D)$, and say whether C and D are independent. [3]

Answer: _____

7 Think [3]

Sadikshya says: "A family has two children. The possible cases are two boys, two girls, or one of each, so the probability of one boy and one girl is $\frac{1}{3}$." Taking each child as equally likely to be a boy or a girl, independently, is she right? Explain.

8 Activity: Bottle caps (not marked)

Toss a bottle cap 50 times and record whether it lands open side up (U) or down (D). Count after 10, 20, 30, 40 and 50 tosses.

Tosses	10	20	30	40	50
Open side up so far					
Relative frequency					

Why can't the classical definition give this probability? Put your class's tosses together: what happens to the relative frequency?