### PROBABILITY

### A OUTCOME

#### A.1 LISTING ALL POSSIBLE OUTCOMES

MCQ 1: Look at this die: If you roll it, what are all the possible outcomes?

 $\Box$  1, 2, 3, 4, 5

 $\Box$  1, 2, 3, 4, 5, 6, 7

 $\boxtimes 1, 2, 3, 4, 5, 6$ 

Answer:

- A die has six sides, numbered 1 to 6.
- So, all possible outcomes are: 1, 2, 3, 4, 5, 6.

**MCQ 2:** Imagine a bag with balls: 2 red, 1 blue, and 3 green. If you pick one ball without looking, what are all the possible colors you could get?





 $\boxtimes$  Red, Blue, Green

 $\hfill\square$ 2 Red, 1 Blue, 3 Green

 $\Box$  Red, Red, Blue, Green, Green, Green

Answer:

- The possible outcomes are the different colors: Red, Blue, Green.
- We don't list the same color more than once because we're looking for possible colors, not how many of each.



MCQ 3: Look at this spinner: the possible letters it could land on?

- $\Box$  A, B
- $\Box$  A, C
- $\boxtimes$  A, B, C

Answer:

• The spinner has three sections: A, B, and C.

• So, the possible outcomes are A, B, and C.

MCQ 4: If you pick a letter from the word "PAPA," what are all the possible letters you could pick?

 $\Box P, A, P, A$  $\Box P, A, P$ 

 $\boxtimes$  P, A

Answer:

- The distinct letters in "PAPA" are P and A.
- So, the possible outcomes are P and A.



MCQ 5: Look at this spinner: the possible numbers it could land on?

 $\Box$  3, 5, 7, 7

 $\Box$  3, 5, 5, 7

 $\boxtimes$  3, 5, 7

Answer:

- The spinner has sections with numbers 3, 5, 7, and another 5.
- But for outcomes, we list each different number once: 3, 5, 7.

**MCQ 6:** A couple is expecting a baby. They don't know if it will be a boy or a girl. What are all the possible outcomes for the baby's gender?

- □ Boy
- $\boxtimes$  Girl, Boy
- $\Box$  Girl

Answer:

• The possible outcomes are: Girl, Boy.

MCQ 7: If you pick a letter from the word "APPLE," what are all the possible letters you could pick?

 $\boxtimes P, A, L, E$  $\Box P, P, A, L, E$  $\Box A, P, L$  $\Box A, L, E, P, P$ 

Answer:

• The distinct letters in "APPLE" are P, A, L, E.

• So, the possible outcomes are P, A, L, E.

MCQ 8: If you pick a letter randomly from the word "BANANA," what are all the possible letters you could pick?

 $\boxtimes$  B, N, A

 $\Box$  B, A, N, A, N, A

 $\Box$  A, B, N, A, B, N

Answer:

- The distinct letters in "BANANA" are B, A, N.
- So, the possible outcomes can be listed as B, N, A (order doesn't matter).

### **B** EVENT

# B.1 IDENTIFYING OUTCOMES FOR DIE-ROLLING EVENTS

**MCQ 9:** If you roll a die, what are the outcomes for the event "getting a 3"?

- $\Box$  1, 3, 5
- $\Box$  2, 3, 4
- $\Box$  1, 2, 3
- $\boxtimes 3$

Answer: The outcomes for the event "getting a 3" are 3.

MCQ 10: If you roll a die, what are the outcomes for the event "getting a 5 or 6"?

- $\boxtimes$  5, 6
- $\Box$  4, 5, 6
- $\Box$  1, 2, 3
- $\Box$  3, 4, 5

Answer: The outcomes for the event "getting a 5 or 6" are 5 and 6.

**MCQ 11:** If you roll a die, what are the outcomes for the event "not getting a 6"?

 $\Box$  2, 3, 4

 $\Box$  1, 2, 3, 4, 5, 6

- $\boxtimes 1, 2, 3, 4, 5$
- $\Box$  1, 3, 5

Answer: The outcomes for the event "not getting a 6" are 1, 2, 3, 4, and 5.

**MCQ 12:** If you roll a die, what are the outcomes for the event "getting a number greater than or equal to 4"?

 $\Box$  1, 2, 3

 $\boxtimes 4, 5, 6$ 

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 $\Box 3, 4, 5$ 

 $\Box$  2, 3, 4

Answer: The outcomes for the event "getting a number greater than or equal to 4" are 4, 5, and 6.

MCQ 13: If you roll a die, what are the outcomes for the event "even number"?

 $\Box$  1, 3, 5

 $\boxtimes 2, 4, 6$ 

 $\Box$  1, 2, 3, 4, 5, 6

 $\Box$  2, 3, 4, 5

Answer: The outcomes for the event "even number" are 2, 4, and 6.

B.2 IDENTIFYING OUTCOMES IN A CASINO SPINNER

MCQ 14: If you spin the spinner below, what are the outcomes for the event "getting a 2"?



 $\boxtimes 2$ 

1,	2,	3	

- $\Box 2, 4, 6$
- $\Box 0, 1, 2$

Answer: The outcomes for the event "getting a 2" are 2.

MCQ 15: If you spin the spinner below, what are the outcomes for the event "not getting a 4"?



 $\Box 1, 2, 3, 4$  $\boxtimes 0, 1, 2, 3, 5, 6, 7, 8$  $\Box 2, 4, 6, 8$  $\Box 4, 5, 6$ 

Answer: The outcomes for the event "not getting a 4" are 0, 1, 2, 3, 5, 6, 7, and 8.

MCQ 16: If you spin the spinner below, what are the outcomes for the event "red"?





 $\Box$  1, 3, 5, 7

- $\Box 0$
- $\boxtimes 2, 4, 6, 8$
- $\Box$  1, 2, 3, 4

Answer: The outcomes for the event "red" are 2, 4, 6, and 8.

MCQ 17: If you spin the spinner below, what are the outcomes for the event "getting an odd number"?



- $\Box 0, 1, 3$
- $\Box$  2, 4, 6, 8
- $\Box$  1, 2, 3, 4
- $\boxtimes$  1, 3, 5, 7

Answer: The outcomes for the event "getting an odd number" are 1, 3, 5, and 7.

# C USING WORDS TO DESCRIBE PROBABILITY

# C.1 FINDING THE PROBABILITY IN A DRAWING EXPERIMENT

**MCQ 18:** What is the chance of picking a red candy from a bag with 4 red candies and 4 blue candies?



Choose one answer:

- $\Box$  Impossible
- $\Box$  Less Likely
- $\boxtimes$  Even Chance
- $\hfill\square$  Most Likely

### $\Box$ Certain

Answer: The correct answer is "Even Chance." Since there are the same number of red and blue candies, you have an equal chance of picking a red candy.

**MCQ 19:** What is the chance of picking a blue candy from a bag with 4 red candies and 4 blue candies?



Choose one answer:

- $\Box$  Impossible
- $\Box$  Less Likely
- $\boxtimes$  Even Chance
- $\Box$  Most Likely
- $\Box$  Certain

Answer: The correct answer is "Even Chance." Since there are the same number of red and blue candies, you have an equal chance of picking a blue candy.

MCQ 20: What is the chance of picking a blue candy from a bag with 9 red candies and 1 blue candy?



Choose one answer:

- □ Impossible
- ☑ Less Likely
- $\Box$  Even Chance
- □ Most Likely
- $\Box$  Certain

Answer: The correct answer is "Less Likely." Since there are many more red candies than blue candies, you have a small chance of picking a blue candy.

MCQ 21: What is the chance of picking a red candy from a bag with 9 red candies and 1 blue candy?







Choose one answer:

 $\Box$  Impossible

- $\Box$  Less Likely
- $\Box\,$  Even Chance
- $\boxtimes$  Most Likely
- $\Box$  Certain

Answer: The correct answer is "Most Likely." Since there are many more red candies than blue candies, you have a big chance of picking a red candy.

# C.2 FINDING THE PROBABILITY IN A DICE EXPERIMENT

**MCQ 22:** What is the chance of getting a 3 when you roll a die?



Choose one answer:

 $\Box$  Impossible

- $\boxtimes$  Less Likely
- $\Box\,$  Even Chance
- $\Box$  Most Likely
- $\Box$  Certain

Answer: The correct answer is "Less Likely." Since there are six numbers on a die, you have a small chance of rolling a 3.

**MCQ 23:** What is the chance of **not** getting a 3 when you roll a die?



Choose one answer:

- $\Box$  Impossible
- $\Box$  Less Likely
- $\Box$  Even Chance
- ⊠ Most Likely
- $\Box$  Certain

Answer: The correct answer is "Most Likely." Since there are six numbers on a die and five of them are not 3, you have a big chance of rolling a 1, 2, 4, 5, or 6.

MCQ 24: What is the chance of getting an even number (2, 4, or 6) when you roll a die?

Choose one answer:

- $\Box$  Impossible
- $\Box$  Less Likely
- $\boxtimes$  Even Chance
- $\Box$  Most Likely
- $\Box$  Certain

Answer: The correct answer is "Even Chance." Since there are six numbers on a die and three of them are even, you have an equal chance of getting an even number or an odd number.

MCQ 25: What is the chance of getting a 7 when you roll a die?



Choose one answer:

- $\boxtimes$  Impossible
- $\Box$  Less Likely
- $\Box$  Even Chance
- $\Box$  Most Likely
- $\Box$ Certain

Answer: The correct answer is "Impossible." Since there are only six numbers on a die, from 1 to 6, you can't roll a 7.

# D USING NUMBERS TO QUANTIFY PROBABILITY

#### D.1 DESCRIBING PROBABILITIES WITH WORDS

**MCQ 26:** The probability of winning a game is  $\frac{1}{10}$ . Find the word to describe this probability.

- $\Box$  Impossible
- $\boxtimes$  Less Likely
- $\Box$  Even Chance
- Most Likely
- $\Box$  Certain

Answer: The correct answer is "Less Likely." The probability of winning is  $\frac{1}{10}$ , which means you have the chance to win 1 game out of 10 games played. So, it's Less Likely.

**MCQ 27:** The probability of winning a game is  $\frac{4}{5}$ . Find the word to describe this probability.



- $\Box$  Impossible
- $\Box$  Less Likely
- $\Box\,$  Even Chance
- $\boxtimes$  Most Likely
- $\Box$  Certain

Answer: The correct answer is "Most Likely." The probability of winning is  $\frac{4}{5}$ , which means you have the chance to win 4 games out of 5 games played. So, it's Most Likely.

**MCQ 28:** The probability of winning a game is  $\frac{1}{2}$ . Find the word to describe this probability.

- $\Box$  Impossible
- $\Box$  Less Likely
- $\boxtimes$  Even Chance
- $\Box$  Most Likely
- $\Box$  Certain

Answer: The correct answer is "Even Chance." The probability of winning is  $\frac{1}{2}$ , which means you have the chance to win 1 game out of 2 games played. So, it's an Even Chance.

MCQ 29: The probability of winning a game is 0. Find the word to describe this probability.

- $\boxtimes$  Impossible
- $\Box$  Less Likely
- $\Box\,$  Even Chance
- $\square$  Most Likely
- $\Box$  Certain

Answer: The correct answer is "Impossible." The probability of winning is 0, which means you have no chance to win the game. So, it's Impossible.

MCQ 30: The probability of winning a game is 1. Find the word to describe this probability.

- $\Box$  Impossible
- $\Box$  Less Likely
- $\Box$  Even Chance
- $\square$  Most Likely
- $\boxtimes$  Certain

Answer: The correct answer is "Certain." The probability of winning is 1, which means you will definitely win the game. So, it's Certain.

#### D.2 MAKING DECISIONS USING PROBABILITIES

**MCQ 31:** Louis advises you to play because the probability of winning this game is  $\frac{3}{4}$ . Do you follow his advice?

 $\boxtimes$  Yes

 $\Box$  No

Answer: The correct answer is "Yes." The probability of winning is  $\frac{3}{4}$ , which means you have the chance to win 3 games out of 4 games played. So it is most likely. Therefore, it's a good idea to follow Louis's advice and play.

**MCQ 32:** Louis advises you to play because the probability of winning this game is  $\frac{1}{4}$ . Do you follow his advice?

 $\Box$  Yes

🛛 No

Answer: The correct answer is "No." The probability of winning is  $\frac{1}{4}$ , which means you have the chance to win 1 game out of 4 games played. So it is less likely. Therefore, it's not a good idea to follow Louis's advice and play.

**MCQ 33:** The probability of succeeding a penalty is  $\frac{1}{2}$  for Louis and  $\frac{3}{4}$  for Hugo. Which player do you choose to take the penalty?

 $\Box$  Louis

🛛 Hugo

Answer: The correct answer is "Hugo." The probability of succeeding for Louis is  $\frac{1}{2}$ , which means he has an even chance to succeed. For Hugo, it's  $\frac{3}{4}$ , which means he is most likely to succeed because he has the chance to succeed in 3 out of 4 penalties. So, Hugo is the better choice to take the penalty.

**MCQ 34:** The probability of succeeding a penalty is  $\frac{1}{4}$  for Louis and  $\frac{3}{5}$  for Hugo. Which player do you choose to take the penalty?

- $\Box$  Louis
- 🛛 Hugo

Answer: The correct answer is "Hugo." The probability of succeeding for Louis is  $\frac{1}{4}$ , which means he is less likely to succeed because he has the chance to succeed in 1 out of 4 penalties. For Hugo, it's  $\frac{3}{5}$ , which means he is most likely to succeed because he has the chance to succeed in 3 out of 5 penalties. So, Hugo is the better choice to take the penalty.

### E CALCULATING PROBABILITIES

#### **E.1 CALCULATING PROBABILITIES**

**Ex 35:** A ball is selected at random from a bag containing a total of 2 red balls and 3 blue balls.

Calculate the probability that the selected ball is a red ball.

$$P("\text{choosing a red ball"}) = \frac{2}{5}$$

Answer:



-

- The total number of possible outcomes when selecting a ball from the bag is 5, since there are 5 balls in total (2 red + 3 blue).
- The number of outcomes for the event "choosing a red ball" is 2, as there are two red balls in the bag.
- Therefore, the probability of choosing a red ball is given by:

 $P("choosing a red ball") = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$  $= \frac{2}{5}$ 

**Ex 36:** A ball is selected at random from a bag containing a total of 2 red balls and 3 blue balls.

Calculate the probability that the selected ball is a blue ball.

$$P("\text{choosing a blue ball"}) = \frac{3}{5}$$

Answer:

- The total number of possible outcomes when selecting a ball from the bag is 5, since there are 5 balls in total (2 red + 3 blue).
- The number of outcomes for the event "choosing a blue ball" is 3, as there are three blue balls in the bag.
- Therefore, the probability of choosing a blue ball is given by:

 $P("choosing a blue ball") = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$  $= \frac{3}{5}$ 

This answer was generated on 06:09 PM +11 on Friday, May 16, 2025.

**Ex 37:** A fruit is selected at random from a basket containing a total of 3 apples, 2 oranges, and 5 bananas.

Calculate the probability that the selected fruit is an apple.

$$P("selecting an apple") = \frac{3}{10}$$

Answer:

- The total number of possible outcomes when selecting a fruit from the basket is 10, since there are 10 fruits in total (3 apples + 2 oranges + 5 bananas).
- The number of outcomes for the event "selecting an apple" is 3, as there are three apples in the basket.
- Therefore, the probability of selecting an apple is given by:

$$P(\text{selecting an apple}) = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$$
$$= \frac{3}{10}$$

**Ex 38:** In our class, there are 10 students including you. What is the probability the teacher selects you when the teacher chooses a student at random?

Answer:

• The total number of possible outcomes when selecting a student from the class is 10, since there are 10 students in total, including you.

P("being selected") =

- The number of outcomes for the event "being selected" is 1, as there is only one student who is you.
- Therefore, the probability of being selected is given by:

$$P("being selected") = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$$
$$= \frac{1}{10}$$

## E.2 CALCULATING PROBABILITIES ON A CASINO SPINNER

**Ex 39:** You spin the casino spinner shown below. Calculate the probability of the event "getting a 2".



Answer:

- The total number of possible outcomes when spinning the casino spinner is 9, since there are 9 sections (0 to 8).
- The number of outcomes for the event "getting a 2" is 1, as there is one section labeled 2 on the spinner.
- Therefore, the probability of getting a 2 is given by:

$$P("getting a 2") = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$$
$$= \frac{1}{9}$$

**Ex 40:** You spin the casino spinner shown below. Calculate the probability of the event "not getting a 4".



Answer:

• The total number of possible outcomes when spinning the casino spinner is 9, since there are 9 sections (0 to 8).



- The number of outcomes for the event "not getting a 4" is 8, as there are eight sections that are not 4: 0, 1, 2, 3, 5, 6, 7, and 8.
- Therefore, the probability of not getting a 4 is given by:

$$P("not getting a 4") = \frac{number of outcomes in the event}{total number of possible outcomes}$$
$$= \frac{8}{9}$$

**Ex 41:** You spin the casino spinner shown below. Calculate the probability of the event "red".



Answer:

- The total number of possible outcomes when spinning the casino spinner is 9, since there are 9 sections (0 to 8).
- The number of outcomes for the event "red" is 4, as there are four red sections on the spinner: 2, 4, 6, and 8.
- Therefore, the probability of landing on a red section is given by:

$$P("red") = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$$
$$= \frac{4}{9}$$

**Ex 42:** You spin the casino spinner shown below. Calculate the probability of the event "getting an odd number".



Answer:

- The total number of possible outcomes when spinning the casino spinner is 9, since there are 9 sections (0 to 8).
- The number of outcomes for the event "getting an odd number" is 4, as there are four odd numbers on the spinner: 1, 3, 5, and 7.
- Therefore, the probability of getting an odd number is given by:

$$P("odd number") = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$$
$$= \frac{4}{9}$$

# F EXPRESSING PROBABILITIES IN DIFFERENT FORMS

# F.1 CALCULATING PROBABILITIES IN DECIMAL FORM

**Ex 43:** In a classroom game, Liam draws a marble from a bag containing 10 marbles: 2 green, 3 red, and 5 blue. Calculate the probability that Liam draws a green marble, and express the result in decimal form.

P("drawing a green marble") = 0.2

Answer:

- The total number of possible outcomes when drawing a marble from the bag is 10, since there are 10 marbles in total (2 green + 3 red + 5 blue).
- The number of outcomes for the event "drawing a green marble" is 2, as there are 2 green marbles in the bag.
- Calculate the probability :

$$P("green marble") = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$$
$$= \frac{2}{10}$$
$$= 2 \div 10$$
$$= 0.2$$

**Ex 44:** In a school raffle, there are a total of 50 tickets. Emma has 1 of those tickets. Calculate the probability that Emma wins the raffle, and express the result in decimal form.

$$P(\text{"drawing Emma's ticket"}) = 0.02$$

Answer:

- The total number of possible outcomes in the raffle is 50, since there are 50 tickets in total.
- The number of outcomes for the event "drawing Emma's ticket" is 1, as Emma has 1 ticket.
- Calculate the probability:

$$P("\text{Emma's ticket"}) = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$$
$$= \frac{1}{50}$$
$$= 1 \div 50$$
$$= 0.02$$

**Ex 45:** In a classroom game, Noah picks a card from a deck containing 20 cards, each labeled with a different number from 1 to 20. Calculate the probability that Noah picks the card labeled "7", and express the result in decimal form.



P("picking the card labeled 7") = 0.05

Answer:

- The total number of possible outcomes in the game is 20, since there are 20 cards in total.
- The number of outcomes for the event "picking the card labeled '7'" is 1, as there is 1 card labeled "7".
- Calculate the probability:

$$P("\text{card labeled 7"}) = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$$
$$= \frac{1}{20}$$
$$= 1 \div 20$$
$$= 0.05$$

**Ex 46:** Sofia spins a spinner divided into 5 equal sections: 3 yellow and 2 blue. Calculate the probability that the spinner lands on a yellow section, and express the result in decimal form.

$$P("yellow section") = 0.6$$

Answer:

- The total number of possible outcomes in the spinner is 5, since there are 5 sections in total.
- The number of outcomes for the event "landing on a yellow section" is 3, as there are 3 yellow sections.
- Calculate the probability:

$$P("yellow section") = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$$
$$= \frac{3}{5}$$
$$= 3 \div 5$$
$$= 0.6$$

### F.2 CALCULATING PROBABILITIES IN PERCENTAGE FORM

**Ex 47:** In a classroom game, Mia draws a marble from a bag containing marbles: 5 yellow, 10 red, and 10 blue. Calculate the probability that Mia draws a yellow marble, and express the result in percentage form.

$$P(\text{"drawing a yellow marble"}) = 20\%$$

Answer:

- The total number of possible outcomes when drawing a marble from the bag is 25, since there are 25 marbles in total (5 yellow + 10 red + 10 blue).
- The number of outcomes for the event "drawing a yellow marble" is 5, as there are 5 yellow marbles in the bag.

• Calculate the probability:

$$P("yellow marble") = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$$
$$= \frac{5}{25}$$
$$= 5 \div 25$$
$$= 0.2$$
$$= 0.2 \times 100\%$$
$$= 20\%$$

**Ex 48:** In a classroom activity, Aisha picks a candy from a jar containing 20 candies: 8 chocolate, 6 vanilla, and 6 strawberry. Calculate the probability that Aisha picks a chocolate candy, and express the result in percentage form.

P("picking a chocolate candy") = 40%

Answer:

- The total number of possible outcomes when picking a candy from the jar is 20, since there are 20 candies in total (8 chocolate + 6 vanilla + 6 strawberry).
- The number of outcomes for the event "picking a chocolate candy" is 8, as there are 8 chocolate candies in the jar.
- Calculate the probability:

$$P("chocolate candy") = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$$
$$= \frac{8}{20}$$
$$= 8 \div 20$$
$$= 0.4$$
$$= 0.4 \times 100\%$$
$$= 40\%$$

**Ex 49:** In a classroom game, Ethan spins a spinner divided into 10 equal sections, numbered 1 to 10. Calculate the probability that the spinner lands on an even number, and express the result in percentage form.

$$P("$$
landing on an even number" $) = 50\%$ 

Answer:

- The total number of possible outcomes when spinning the spinner is 10, since there are 10 sections in total (numbered 1 to 10).
- The number of outcomes for the event "landing on an even number" is 5, as there are 5 even numbers on the spinner: 2, 4, 6, 8, and 10.

• Calculate the probability:

$$P("even number") = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$$
$$= \frac{5}{10}$$
$$= 5 \div 10$$
$$= 0.5$$
$$= 0.5 \times 100\%$$
$$= 50\%$$

**Ex 50:** In a classroom game, Zara picks a fruit from a basket containing 30 fruits: 6 oranges, 12 apples, and 12 bananas. Calculate the probability that Zara picks an orange, and express the result in percentage form.

$$P("picking an orange") = 20\%$$

Answer:

- The total number of possible outcomes when picking a fruit from the basket is 30, since there are 30 fruits in total (6 oranges + 12 apples + 12 bananas).
- The number of outcomes for the event "picking an orange" is 6, as there are 6 oranges in the basket.
- Calculate the probability:

$$P("orange") = \frac{\text{number of outcomes in the event}}{\text{total number of possible outcomes}}$$
$$= \frac{6}{30}$$
$$= 6 \div 30$$
$$= 0.2$$
$$= 0.2 \times 100\%$$
$$= 20\%$$

### G EXPERIMENTAL PROBABILITY

## G.1 CALCULATING EXPERIMENTAL PROBABILITIES IN PERCENTAGE FORM

**Ex 51:** During a classroom experiment, Ethan flips a coin 50 times and records that it lands on heads 30 times. Calculate the experimental probability that the coin lands on heads, and express the result in percentage form.

$$P(\text{"landing on heads"}) \approx 60\%$$

Answer:

- The total number of trials in the experiment is 50, since Ethan flipped the coin 50 times.
- The number of successful outcomes for the event "landing on heads" is 30, as the coin landed on heads 30 times.

• Calculate the experimental probability:

$$P("landing on heads") \approx \frac{\text{number of successful outcomes}}{\text{total number of trials}} \\ \approx \frac{30}{50} \\ \approx 30 \div 50 \\ \approx 0.6 \\ \approx 0.6 \times 100\% \\ \approx 60\%$$

**Ex 52:** During a week of basketball practice, Mia made 45 out of 60 free-throw attempts. Estimate the experimental probability that Mia will make her next free-throw attempt, and express the result in percentage form.

 $P(\text{"making the next attempt"}) \approx 75\%$ 

Answer:

- The total number of trials in the experiment is 60, since Mia made 60 free-throw attempts.
- The number of successful outcomes for the event "making the next attempt" is 45, as Mia successfully made 45 free-throws.
- Calculate the experimental probability:

 $P(\text{"making the next attempt"}) \approx \frac{\text{number of successful outcom}}{\text{total number of trials}}$ 

$$= \frac{45}{60} = 45 \div 60 = 0.75 = 0.75 \times 100\% = 75\%$$

**Ex 53:** During a week, the school cafeteria recorded that out of 150 students, 120 chose a vegetarian meal. Estimate the experimental probability that the next student will choose a vegetarian meal, and express the result in percentage form.

 $P(\text{choosing a vegetarian meal}) \approx 80\%$ 

Answer:

- The total number of trials in the experiment is 150, since 150 students were recorded.
- The number of successful outcomes for the event "choosing a vegetarian meal" is 120, as 120 students chose a vegetarian meal.
- Calculate the experimental probability:

$$P("vegetarian meal") \approx \frac{\text{number of successful outcomes}}{\text{total number of trials}}$$
$$= \frac{120}{150}$$
$$= 120 \div 150$$
$$= 0.8$$
$$= 0.8 \times 100\%$$
$$= 80\%$$

**Ex 54:** Over the course of a year, it rained on 146 days out of 365 recorded days. Estimate the experimental probability that it will rain, and express the result in percentage form.

$$P("raining") \approx 40\%$$

Answer:

- The total number of trials in the experiment is 365, since 365 days were recorded.
- The number of successful outcomes for the event "raining" is 146, as it rained on 146 days.
- Calculate the experimental probability:

$$P("raining") \approx \frac{\text{number of successful outcomes}}{\text{total number of trials}}$$
$$= \frac{146}{365}$$
$$= 146 \div 365$$
$$= 0.4$$
$$= 0.4 \times 100\%$$
$$= 40\%$$

### G.2 CONDUCTING EXPERIMENTS TO ESTIMATE PROBABILITIES

**Ex 55:** In a experiment, you are asked to toss a fair coin at least 30. Follow these steps:

- 1. Note the number of times the coin lands on heads.
- 2. Note the total number of trials (tosses).
- 3. Calculate the experimental probability that the coin lands on heads, and express the result in decimal form.

Answer: To demonstrate the process, let's assume a sample result from the experiment: I conducted these experiments and noted each result using tally marks.

- 1. Number of heads = # # # # #Number of heads = 18
- 3. Calculate the experimental probability that the coin lands on heads:

 $P("\text{landing on heads"}) \approx \frac{\text{number of successful outcomes}}{\text{total number of trials}} \approx \frac{18}{40} \\ \approx 18 \div 40 \\ \approx 0.45$ 

This is a sample result; your actual probability will depend on your experiment's outcomes.

**Ex 56:** In a classroom experiment, you are asked of your friends at least 10 to choose randomly a single number from 1, 2, 3, 4, or 5. Follow these steps:

- 1. Note the number of times the answer is 5.
- 2. Note the total number of trials (friends asked).
- 3. Calculate the experimental probability that a friend chooses the number 5, and express the result in decimal form.

Answer: To demonstrate the process, let's assume a sample result from the experiment: I conducted this survey by asking 40 friends, and I noted each result using tally marks.

- 1. Number of times the answer is  $5 = \# \# \# \|$ Number of times the answer is 5 = 12
- 3. Calculate the experimental probability that a friend chooses the number 5:

$$\begin{split} P("\text{choosing the number 5"}) &\approx \frac{\text{number of successful outcomes}}{\text{total number of trials}} \\ &\approx \frac{12}{40} \\ &\approx 12 \div 40 \\ &\approx 0.3 \end{split}$$

This is a sample result; your actual probability will depend on your experiment's outcomes.