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MATEMÁTICA CONECTADA

TEACHER GUIDE

Lesson 1 - Probability Unit

FACULTAD DE CIENCIAS FÍSICAS Y MATEMÁTICAS UNIVERSIDAD DE CHILE

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Lesson Overview

Lesson goal

Recognize random situations in everyday contexts

Lesson's role within the unit

In this first lesson on the basic concepts of probability, students are introduced to the notion of randomness. The goal is to identify the characteristics that define a situation as random. This understanding is essential for future lessons, where students will learn to estimate and calculate probabilities in random situations.

Mathematical Actions

MA1. Recognize that some everyday situations can change in unpredictable ways.
MA2. Connect the idea of unpredictability with the notion of randomness.
MA3. Determine whether a given situation involves randomness.

Lesson preview

This lesson consists of two activities. In Activity 1, students go out to the schoolyard to observe and record different situations. They then reflect on the variability of these observations by considering, for example, what might happen if the same situation were observed at a different time (MA1). This activity is designed to help students recognize that **some situations can change in unpredictable ways** and to begin formalizing the notion of randomness based on everyday contexts (MA2).

In Activity 2, students are asked to determine whether certain given situations involve randomness (MA3).

Activity 1

1. In groups go out to the school yard to observe specific situations and complete the table below.

What we are going to observe?	What was observed
Yard dirt	
Number of people in the schoolyard	
Number of seats or benches in the schoolyard	
Sky cloudiness	
Feels-like temperature	

View Expected Response

What we are going to observe?	What was observed
Yard dirt	"High", "low", "medium". "A lot", "a few", "nothing".
Number of people in the schoolyard	5, 10, 30.
Number of seats or benches in the schoolyard	7, 15, 21.
Sky cloudiness	Mostly clear, Partly cloudy, Overcast.
Feels-like temperature	Hot, cold, mild.

About what was observed, let us reflect on the following questions.

A why do you think there is differences between what was observed by each group?

View Expected Response

There are differences because people may have different perceptions of the same observation. For example, one group may perceive a lower feels-like temperature than another, even in the same conditions; or one group may consider the schoolyard to be very dirty, while another sees it as only moderately dirty.

B What would happen if we were to observe this situations again in another time? Would the observations be the same un each case ?

View Expected Response

If we observe these situations again at a different times, what we observed might change in some cases. For example, the cleanliness of the schoolyard and the number of people in it vary throughout the day, especially during recess.

C what role does randomness plays on each observation?

View Expected Response

In cases a, b, e, and f, the situations described vary easily, and therefore there is uncertainty about what will be observed at a given moment. In other words, chance—or randomness—is present in these cases. In contrast, in cases c and d, chance is not involved.

Suggested Teacher Guidance – Activity 1

Objective
Recognize that, in everyday contexts, there are situations of a random nature in which chance is involved.

Work in groups

Present item 1 and organize students into groups. Instruct them to go out to the schoolyard to record their observations, encouraging discussion and decision-making within each group during the process. Once back in the classroom, guide a group reflection by posing the questions in item 2.

Whole class discussion

Facilitate a group discussion so students can share their answers to the questions in item 2. Make sure that they:

- Recognize that there may be differences between groups, as the perceptions and scales used to record observations may vary (e.g., When recording how dirty the yard was, how did you do it? Did you count the number of papers on the ground, or use categories like “a lot” or “a little”?)

- Recognize that some situations may yield different results depending on the moment of observation (e.g., Everyone recorded the same number of people in the schoolyard — but would that number be the same during recess? What about during a school event?).

- Recognize that in some situations it is not possible to predict what will be observed, since the results may differ from one moment to another — and all of them can still be valid observations

Conclusions

Summarize the key points from the discussions and connect students' responses to the upcoming formalization:

Defining key mathematical ideas

There are situations in which we can't anticipate what will be observed due to uncertainty. We say these situations are random in nature, and that chance is involved. While such situations are common in games of chance, we also encounter random situations in everyday life where it is not possible to predict the outcome.

Anticipated Responses and Suggestions

When discussing the last question, it is recommended to talk about chance in a colloquial way, building on the shared understanding students may have, without aiming for a formal definition. You might mention, for example, that chance is involved in situations where there are multiple possible outcomes and no way to know in advance which one will be observed.

To support the goals of the discussion, it is important that the observations from each group show some variability. Therefore, it is recommended to have a table prepared in advance with data from a different time, or with invented data that are clearly different — but still reasonable — to help guide the discussion **in case the groups' observations are too similar.**

Activity 2

Analyze the situations described in the following table and indicate whether each one is random in nature or not. Justify your answer in each case.

What we are going to observe?	Is it a random situation?		Why
	Yes	No	
Waiting time in the supermarket checkout line.			
Kilometers you travel to school using your usual route.			
Number of times a square's side fits into its perimeter.			
Days remaining until the next eclipse			
Number of people who share a TikTok video within an hour			
Number obtained by throwinga die			

View Expected Response

What we are going to observe?	Is it a random situation?		Why
	Yes	No	
Waiting time in the supermarket checkout line.	X		Yes, because we can't predict how long each customer will take.
Kilometers you travel to school using your usual route.		X	No, because the number of kilometers doesn't change if I always take the same route.
Number of times a square's side fits into its perimeter.		X	No, because it's a fixed value — it's always 4.
Days remaining until the next eclipse		X	No, since it is possible to calculate the exact time of the next eclipse using the current position of the moon and sun.
Number of people who share a TikTok video within an hour	X		Yes, because we can't predict how many people will share the video.
Number obtained by throwinga die	X		Yes, because we can't predict the number that will come up when we roll the die.

Suggested Teacher Guidance – Activity 2

Objective
Identify whether or not a given situation is random.

Individual work

Give students time to complete the table individually. While monitoring, encourage them to fill in the "Why?" column by reasoning about the characteristics of each situation.

Whole class discussion

Facilitate a group discussion so students can share their answers to the questions in item 2. Make sure that they:

- Justify whether each situation is random by considering if it is possible to predict or anticipate what is observed (e.g., Can we predict how long a person will wait in line at the supermarket? Can we be sure how many people will share a TikTok video?).

Conclusions

Summarize the key points of the discussion and reinforce the main ideas from the previous activity:

- To assess whether a situation is random, it is important to identify whether chance is involved. This means asking whether it is possible to anticipate what will be observed in that situation. If there is no certainty about what the observation will be, we say that the situation is random.

Anticipated Responses and Suggestions

Some students may claim that a situation is random when it is not — or that it is not random when it actually is. This confusion may stem from a lack of information or limited experience with the specific situation. For example:

- If they think the number of days until the next eclipse is random, remind them that eclipses are caused by the relative positions of the Moon and the Sun. Through mathematics, astronomy has made it possible to predict eclipse dates with incredible precision — down to the second.
- If they don't know exactly how many kilometers they travel to school, they might consider the situation random. However, if they always follow the same route, the distance doesn't vary — so it's possible to predict with certainty how many kilometers they'll travel next time.

Exit Ticket

Indicate whether the following situations are random or not.

Situation	Is a random situation? (Yes / No)
Measuring the amount of rain that falls on a winter day	
Count the number of dogs flying over a street	
Record the length of a conversation between two friends	

Check possible understandings

Assessment Indicator	Identify whether a given situation is random or not.

Situation	Correct answer	Possible understandings behind the error
1	Yes	*(Error: No)* Students may not recognize the unpredictable nature of the situation, perhaps because they believe it "always" rains in winter—without realizing that this reasoning doesn't guarantee the situation isn't variable (does it actually rain every day? And in the same amount?).
2	No	*(Error: Yes)* Students may think that it's impossible to know how many dogs fly over the streets on a given day, without realizing that this is an impossible situation — and therefore, there is certainty about what will be observed.
3	Yes	*(Error: No)* Some students may argue the situation isn't random based on personal experience —for example, saying they "always talk to their friend for the same amount of time"— without realizing this reasoning doesn't guarantee the situation isn't variable (do you really talk for exactly the same amount of time each time?).

Lesson Summary

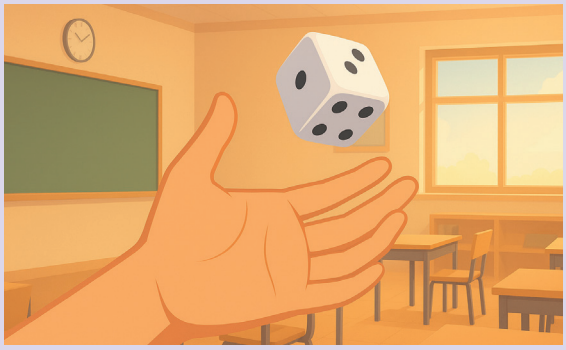
Lesson 1 - Probability Unit

In this lesson:

- We learned to recognize **random situations** in our daily environment, which can change unpredictably and whose observations cannot be predicted.

Random situación (can't predict their observations)	**Predectible situations**
• To observe yard dirt • Count the number of people in the schoolyard • Record sky cloudiness • Describe feels-like temperature	• Count the number of seats or benches in the schoolyard • To determine days remaining until the next eclipse • To determine the number of times a square's side fits into its perimeter.

- We contrast the randomness present in **everyday situations**, where chance arises naturally, with **chance experiments**, where randomness is deliberately introduced through a concrete action that makes sense within the context of a game.

Counting the number of birds on a tree branch.	**Rolling a die and looking at the number on top.**
	
Chance is present naturally, since the number of birds on the branch at any given moment cannot be controlled.	Chance is intentionally introduced through the act of rolling, since this action makes it impossible to predict the outcome in advance. This unpredictability creates the random nature of the game.

Mathematical Terms I Can Now Use

- Random situacion
- Chance
- Predictible situations
- Chance experiments