

Probability – Basic Concepts and Simple Events

Professional lesson note for classroom use

SUBJECT
Mathematics

CLASS
ss2

FORMAT
Traditional Nigerian

DATE
2026-06-02

DURATION
40 minutes

AGE OF LEARNERS
12years

SUB-TOPIC
basic concepts and
simple events

MAIN AIM

To introduce SS2 learners to the basic concepts of probability and enable them to identify, describe, and calculate the probability of simple events using correct method and accurate working.

SUBSIDIARY AIMS

- To help learners understand key probability language such as experiment, outcome, sample space, and event.
- To guide learners to apply the basic probability formula correctly to simple events.
- To build the habit of showing full working and checking answers before writing a final response.

OBJECTIVES

- By the end of the lesson, learners will be able to define probability and explain what it measures in everyday situations.
- By the end of the lesson, learners will be able to list the sample space of a simple experiment such as tossing a coin or rolling a die.
- By the end of the lesson, learners will be able to identify a simple event from a given sample space.
- By the end of the lesson, learners will be able to apply the formula $P(E) = \frac{\text{number of favourable outcomes}}{\text{total number of outcomes}}$ to calculate the probability of a simple event.
- By the end of the lesson, learners will be able to verify that a probability value always falls between 0 and 1 inclusive.

PREVIOUS KNOWLEDGE

- Learners can write and simplify fractions from JSS work.
- Learners have encountered the idea of chance in everyday language — 'it might rain', 'I may pass', 'there is a fifty-fifty chance'.
- Learners can count and list items in a set from their work on sets in SS1.
- Learners understand basic division and can express one number as a fraction of another.

MATERIALS

- Chalkboard and chalk (white and coloured if available)
- One ordinary coin (naira coin works perfectly)

KEY VOCABULARY

Probability – a number between 0 and 1 that tells us how likely an event is to happen.

Experiment – any action or process that produces a result, such as tossing a coin or picking a card.

- One standard six-faced die (or a hand-drawn die face on the board)
- Printed or hand-drawn probability scale strip (0 to 1)
- Exercise books and pens
- New General Mathematics for SS2 (Longman) or equivalent approved textbook

Outcome – a single possible result of an experiment, for example getting a Head when a coin is tossed.

Sample Space (S) – the complete list of all possible outcomes of an experiment.

Event (E) – one or more outcomes from the sample space that we are interested in.

Favourable outcome – the specific outcome or outcomes that match the event we are looking for.

Certain event – an event that will definitely happen; its probability is 1.

Impossible event – an event that can never happen; its probability is 0.

VOCABULARY NOTES

basic concepts and simple events

Basic Concepts And Simple Events should be taught through clear method, accurate working, and repeated checking of steps.

Method

Method is the ordered way of solving or explaining the task step by step.

LESSON STRUCTURE

INTRODUCTION / MENTAL WARM-UP (5 MINUTES)

- The teacher holds up a naira coin and asks: 'If I toss this coin right now, what can happen?' Learners call out answers — Head or Tail.
- Teacher asks: 'Can I get both Head and Tail at the same time?' Learners say no. Teacher confirms: 'Exactly. There are only two possible results. In Mathematics, we call each result an outcome.'
- Teacher writes the word OUTCOME on the board and asks learners to copy it.
- Teacher then asks: 'In everyday life, when do we talk about chance or likelihood?' Learners give examples — rain, exam results, winning a game. Teacher affirms and says: 'Today we are going to put numbers to that idea of chance. That is what Probability is.'
- Teacher writes the lesson topic on the board: PROBABILITY – BASIC CONCEPTS AND SIMPLE EVENTS.

PRESENTATION OF
NEW CONTENT (15
MINUTES)

- **WHAT IS PROBABILITY?** Teacher explains: Probability is the measure of how likely an event is to occur. It is always written as a number from 0 to 1. A probability of 0 means the event is impossible. A probability of 1 means the event is certain. Everything else falls in between.
- Teacher draws a horizontal probability scale on the board labelled 0 at the left end and 1 at the right end, with $1/2$ in the middle. Teacher marks: Impossible (0), Unlikely, Even chance ($1/2$), Likely, Certain (1).
- **KEY TERMS** — Teacher writes and explains each term with a real example: (1) Experiment: Tossing a coin. (2) Outcome: Getting a Head. (3) Sample Space S: {Head, Tail}. (4) Event E: Getting a Tail. (5) Favourable outcome: Tail — because that is what we want.
- **THE PROBABILITY FORMULA** — Teacher writes clearly on the board: $P(E) = n(E) / n(S)$, where $n(E)$ = number of outcomes in the event, and $n(S)$ = total number of outcomes in the sample space.
- Teacher emphasises: 'Always write out the sample space first before you use the formula. That is the method. Do not skip that step — it is where most mistakes begin.'
- Teacher also states the two boundary rules: (i) $0 \leq P(E) \leq 1$ for any event E. (ii) The sum of probabilities of all outcomes in a sample space equals 1. Teacher writes both on the board and asks learners to copy.

WORKED EXAMPLES
ON THE BOARD (10
MINUTES)

- Teacher works through three examples step by step on the board, narrating each step aloud and asking learners to follow in their books.
- **Example 1** — Tossing a fair coin: Find the probability of getting a Head. Teacher writes: Experiment = tossing a coin. $S = \{H, T\}$, so $n(S) = 2$. Event E = getting a Head. $n(E) = 1$. $P(\text{Head}) = 1/2$. Teacher checks: Is $1/2$ between 0 and 1? Yes. Answer is correct.
- **Example 2** — Rolling a fair die: Find the probability of getting a 4. Teacher writes: $S = \{1, 2, 3, 4, 5, 6\}$, $n(S) = 6$. $E = \{4\}$, $n(E) = 1$. $P(4) = 1/6$. Teacher checks: $1/6$ is between 0 and 1. Correct.
- **Example 3** — Rolling a fair die: Find the probability of getting an even number. Teacher writes: $S = \{1, 2, 3, 4, 5, 6\}$, $n(S) = 6$. $E = \{2, 4, 6\}$, $n(E) = 3$. $P(\text{even}) = 3/6 = 1/2$. Teacher simplifies the fraction and checks the answer.
- After each example, teacher asks: 'What did I write first? The sample space. What did I write second? The event. What did I apply? The formula. What did I do last? I checked.' Teacher reinforces this four-step method every time.

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| GUIDED CLASS PRACTICE (7 MINUTES) | <ul style="list-style-type: none"> • Teacher gives two problems for learners to attempt in their exercise books while the teacher walks around the class to observe working. • Problem 1: A bag contains 3 red balls and 2 blue balls. A ball is picked at random. Find the probability that the ball is red. • Problem 2: A fair die is rolled once. Find the probability of getting a number less than 3. • Teacher selects two learners to write their working on the board. The class checks together. Teacher corrects any errors immediately, especially if a learner skips writing the sample space or forgets to simplify the fraction. • Common error to address: Some learners write $P(\text{red}) = 3$ instead of $3/5$. Teacher reminds them: 'Probability is always a fraction, decimal, or percentage — never a whole number greater than 1.' |
| EVALUATION AND WRAP-UP (3 MINUTES) | <ul style="list-style-type: none"> • Teacher asks three oral questions to the class to confirm understanding before closing. • Teacher summarises the lesson on the board using the board summary points. • Teacher assigns homework and dismisses the class. |

TEACHING EXPLANATION

- Probability measures likelihood. It does not tell us what WILL happen — it tells us what is LIKELY to happen. A probability of $1/2$ does not mean if you toss a coin twice you must get one Head. It means each toss has an equal chance.
- The sample space must be written out completely before any calculation. If you miss an outcome from the sample space, your denominator is wrong and every answer that follows is wrong.
- An event is simply the outcome or group of outcomes you are focusing on. When the question says 'find the probability of getting an even number on a die', the event is $\{2, 4, 6\}$ — not just the word 'even'.
- Probability can be expressed as a fraction, a decimal, or a percentage. In SS2, fractions are the standard form unless the question asks otherwise. Always simplify your fraction.
- The two extreme cases: if an event contains all outcomes in the sample space, $P(E) = 1$ (certain). If an event contains no outcomes, $P(E) = 0$ (impossible). These are the boundaries — no probability can go outside them.
- A common classroom error is writing the number of favourable outcomes as the answer without dividing by the total. Remind learners: the formula always divides. The answer is always a ratio.

TEXTBOOK-STYLE WORKED NOTES

Textbook Example 1 – Tossing a Coin (New General Mathematics SS2, Chapter on Probability)

A fair coin is tossed once. What is the probability of getting a Tail?

Solution:

Experiment: Tossing a fair coin.

Sample Space $S = \{\text{Head}, \text{Tail}\}$, $n(S) = 2$.

Event $E = \text{getting a Tail}$, $n(E) = 1$.

$P(\text{Tail}) = n(E)/n(S) = 1/2$.

Check: $0 \leq 1/2 \leq 1$. ✓

Textbook Example 2 – Picking from a Set of Numbers (New General Mathematics SS2, Chapter on Probability)

The numbers 1 to 10 are written on cards and one card is picked at random. Find the probability of picking a multiple of 3.

Solution:

Sample Space $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $n(S) = 10$.

Multiples of 3 between 1 and 10: $E = \{3, 6, 9\}$, $n(E) = 3$.

$P(\text{multiple of 3}) = 3/10$.

Check: $0 \leq 3/10 \leq 1$. ✓

WORKED EXAMPLES

- **WORKED EXAMPLE 1 — Tossing a Coin Question:** A fair coin is tossed. Find the probability of getting a Head. Step 1 – Write the experiment: Tossing a fair coin. Step 2 – Write the sample space: $S = \{H, T\}$, $n(S) = 2$. Step 3 – Identify the event: $E = \{H\}$, $n(E) = 1$. Step 4 – Apply the formula: $P(H) = n(E)/n(S) = 1/2$. Step 5 – Check: $1/2$ is between 0 and 1. Answer is valid. ✓
- **WORKED EXAMPLE 2 — Rolling a Die Question:** A fair die is rolled once. Find the probability of getting a 4. Step 1 – Experiment: Rolling a fair six-faced die. Step 2 – Sample Space: $S = \{1, 2, 3, 4, 5, 6\}$, $n(S) = 6$. Step 3 – Event: $E = \{4\}$, $n(E) = 1$. Step 4 – Formula: $P(4) = 1/6$. Step 5 – Check: $1/6$ is between 0 and 1. ✓
- **WORKED EXAMPLE 3 — Rolling a Die (Compound Simple Event) Question:** A fair die is rolled. Find the probability of getting an even number. Step 1 – Experiment: Rolling a fair die. Step 2 – Sample Space: $S = \{1, 2, 3, 4, 5, 6\}$, $n(S) = 6$. Step 3 – Event: Even numbers on a die = $\{2, 4, 6\}$, $n(E) = 3$. Step 4 – Formula: $P(\text{even}) = 3/6 = 1/2$. Step 5 – Simplify: $3/6 = 1/2$. Check: $0 \leq 1/2 \leq 1$. ✓
- **WORKED EXAMPLE 4 — Picking a Ball from a Bag Question:** A bag contains 3 red balls and 2 blue balls. One ball is picked at random. Find the probability of picking a blue ball. Step 1 – Experiment: Picking one ball from the bag. Step 2 – Sample Space: $S = \{R, R, R, B, B\}$, $n(S) = 5$. Step 3 – Event: $E = \text{picking a blue ball} = \{B, B\}$, $n(E) = 2$. Step 4 – Formula: $P(\text{blue}) = 2/5$. Step 5 – Check: $2/5$ is between 0 and 1. ✓

BOARD SUMMARY

- **TOPIC: PROBABILITY – BASIC CONCEPTS AND SIMPLE EVENTS**
- **DEFINITION:** Probability is the measure of how likely an event is to occur.
- **SCALE:** 0 (Impossible) ←————— $1/2$ (Even Chance) —————→ 1 (Certain)
- **KEY TERMS:**
 - Experiment – the action performed (e.g. tossing a coin)
 - Outcome – one possible result (e.g. Head)
 - Sample Space S – all possible outcomes (e.g. $\{H, T\}$)
 - Event E – the outcome(s) we want (e.g. getting a Tail)
- **THE FORMULA:** $P(E) = n(E) / n(S)$
- where $n(E)$ = number of favourable outcomes
- and $n(S)$ = total number of outcomes in the sample space
- **RULES:** (i) $0 \leq P(E) \leq 1$ (ii) Sum of all probabilities in $S = 1$
- **EXAMPLE:** Roll a die. $P(\text{even}) = 3/6 = 1/2$
- $S = \{1, 2, 3, 4, 5, 6\}$, $n(S) = 6$ | $E = \{2, 4, 6\}$, $n(E) = 3$ | $P = 3/6 = 1/2$ ✓
- **METHOD TO FOLLOW EVERY TIME:**
 - 1. Write the experiment.
 - 2. Write the full sample space and count $n(S)$.

- 3. Identify the event and count $n(E)$.
- 4. Apply $P(E) = n(E)/n(S)$. Simplify.
- 5. Check: answer must be between 0 and 1.

TEACHER PROCEDURE

1. Begin the lesson by holding up a naira coin. Ask learners what can happen if you toss it. Accept answers and introduce the word 'outcome'. Write OUTCOME on the board.
2. Ask learners to give everyday examples of chance. Affirm their responses and link them to the mathematical idea of probability. Write the lesson topic on the board.
3. Explain the meaning of probability clearly. Draw the probability scale on the board from 0 to 1 and label the key positions. Ask learners to copy it.
4. Introduce and explain each key term — experiment, outcome, sample space, event, favourable outcome — using the coin and die as physical or drawn examples. Write each term and its meaning on the board.
5. Write the probability formula on the board: $P(E) = n(E)/n(S)$. Explain what each part means. State the two boundary rules and write them below the formula.
6. Work through Worked Example 1 (coin toss) on the board step by step, narrating every step aloud. Ask learners to copy the working.
7. Work through Worked Example 2 (rolling a die, getting a 4) using the same four-row box format. Ask a learner to tell you what to write in each row.
8. Work through Worked Example 3 (rolling a die, getting an even number). Emphasise listing the event set before counting. Simplify the fraction and check.
9. Select two learners to write their solutions on the board. Guide the class to check the working together. Correct errors on the spot, especially the common mistake of writing a whole number as the answer.
10. Ask three oral evaluation questions to the class. Summarise the lesson using the board summary. Assign homework and close the lesson.

LEARNER ACTIVITIES

- Learners respond to the teacher's opening question about the coin toss and suggest everyday examples of chance.
- Learners copy the probability scale, key terms, formula, and boundary rules from the board into their exercise books.
- Learners follow the teacher's worked examples and copy each solution step by step.
- During Worked Example 2, learners respond to the teacher's prompts by calling out what should be written in each row of the board layout.
- Two learners come to the board to write their solutions for the class to check.
- Learners participate in the oral evaluation by answering the teacher's closing questions.
- Learners copy the board summary as their lesson notes for the day.

ACTIVITIES

- Opening coin-toss demonstration to activate prior knowledge of chance and introduce the word 'outcome'.
- Probability scale drawing activity — learners draw and label the scale in their books and place given events on it (e.g. 'it will snow in Lagos' near 0, 'the sun will rise tomorrow' at 1).
- Four-row box board work — teacher models the structured layout and learners replicate it for every example.
- Guided pair-check — after the two practice problems, learners swap books with a neighbour and check each other's sample space and formula application before the board correction.
- Board presentation — two learners write full solutions on the board while the class acts as checkers.

EVALUATION QUESTIONS

- A fair coin is tossed once. What is the probability of getting a Tail? Show your sample space and working.
- A fair die is rolled. What is the probability of getting the number 6?
- A fair die is rolled. List all the odd numbers on a die and find the probability of getting an odd number.
- A bag contains 4 green balls and 1 yellow ball. If one ball is picked at random, what is the probability of picking the yellow ball?
- A card is picked at random from cards numbered 1 to 5. Find the probability of picking the number 3.
- True or False: The probability of an impossible event is 1. Explain your answer.
- If $P(E) = 7/6$, is this a valid probability? Give a reason for your answer.
- A die is rolled. Find the probability of getting a number greater than 4.

ASSESSMENT

- Board presentation: two learners demonstrate full working publicly; errors are corrected immediately and the correct method is reinforced for the whole class.
- Oral evaluation: three questions at the end of the lesson check recall of the formula, ability to list a sample space, and understanding of the 0-to-1 boundary.
- Homework marking: teacher checks for correct sample space, correct identification of favourable outcomes, correct application of the formula, simplification of fractions, and the boundary check.
- Exit check: before learners close their books, teacher asks one final question — 'What is the first thing you write before using the probability formula?' The expected answer is 'the sample space'. Any learner who cannot answer is noted for follow-up.

DIFFERENTIATION / SUPPORT

- Average learners: Follow the standard lesson sequence. Encourage them to write the sample space without being prompted and to simplify all fractions independently.
- For learners who confuse $n(E)$ and $n(S)$: Draw the four-row box on a small card and ask them to fill in each row before touching the formula. The structure slows them down enough to avoid the swap error.
- For learners who write probability as a whole number: Ask them to read their answer back — 'You wrote 3. Is 3 between 0 and 1?' The self-check question usually triggers self-correction.

HOMEWORK

- 1. A fair die is rolled once. Find the probability of getting: (a) the number 2 (b) a number less than 5 (c) a number greater than 6.
- 2. A box contains 5 red pens, 3 blue pens, and 2 black pens. One pen is picked at random. Find the probability that the pen is: (a) red (b) blue (c) black.
- 3. Write down one example of a certain event and one example of an impossible event from your everyday life. State the probability of each.
- For all questions, show your sample space, identify the event, apply the formula, simplify your answer, and check that your answer is between 0 and 1.

SUMMARY

This 40-minute SS2 Mathematics lesson introduces learners to the basic concepts of probability and the calculation of simple events. Starting from the familiar idea of chance in everyday life, the lesson builds systematically through key vocabulary, the probability scale, the core formula $P(E) = n(E)/n(S)$, and four fully worked examples using a coin and a die. Learners practise the structured four-step method — writing the experiment, listing the sample space, identifying the event, and applying the formula — before attempting guided and independent problems. The lesson addresses the most common errors directly: skipping the sample space, writing a whole number as the answer, and failing to simplify fractions. Assessment is continuous through observation, board work, oral questions, and homework. The lesson is designed to be immediately usable in a Nigerian SS2 classroom with minimal resources.

SUGGESTED TEACHING VISUALS

- worked board sketch for basic concepts and simple events
- step-by-step teacher model with labelled working

TEACHER REFLECTION

- Did every learner write out the sample space before applying the formula, or were some still jumping straight to the answer?
- Were learners able to distinguish between the number of favourable outcomes and the total number of outcomes without confusing the two?
- Was the pace of the worked examples appropriate — did learners have enough time to copy and process each step before moving to the next?
- Which learners struggled most and what specific error did they make — wrong formula, incomplete sample space, or failure to simplify?
- Was the coin and die demonstration effective in making the abstract idea of probability concrete for 12-year-olds?
- Did the guided practice reveal any misconceptions that need to be addressed at the start of the next lesson before moving to the next sub-topic?