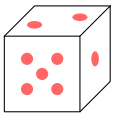
PROBABILITY

A SAMPLE SPACES

A.1 FINDING THE SAMPLE SPACES

MCQ 1: A fair six-sided die is rolled once.



Find the sample space.

☐ $\{1, 2, 3, 4, 5\}$

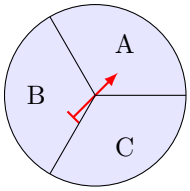
☐ $\{1, 2, 3, 4, 5, 6, 7\}$

☒ $\{1, 2, 3, 4, 5, 6\}$

Answer:

- The sample space is all possible outcomes.
- When rolling a fair six-sided die, the possible outcomes are the numbers on the die's faces.
- So, the sample space is $\{1, 2, 3, 4, 5, 6\}$.

MCQ 2: You spin the arrow on the spinner below.



Find the sample space.

☒ $\{A, B, C\}$

☐ $\{A, B\}$

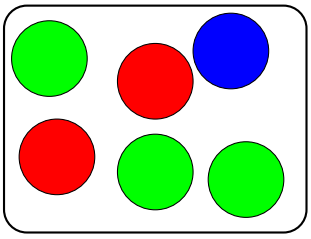
☐ $\{A, C\}$

Answer:

- The sample space is all possible outcomes of spinning the arrow.
- Here, the possible outcomes are A, B, and C.
- So, the sample space is $\{A, B, C\}$.

MCQ 3: A ball is chosen randomly from a bag containing 2 red balls, 1 blue ball, and 3 green balls.

Bag



Find the sample space.

☒ {Red, Blue, Green}

☐ {2 Red, 1 Blue, 3 Green}

☐ {Red, Red, Blue, Green, Green, Green}

Answer:

- When choosing a ball randomly from the bag containing 2 red balls, 1 blue ball, and 3 green balls, the balls are identical in color, so we do not distinguish between them based on quantity.
- So, the sample space (all possible outcomes) is: {Red, Blue, Green}

MCQ 4: A letter is chosen randomly from the word BANANA. Find all possible outcomes for the chosen letter.

☒ {B, N, A}

☐ {B, A, N, A, N, A}

☐ {A, B, N, A, B, N}

Answer:

- When choosing a letter randomly from the word "BANANA", the possible outcomes are the distinct letters in the word.
- So, the sample space (all possible outcomes) is: {B, A, N} or {B, N, A}. The order in which the letters are listed does not matter.

MCQ 5: A couple is expecting a baby. What is the sample space for this random experiment?

☒ {boy, girl}

☐ {boy}

☐ {girl}

Answer:

- The sample space is all possible outcomes for the sex of the baby.
- The possible outcomes are "boy" or "girl".
- So, the sample space is {boy, girl}.

B EVENTS

B.1 FINDING EVENTS FOR DIE-ROLLING EVENTS

MCQ 6: If you roll a die, what is the set of outcomes for the event "getting a 3"?

☐ $\{1, 3, 5\}$

☐ $\{2, 3, 4\}$

☐ $\{1, 2, 3\}$

☒ $\{3\}$

Answer: The set of outcomes for the event "getting a 3" is $\{3\}$.

MCQ 7: If you roll a die, what is the set of outcomes for the event "getting a 5 or 6"?

☒ $\{5, 6\}$

☐ $\{4, 5, 6\}$

☐ $\{1, 2, 3\}$

☐ $\{3, 4, 5\}$

Answer: The set of outcomes for the event "getting a 5 or 6" is $\{5, 6\}$.

MCQ 8: If you roll a die, what is the set of outcomes for the event "getting a number greater than or equal to 4"?

☐ $\{1, 2, 3\}$

☒ $\{4, 5, 6\}$

☐ $\{3, 4, 5\}$

☐ $\{2, 3, 4\}$

Answer: The set of outcomes for the event "getting a number greater than or equal to 4" is $\{4, 5, 6\}$.

MCQ 9: If you roll a die, what is the set of outcomes for the event "even number"?

☐ $\{1, 3, 5\}$

☒ $\{2, 4, 6\}$

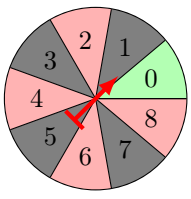
☐ $\{1, 2, 3, 4, 5, 6\}$

☐ $\{2, 3, 4, 5\}$

Answer: The set of outcomes for the event "even number" is $\{2, 4, 6\}$.

B.2 FINDING EVENTS IN A CASINO SPINNER

MCQ 10: If you spin the spinner below, what is the set of outcomes for the event "getting a 2"?



☒ $\{2\}$

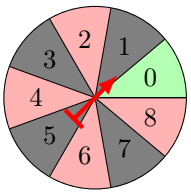
☐ $\{1, 2, 3\}$

☐ $\{2, 4, 6\}$

☐ $\{0, 1, 2\}$

Answer: The set of outcomes for the event "getting a 2" is $\{2\}$.

MCQ 11: If you spin the spinner below, what is the set of outcomes for the event "red"?



☐ $\{1, 3, 5, 7\}$

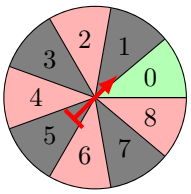
☐ $\{0\}$

☒ $\{2, 4, 6, 8\}$

☐ $\{1, 2, 3, 4\}$

Answer: The set of outcomes for the event "red" is $\{2, 4, 6, 8\}$.

MCQ 12: If you spin the spinner below, what is the set of outcomes for the event "getting an odd number"?



☐ $\{0, 1, 3\}$

☐ $\{2, 4, 6, 8\}$

☐ $\{1, 2, 3, 4\}$

☒ $\{1, 3, 5, 7\}$

Answer: The set of outcomes for the event "getting an odd number" is $\{1, 3, 5, 7\}$.

C COMPLEMENTARY EVENTS

C.1 FINDING THE COMPLEMENTARY EVENTS

MCQ 13: If you roll a die, what is the set of outcomes for the event "not getting a 6"?

☐ $\{2, 3, 4\}$

☐ $\{1, 2, 3, 4, 5, 6\}$

☒ $\{1, 2, 3, 4, 5\}$

☐ $\{1, 3, 5\}$

Answer: The set of outcomes for the event "not getting a 6" is $\{1, 2, 3, 4, 5\}$.

MCQ 14: If you roll a die, what is the set of outcomes for the event "not getting an odd number"?

☒ $\{2, 4, 6\}$

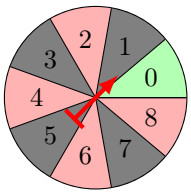
☐ $\{1, 2, 3, 4, 5, 6\}$

☐ $\{1, 2, 3\}$

☐ $\{1, 3, 5\}$

Answer: The set of outcomes for the event "not getting an odd number" is $\{2, 4, 6\}$.

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



☐ $\{1, 2, 3, 4\}$

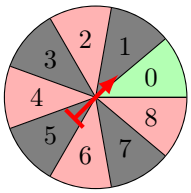
☒ $\{0, 1, 2, 3, 5, 6, 7, 8\}$

☐ $\{2, 4, 6, 8\}$

☐ $\{4, 5, 6\}$

Answer: The set of outcomes for the event "not getting a 4" is $\{0, 1, 2, 3, 5, 6, 7, 8\}$.

MCQ 16: If you spin the spinner below, what is the set of outcomes for the event "not getting red"?



☒ $\{0, 1, 3, 5, 7\}$

☐ $\{2, 4, 6, 8\}$

☐ $\{1, 2, 3, 4, 5, 6, 7, 8\}$

☐ $\{0\}$

Answer: The set of outcomes for the event "not getting red" is $\{0, 1, 3, 5, 7\}$.

D USING WORDS TO DESCRIBE PROBABILITY

D.1 FINDING THE PROBABILITY IN A DRAWING EXPERIMENT

MCQ 17: What is the chance of picking a red candy from a bag with 4 red candies and 4 blue candies?

Choose one answer:

☐ Impossible

☐ Less Likely

☒ Even Chance

☐ Most Likely

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

Choose one answer:

☐ Impossible

☐ Less Likely

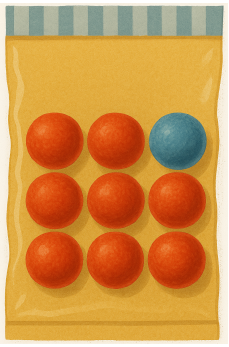
☒ Even Chance

☐ Most Likely

☐ 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 19: 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

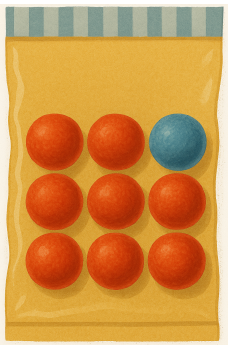
☐ Even Chance

☐ Most Likely

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



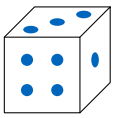
Choose one answer:

- ☐ Impossible
- ☐ Less Likely
- ☐ Even Chance
- ☒ Most Likely
- ☐ 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.

D.2 FINDING THE PROBABILITY IN A DICE EXPERIMENT

MCQ 21: What is the chance of getting a 3 when you roll a die?

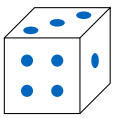


Choose one answer:

- ☐ Impossible
- ☒ Less Likely
- ☐ Even Chance
- ☐ Most Likely
- ☐ 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 22: What is the chance of **not** getting a 3 when you roll a die?

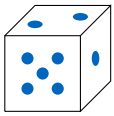


Choose one answer:

- ☐ Impossible
- ☐ Less Likely
- ☐ Even Chance
- ☒ Most Likely
- ☐ 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 23: What is the chance of getting an even number (2, 4, or 6) when you roll a die?

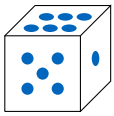


Choose one answer:

- ☐ Impossible
- ☐ Less Likely
- ☒ Even Chance
- ☐ Most Likely
- ☐ 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 24: What is the chance of getting a 7 when you roll a die?



Choose one answer:

- ☒ Impossible
- ☐ Less Likely
- ☐ Even Chance
- ☐ Most Likely
- ☐ 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.

E PROBABILITY

E.1 DESCRIBING PROBABILITIES WITH WORDS

MCQ 25: The probability of winning a game is $\frac{1}{10}$. Find the word to describe this probability.

- ☐ Impossible
- ☒ Less Likely
- ☐ Even Chance
- ☐ Most Likely
- ☐ 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 26: The probability of winning a game is $\frac{4}{5}$. Find the word to describe this probability.

☐ Impossible

☐ Less Likely

☐ Even Chance

☒ Most Likely

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

☐ Impossible

☐ Less Likely

☒ Even Chance

☐ Most Likely

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

☒ Impossible

☐ Less Likely

☐ Even Chance

☐ Most Likely

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

☐ Impossible

☐ Less Likely

☐ Even Chance

☐ Most Likely

☒ 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.

E.2 MAKING DECISIONS USING PROBABILITIES

MCQ 30: Louis advises you to play because the probability of winning this game is $\frac{3}{4}$. Do you follow his advice?

☒ Yes

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

☐ 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 32: 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?

☐ 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 33: 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?

☐ Louis

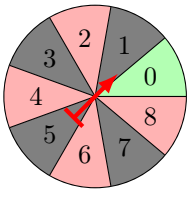
☒ Hugo

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.

F EQUALLY LIKELY

F.1 FINDING PROBABILITIES IN A CASINO SPINNER

Ex 34: You spin the casino spinner shown below. Calculate the probability of the event "getting a 2".



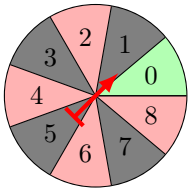
$$P(\text{"getting a 2"}) = \boxed{\frac{1}{9}}$$

Answer:

- The number of outcomes in the universe 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:

$$\begin{aligned} P(\text{"getting a 2"}) &= \frac{\text{number of outcomes in the event}}{\text{number of outcomes in the universe}} \\ &= \frac{1}{9} \end{aligned}$$

Ex 35: You spin the casino spinner shown below. Calculate the probability of the event "not getting a 4".



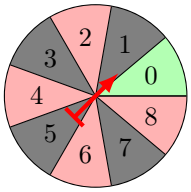
$$P(\text{"not getting a 4"}) = \boxed{\frac{8}{9}}$$

Answer:

- The number of outcomes in the universe 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:

$$\begin{aligned} P(\text{"not getting a 4"}) &= \frac{\text{number of outcomes in the event}}{\text{number of outcomes in the universe}} \\ &= \frac{8}{9} \end{aligned}$$

Ex 36: You spin the casino spinner shown below. Calculate the probability of the event "red".



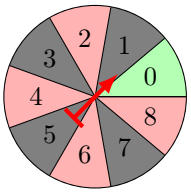
$$P(\text{"red"}) = \boxed{\frac{4}{9}}$$

Answer:

- The number of outcomes in the universe 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:

$$\begin{aligned} P(\text{"red"}) &= \frac{\text{number of outcomes in the event}}{\text{number of outcomes in the universe}} \\ &= \frac{4}{9} \end{aligned}$$

Ex 37: You spin the casino spinner shown below. Calculate the probability of the event "getting an odd number".



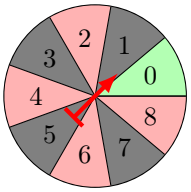
$$P(\text{"getting an odd number"}) = \boxed{\frac{4}{9}}$$

Answer:

- The number of outcomes in the universe 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:

$$\begin{aligned} P(\text{"odd number"}) &= \frac{\text{number of outcomes in the event}}{\text{number of outcomes in the universe}} \\ &= \frac{4}{9} \end{aligned}$$

Ex 38: You spin the casino spinner shown below. Calculate the probability of the event "not getting red".



$$P(\text{"not getting red"}) = \boxed{\frac{5}{9}}$$

Answer:

- The number of outcomes in the universe when spinning the casino spinner is 9, since there are 9 sections (0 to 8).
- The number of outcomes for the event "not getting red" is 5, as there are five sections that are not red: 0, 1, 3, 5, and 7.
- Therefore, the probability of not getting red is given by:

$$\begin{aligned} P(\text{"not getting red"}) &= \frac{\text{number of outcomes in the event}}{\text{number of outcomes in the universe}} \\ &= \frac{5}{9} \end{aligned}$$

F.2 FINDING PROBABILITIES IN A DICE EXPERIMENT

Ex 39: If you roll a die, what is the probability of the event "getting a 3"?

$$P(\text{"getting a 3"}) = \boxed{\frac{1}{6}}$$

Answer: There is 1 outcome (3) out of 6 possible outcomes, so the probability is $\frac{1}{6}$.

Ex 40: If you roll a die, what is the probability of the event "getting a 5 or 6"?

$$P(\text{"getting a 5 or 6"}) = \boxed{\frac{1}{3}}$$

Answer: There are 2 outcomes (5 or 6) out of 6 possible outcomes, so the probability is $\frac{2}{6} = \frac{1}{3}$.

Ex 41: If you roll a die, what is the probability of the event "getting a number greater than or equal to 4"?

$$P(\text{"number} \geq 4\text{"}) = \boxed{\frac{1}{2}}$$

Answer: There are 3 outcomes (4, 5, or 6) out of 6 possible outcomes, so the probability is $\frac{3}{6} = \frac{1}{2}$.

Ex 42: If you roll a die, what is the probability of the event "even number"?

$$P(\text{"even number"}) = \boxed{\frac{1}{2}}$$

Answer: There are 3 outcomes (2, 4, or 6) out of 6 possible outcomes, so the probability is $\frac{3}{6} = \frac{1}{2}$.

Ex 43: If you roll a die, what is the probability of the event "not getting a 6"?

$$P(\text{"not getting a 6"}) = \boxed{\frac{5}{6}}$$

Answer: There are 5 outcomes (1, 2, 3, 4, or 5) out of 6 possible outcomes, so the probability is $\frac{5}{6}$.

Ex 44: If you roll a die, what is the probability of the event "not getting an odd number"?

$$P(\text{"not getting an odd number"}) = \boxed{\frac{1}{2}}$$

Answer: There are 3 outcomes (2, 4, or 6) out of 6 possible outcomes, so the probability is $\frac{3}{6} = \frac{1}{2}$.

G COMPLEMENT RULE

G.1 APPLYING THE COMPLEMENT RULE

Ex 45: I toss a fair coin. The probability of getting heads is $\frac{1}{2}$.
Find the probability of getting tails.

$$P(\text{"Getting tails"}) = \boxed{\frac{1}{2}}$$

Answer:

- The probability of getting heads is $\frac{1}{2}$.
- The event "Getting tails" is the complement of "Getting heads."
- Using the complement rule:

$$\begin{aligned} P(\text{"Getting tails"}) &= 1 - P(\text{"Getting heads"}) \\ &= 1 - \frac{1}{2} \\ &= \frac{1}{2} \end{aligned}$$

- So, the probability of getting tails is $\frac{1}{2} = 50\%$.

Ex 46: A teacher told a joke in class: "Why was the math book sad? Because it had too many problems!" The probability that a student laughs at the joke is 70%.
Find the probability that a student does not laugh at the joke.

$$P(\text{"Not laughing"}) = \boxed{30}\%$$

Answer:

- The probability that a student laughs at the joke is 70%.
- The event "Not laughing" is the complement of "Laughing."
- Using the complement rule:

$$\begin{aligned} P(\text{"Not laughing"}) &= 1 - P(\text{"Laughing"}) \\ &= 100\% - 70\% \\ &= 30\% \end{aligned}$$

- Therefore, the probability that a student does not laugh at the joke is 30%.

Ex 47: I randomly select a student in the class. The probability that a girl is selected is $\frac{9}{10}$.
Find the probability that a boy is selected.

$$P(\text{"Selecting a boy"}) = \boxed{\frac{1}{10}}$$

Answer:

- The probability that a girl is selected is $\frac{9}{10}$.
- The event "Selecting a boy" is the complement of "Selecting a girl."
- Using the complement rule:

$$\begin{aligned} P(\text{"Selecting a boy"}) &= 1 - P(\text{"Selecting a girl"}) \\ &= 1 - \frac{9}{10} \\ &= \frac{1}{10} \end{aligned}$$

- So, the probability that a boy is selected is $\frac{1}{10} = 10\%$.

Ex 48: The weather forecast predicts that there is a 70% chance of rain tomorrow.
Find the probability that it will not rain tomorrow.

$$P(\text{"No rain"}) = \boxed{30}\%$$

Answer:

- The probability that it will rain tomorrow is 70%.
- The event "No rain" is the complement of "Rain".
- Using the complement rule:

$$\begin{aligned} P(\text{"No rain"}) &= 1 - P(\text{"Rain"}) \\ &= 100\% - 70\% \\ &= 30\% \end{aligned}$$

- Therefore, the probability that it will not rain tomorrow is 30%.

Ex 49: In a loto game, the probability of winning is $\frac{1}{100}$. Find the probability of losing.

$$P(\text{"Losing"}) = \boxed{\frac{99}{100}}$$

Answer:

- The probability of winning is $\frac{1}{100}$.
- The event "Losing" is the complement of "Winning."
- Using the complement rule:

$$\begin{aligned} P(\text{"Losing"}) &= 1 - P(\text{"Winning"}) \\ &= 1 - \frac{1}{100} \\ &= \frac{100}{100} - \frac{1}{100} \\ &= \frac{99}{100} \end{aligned}$$

- So, the probability of losing is $\frac{99}{100} = 99\%$.

H EXPERIMENTAL PROBABILITY

H.1 CALCULATING EXPERIMENTAL PROBABILITIES IN PERCENTAGE FORM

Ex 50: 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.

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

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:

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

Ex 51: 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.

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

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:

$$\begin{aligned} P(\text{"making the next attempt"}) &\approx \frac{\text{number of successful outcom}}{\text{total number of trials}} \\ &= \frac{45}{60} \\ &= 45 \div 60 \\ &= 0.75 \\ &= 0.75 \times 100\% \\ &= 75\% \end{aligned}$$

Ex 52: 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.

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

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:

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

Ex 53: 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.

$$P(\text{"raining"}) \approx \boxed{40}\%$$

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:

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

H.2 CONDUCTING EXPERIMENTS TO ESTIMATE PROBABILITIES

Ex 54: 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 = 𝍸 𝍸 𝍸 |||
   Number of heads = 18
2. Number of trials = 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸
   Number of trials = 40
3. Calculate the experimental probability that the coin lands on heads:

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

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

Ex 55: 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 = 𝍸 𝍸 ||
   Number of times the answer is 5 = 12
2. Number of trials = 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸
   Number of trials = 40
3. Calculate the experimental probability that a friend chooses the number 5:

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

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