

LESSON PLAN TEMPLATE

Lesson Title	Data Visualization and Measures of Position
Learning Area/s	Mathematics
Name of Teacher/s	DEPED TAMBAYAN PH (www.depedtambayanph.net)
Grade Level and Section	Grade 10
No. of Sessions	4 Sessions
References	None specified
Declaration of AI use	This lesson plan was co-created using Gemini AI to assist with unpacking competencies into a 4-session learning design, structuring activities, and assessment formulation.

Intentions.

Meaningful learning experiences are anchored in how we frame them. Start by deciding what you want learners to master by the end of the lesson – keep it clear and simple.

Learning Competency and Curriculum Standards:

Learning Competency:

Construct and interpret box - and - whisker plots and cumulative frequency histograms and polygons. Calculate a specified measure of position, interquartile range, and outliers, from ungrouped data.

Content Standards:

The learners should have knowledge and understanding of... • the laws of sines and the laws of cosines • translations, reflections, and rotations, in the Cartesian plane • quadratic inequalities in one variable and in two variables • absolute value equations and inequalities in one variable and their graphs • box - and - whisker plots, and cumulative frequency histograms and polygons • quartiles, deciles, and percentiles; interquartile range, and outliers

Performance Standards:

By the end of the term, the learners are able to... • find sides and angles in oblique triangles using the laws of sines and the laws of cosines. • describe translations, reflections, and rotations in the Cartesian plane. • solve and graph the solutions of quadratic inequalities in one variable and in two variables. • solve absolute value equations in one variable and absolute value inequalities in one variable, and graph the solutions. • construct and interpret box - and - whisker plots, and cumulative frequency histograms and polygons. • calculate quartiles, deciles, and percentiles;

	interquartile range, and outliers.			
	Session 1	Session 2	Session 3	Session 4
Learning Objectives:	By the end of the session, learners should be able to: - Calculate specified measures of position (quartiles, deciles, and percentiles) from ungrouped data. - Determine the interquartile range (IQR) and identify potential outliers using the $1.5 \times \text{IQR}$ rule.	By the end of the session, learners should be able to: - Construct a box-and-whisker plot from a given set of ungrouped data. - Interpret the distribution of data (symmetry, skewness) based on the box-and-whisker plot.	By the end of the session, learners should be able to: - Construct a cumulative frequency histogram and a cumulative frequency polygon (Ogive). - Extract specific data points (e.g., median position) from the constructed polygon.	By the end of the session, learners should be able to: - Interpret and compare two sets of data using box-and-whisker plots and cumulative frequency polygons. - Solve real-life problems involving measures of position and data visualization.
Learner Context:	Learners in this Grade 10 section exhibit mixed readiness levels in Mathematics. While most can calculate the median, they often struggle with the abstract formulas for other measures of position. A significant number of students are visual learners who benefit from seeing data mapped out on a number line. A few learners face barriers with multi-step calculations due to foundational gaps	The class shows a strong preference for hands-on activities. They are more engaged when they are allowed to draw and manipulate visual tools. A potential barrier is the lack of precision in drawing scales on the number line, which can lead to misinterpretation of the box plot. Learners have recently responded well to peer-to-peer tutoring during graphing activities.	Learners are generally proficient in basic tallying but find the concept of "cumulative frequency" (adding up previous frequencies) confusing. They have a high interest in sports and local demographics. Some students with visual processing difficulties may find the overlapping lines of a polygon challenging to track without color-coding.	Students are now familiar with the tools and are ready for higher-order thinking. They enjoy competitive activities and real-world scenarios. A barrier remains in their ability to articulate "why" a certain measure is more appropriate than another. Most learners respond well to "What if" scenarios that connect math to their daily lives.

	in basic arithmetic, while others show high interest in data related to local community issues like mobile data usage or market prices.			
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Learning Experience.

A learning experience is like a thoughtfully designed journey. Each activity and interaction builds towards meaningful understanding and growth. Identify activities and interactions to help learners gain knowledge, skills, or understanding in a purposeful way.

Pre-Lesson:	"Find Your Place" Game: Arrange 11 students in front of the class based on their height. Ask the class to identify who is in the middle (median) and then find the middle of the two halves to introduce the concept of quartiles.	"The Five-Number Summary Recall": Flash a dataset on the screen. Students must quickly write down the Minimum, Q1, Median, Q3, and Maximum on their mini-whiteboards or notebooks.	"The Running Total": A quick mental math drill where the teacher calls out numbers, and students must shout back the cumulative sum (e.g., Teacher: "3", Students: "3"; Teacher: "5", Students: "8"; Teacher: "2", Students: "10").	"Which Team is Better?": Show two box plots representing the scores of two different basketball teams. Ask students to vote on which team is more consistent and why.
Flow:	1. Scaffolding: Review the concept of the median as the middle value. Introduce quartiles (Q1, Q2, Q3) as extensions of this concept. Provide a step-by-step guide for calculating Deciles and Percentiles. 2. Active Retrieval: Provide a small dataset of local fish prices (e.g., Tilapia prices per kilo from 9	1. Modeling: Using the five-number summary from the previous session, demonstrate on the board how to draw a number line and construct the box and the whiskers. Explicitly point out that the box represents the middle 50% of the data. 2. Scaffolding: Provide a template with a pre-drawn number line to help	1. Contextualized Instruction: Present a frequency table of the ages of people in a typical Filipino "Barangay" street. Walk through the creation of the "Less Than" Cumulative Frequency column. 2. Scaffolding: Demonstrate how the x-axis represents class boundaries and the y-axis represents cumulative	1. Active Retrieval: Briefly review how to find the 50th percentile (median) on an Ogive by drawing a horizontal line from the y-axis to the curve. 2. Collaborative Problem Solving: Provide a scenario: "A local scholarship is only given to the top 10% (90th percentile) of students based on an entrance

	vendors). Ask students to arrange them and identify the median quickly. 3. Direct Instruction with CFUs: Demonstrate the IQR calculation ($Q3 - Q1$) and the outlier formula. Use "Thumbs Up/Down" to check for understanding after each step. 4. Social Learning: In pairs, students calculate the 75th percentile and check for outliers in a dataset representing the daily allowance (baon) of 15 students.	students who struggle with spatial organization. 3. Active Learning: Students work in groups of 4 to create a large-scale box-and-whisker plot on Manila paper using data from a survey on "Minutes spent on Social Media" among their classmates. 4. Gallery Walk: Groups move around to interpret other groups' plots, identifying which dataset has the most spread or if any are skewed.	frequency. Use different colored chalk for the histogram bars versus the polygon line. 3. Check for Understanding: Ask: "Why does the line always go up?" to reinforce the concept of cumulative data. 4. Social Learning: Students work in pairs to plot the Ogive for a dataset involving the "Weight (kg) of harvested rice sacks."	exam." Provide the Ogive of exam scores. Groups must determine the cut-off score. 3. Integration & Synthesis: Compare a box-and-whisker plot and an Ogive representing the same dataset (e.g., height of Grade 10 students). Discuss which graph shows outliers better and which shows the total count better. 4. Scaffolding: Provide sentence starters for the interpretation part (e.g., "Based on the box plot, the data is skewed to the right because...").
Learning Resources:	- Scientific calculators - Chalkboard and colored chalk - Printed worksheets with local price datasets	- Manila paper and markers - Rulers - Projector for visual examples of skewed plots	- Graph paper - Colored pens/pencils - Sample frequency distribution tables	- Worksheets with comparison scenarios - Smart TV/Projector for displaying comparative graphs
Opportunities for integration:	Economics: Discussion on how outlier prices in the market affect the average consumer. Literacy: Correct use of mathematical terminology in explaining data positions.	ICT: Introduction to how spreadsheet software (Excel/Google Sheets) generates box plots. Art: Emphasis on precision, scale, and visual clarity in graphing.	Social Studies: Using population pyramids and cumulative data to understand community growth. Values Education: Discussing the importance of accurate data reporting in community service.	Health/PE: Analyzing BMI data or fitness test results using percentiles. Career Guidance: Understanding percentile ranks in National Achievement Tests (NAT) or college entrance exams.

Assessment.

Assessments reveal what learners have gained and what they still need help with. These are helpful in providing you with information to guide your future instruction throughout the entire session.

Formative Assessment:	"Quick Check" Worksheet: Students are given a list of test scores and must calculate Q1, Q3, the IQR, and determine if a score of 100 is an outlier. Teacher circulates to provide immediate feedback to struggling students.	Plot Critique: Display three different box plots on the screen. Ask students to identify which one shows a "right-skewed" distribution and justify their answer in two sentences.	Step-by-Step Construction: Students are given a frequency table. They must complete the CF column and draw the Ogive. Teacher uses a checklist to monitor: (a) Correct CF calculation, (b) Correct axis labeling, (c) Smooth line connection.	Performance Task: Students are given two datasets (e.g., Test scores of Section A vs. Section B). They must choose one visualization method (Box Plot or Ogive), construct it, and write a 3-sentence recommendation on which section needs more tutoring.
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Ways Forward.

Meaningful learning can also happen beyond the classroom – for both the learners and the teacher. Pause and reflect on what happened today.

Extended learning opportunities:	For students needing support: Provide a simplified worksheet with smaller datasets (5-7 values). For advanced learners: Ask them to research how outliers are handled in real-world census data.	Assign learners to find a box-and-whisker plot in a news article or online report (e.g., DOH COVID-19 stats or weather patterns) and bring it to class for discussion.	Provide a "How-To" video link or a printed infographic for students who need to review the construction of Ogives at home.	Advanced students can explore "Percentile Ranks" and how they differ from "Percentage Scores" in a written reflection.
Reflections:	Reflect on how many students reached the mastery level in identifying outliers. Did the height	Evaluate the accuracy of the students' box plots. Did the use of a pre-drawn number line template	Did the "Running Total" drill effectively prepare them for the CF column? Identify which students still	How well did the students transition from calculation to interpretation? Were the sentence starters helpful in

	activity effectively bridge the gap to the Quartile formula?	reduce errors in representation?	struggle with plotting coordinates on graph paper.	improving their mathematical communication?
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