Lesson Guide
In
Elementary Mathematics
Grade 5

Chapter V
Graphs
Line Graph

DEPARTMENT OF EDUCATION
BUREAU OF ELEMENTARY EDUCATION
in coordination with
ATENEO DE MANILA UNIVERSITY
2010

Reformatted for distribution via
DepEd LEARNING RESOURCE MANAGEMENT and DEVELOPMENT SYSTEM PORTAL
INSTRUCTIONAL MATERIALS COUNCIL SECRETARIAT, 2011
Lesson Guides in Elementary Mathematics
Grade 5

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Printed By:

Book Media Press, Inc. in joint venture with Printwell, Inc.
21-E. Boni Serrano Ave., Q.C., 721-2803, 726-6647
33 Dansalan St., Mandaluyong City 533-2388

ISBN – 971-92775-4-8
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The Lesson Guides in Elementary Mathematics were developed by the Department of Education through the Bureau of Elementary Education in coordination with the Ateneo de Manila University. These resource materials have been purposely prepared to help improve the mathematics instruction in the elementary grades. These provide integration of values and life skills using different teaching strategies for an interactive teaching/learning process. Multiple intelligences techniques like games, puzzles, songs, etc. are also integrated in each lesson; hence, learning Mathematics becomes fun and enjoyable. Furthermore, Higher Order Thinking Skills (HOTS) activities are incorporated in the lessons.

The skills are consistent with the Basic Education Curriculum (BEC)/Philippine Elementary Learning Competencies (PELC). These should be used by the teachers as a guide in their day-to-day teaching plans.
### V. GRAPHS

#### A. Comprehension of Graphs

1. Read/Interpret data presented in a line graph
2. Read a line graph
3. Construct a line graph
4. Organize data presented in a line graph
5. Find the average of data presented in a line graph

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</tr>
</tbody>
</table>

- **Values Integrated**: Proper nutrition, Cooperation
- **Strategies Used**: Drawing graphs, Graphs, Tables
- **Multiple Intelligences Techniques**: Graphs, Self-awareness activities, Graphs, Cooperative groups, Cooperative groups, Reading, Writing, Speaking, Games, Numbers, Graphs
- **With HOTS**: √
I. Learning Objectives

Cognitive: Read and interpret data presented on a line graph
Psychomotor: Write data presented on a line graph
Affective: Choose the right kind of food

II. Learning Content

Skill: Reading and interpreting data presented on a line graph
Reference: BEC PELC V A.1
Materials: graph, pocket charts, grid board
Value: Proper nutrition

III. Learning Experiences

A. Preparatory Activities

1. Drill: Plotting of Points on the Grid

   Strategy 1 – Game: “What Am I?”

   Mechanics:
   a. Form 2 groups. Each will be given a grid board and a piece of chalk.
   b. From the given reference point, pupils will plot the points that the teacher will
      announce.

      Example.
      From the reference point, locate point 2 at the right of the horizontal line

      Note: Use the last point as the point of reference for the succeeding points.
   c. As soon as the last point is plotted on the grid, the last pupil will then connect all the
      points on the grid.
   d. The team who can identify first the figure formed is the winner.

   Strategy 2 – Name a Point

   Mechanics:
   a. Form 2 groups. Each will be given a Show-Me-Board.
   b. The teacher plots a point on the grid board and asks how many units it is from the
      vertical axis and from the horizontal axis.

      Note: Emphasize that a point is determined by ordered pairs (x, y).

      The first number is the number in the x-axis which matches the point and the 2nd is
      the number in the y-axis which corresponds to the same point.
   c. Each group flashes their answers on the grid.
   d. The group with the most number of points wins the game.
2. Review

Here is a graph which you have learned before. Use the graph to answer the questions about it.

**Temperature Readings Taken in a Day**

Answer the questions.

- a. What was the lowest temperature of the day? the highest temperature?
- b. At what time of the day the temperature was coolest? warmest?
- c. How many degrees is the difference between the highest and lowest temperature?
- d. What do you call this kind of graph?

3. Motivation

How many times do you visit your doctor?
What are usually routine activity given or conducted to you during your visit or check up?
Why do you think your doctor check your height and weight? (especially children)
Why is it that the changes of height and weight should be monitored by your doctor?

B. Developmental Activities

1. Presentation

- a. Present the grid with numbers 1 to 10 on the x-axis and numbers 20 to 140 on the y-axis as shown:

- b. Call on pupils to plot these points on the grid:
(x, y)

1) (0, 40)  
2) (5, 110)  
3) (1, 60)  
4) (6, 120)  
5) (2, 80)  
6) (7, 130)  
7) (3, 90)  
8) (8, 140)  
9) (4, 100)  
10) (9, 150)  

c. Call on a pupil to connect all the plotted points on the grid.  
d. Label the data presented on the x and y axes and put a title.  
e. Teacher asks: What do you think will be formed?  (The output must be the graph below.)  
   Explain why such is called a line graph.  Guide the pupils to see these features: titles, the x and y-axes and what data are presented in each of the axes.

   **MARICEL’S HEIGHT**

   Let them read and interpret the line graph by answering the following questions about the graph.  
   1) What is the title of the graph?  
   2) What was Maricel’s height when she was 2 years old?  
   3) What were her fast growing years?  
   4) How many centimetres was the increase in height from age 4 to 7 years?  

f. Answer more questions about the graph.  
   1) How tall was Maricel when she was 6 years old?  
   2) How old was Maricel when she was 110 cm tall?  
   3) What was the difference between Maricel’s height when she was 3 years old and 7 years old?  
   4) What was the total increase in Maricel’s height from the time she was born until the time she was 9 years old?  
   5) What do you think made Maricel taller than other children of her age?  What kind of food does she eat?  

2. **Fixing Skills**

   The line graph below shows the height of a potted plant measured at noon every day for 10 day.  Study the graph and answer the questions which follow.
a. What would be an appropriate title for the graph?
b. What is the height of the plant measured in Day 1? Day 5?
c. On which day was the height of the plant 5 cm? 11 cm?
d. What is the increase in height of the plant between Day 2 and 3? Day 5 and 7?
e. Between which two day days did the plant grow most? What was its increase in height between these two days?

3. Generalization

Why are line graphs useful?
Line graph helps one see easily and clearly the changes in the data presented.
What are the parts of a line graph?
A line graph has a title, one kind of information on the x-axis and another kind of information on the y-axis.
How do you interpret data presented in a line graph?
In reading and interpreting the data presented in a line graph, we usually compare the data in terms of size and amount or quality presented.

C. Application

The graph shows Carlo’s weight in kilograms for six months. Study the graph and answer the following questions.
1. During what month did Carlo gain weight the most/the least?
2. What was the range of the recorded gains in weight between June and July?
3. In what month did Carlo lose weight?
4. Why do you think he lost weight?
5. How many kilograms did Carlo weigh in September?
6. What should Carlo do to maintain his normal weight level?
7. Why is it important to have normal body weight?

IV. Evaluation

A. Study this graph carefully, then answer the questions that follow.

Average Daily Sales at Mang Ben's Sari-Sari Store

![Graph]

1. On what day was the highest sale?
2. On what days were the sales the same?
3. How much was the total sales?
4. Looking at the data, what can you say about the average daily sales of Mang Ben’s Sari Sari Store?
5. If you are Mang Ben, what will you do to surplus the sales everyday?
6. On your opinion, do you think opening business on Sunday is acceptable or not? Why?

B. Use the graph to answer the following.
1. How many schools were constructed in 1996?
2. How many more schools were constructed in 1998 than in 1997?
3. How many schools were constructed from 1996 to 2000?

V. Assignment

A. Use the graph on average sales. Provide questions other than those given below.

1. How much was the sale on Sunday?
2. On what day was the least sales?

B. Have them cutout graphs from old magazines and newspapers. Ask them to prepare questions about the graphs for their classmates to answer.

Constructing a Line Graph

I. Learning Objectives

Cognitive: Construct a line graph based on organized data presented
Psychomotor: Construct a line graph based on organized data presented
Affective: Work cooperatively in-groups

II. Learning Content

Skills: Constructing a line graph based on organized data presented
Reference: BEC PELC V.A.3.1
Materials: Graphing paper, grid board, colored chalk
Value: Cooperation

III. Learning Experience

A. Preparatory Activities

1. Drill on plotting points on a grid board

| 1) (1, 2) | 4) (3, 6) |
| 2) (4, 5) | 5) (5, 7) |
| 3) (8, 12) | 6) (9, 3) |

Strategy:

a. Form groups of five. Give each a grid board, a piece of chalk and cards wherein the ordered pairs are written.
b. At the signal “Go”, pupils will plot the points on the grid board.
c. The group who finishes first and with the most number of correct items wins the game.

2. Review

Study the line graph on the next page, then answer the questions that follow.
Janno’s Score in a Computer Game

a. In what games did Janno get the highest points? How many points?
b. In what games did he get the same points. How many points?
c. How many more points did he get in sipa than in tennis?
d. Find his total points in all the games.
e. In what part of the game is Janno more capable of playing? Why?
f. What is the line graph all about?

3. Motivation

Discuss what data are suitable to present on line graph.
Point out that line graphs are best for data that show trends such as increases and decreases.

B. Developmental Activities

1. Presentation

Strategy 1: Using a Grid Board

a. Let the pupils plot the x and y axes on the grid.
b. Discuss how to select a scale or interval suitable in presenting the data given below.

Results of an Experiment

<table>
<thead>
<tr>
<th>Height of Plant</th>
<th>Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cm</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
</tr>
<tr>
<td>2 cm</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
</tr>
<tr>
<td>2.5 cm</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
</tr>
<tr>
<td>3.5 cm</td>
<td>4&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>4 cm</td>
<td>4&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>6 cm</td>
<td>6&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Note: Point out that the choice of scale can make a difference on how the graph would look like.

c. The teacher guides the pupils how the vertical and horizontal sides of the graph should be labeled. (Note: Explain that the dependent quantity occupies the y-axis)
d. Have them mark the points where the weeks and the height of plants intersect.
e. Then, have them connect with a ruler the points on the grid.
f. Emphasize neatness and orderliness in making their graphs.
g. Discuss with the pupils the constructed line graph by answering the comprehension questions.
   - What is the title of the graph?
   - In which week was the greatest increase in height?
   - What is the height of the plant after 3 weeks?
   - What data was presented on the x-axis? y-axis?

Strategy 2: Using Grid Papers (Cooperative Learning)

Class will be divided into groups.
   a. Each group will be given an organized data to work on.
   b. Pupils will mark their horizontal and vertical axes.
   c. Select a scale or interval in presenting the given data.
   d. Teacher guides pupils what data should be presented in each axes. (Note: The dependent quantity occupies the y-axis.)
   e. Let them mark the points using the tabulated data.
   f. Ask them to connect the plotted points.
   g. Each group take turns in presenting or discussing their line graph.
      After the activity the teacher may ask: How did you work with your groupmates to make the activity a success?

2. Fixing Skills

Below are the results of Third Grading Tests in a Grade V class. Present these results on the line graph.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Percentage of Mastery</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>68%</td>
</tr>
<tr>
<td>Filipino</td>
<td>94%</td>
</tr>
<tr>
<td>Makabayan</td>
<td>86%</td>
</tr>
<tr>
<td>Math</td>
<td>80%</td>
</tr>
<tr>
<td>Science</td>
<td>76%</td>
</tr>
</tbody>
</table>

In what subject do pupils need improvement? ____________________________
Why? ____________________________

3. Generalization

What steps have you learned in making or constructing a line graph?

   a. Organizing the data in a chart or table.
   b. Select a scale to fit the data.
   c. Draw and label the horizontal and vertical sides of the graph.
   d. Plot the points and connect all points using line segments.
   e. Write the title of the graph.

C. Application

A. Using your graphing papers construct a line graph. Use the data below.

<table>
<thead>
<tr>
<th>Month</th>
<th>Deposit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov</td>
<td>₱550</td>
</tr>
<tr>
<td>Dec</td>
<td>₱800</td>
</tr>
<tr>
<td>Jan</td>
<td>₱400</td>
</tr>
</tbody>
</table>
Feb 500
Mar 450
Apr 650

B. Jane would like to make a line graph about her scores in Math for the month of July as shown below. Can you help her construct the graph?

<table>
<thead>
<tr>
<th>Week</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>47</td>
</tr>
<tr>
<td>3</td>
<td>46</td>
</tr>
<tr>
<td>4</td>
<td>49</td>
</tr>
</tbody>
</table>

IV. Evaluation

A. Study these data. Organize them in table form. Decide what interval to use then make a line graph.

These are the eggs sold by Nancy in one week: May 3 – 40 dozens; May 4 – 50 dozens; May 5 – 60 dozens; May 6 – 50 dozens; May 7 – 25 dozens; May 8 – 65 dozens; May 9 – dozens.

B. Construct a line graph that will represent the number of Overseas Filipino Workers (OFW) sent to Southeast Asian from 2005 – 2009 countries.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of OFW</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>50,000</td>
</tr>
<tr>
<td>2006</td>
<td>55,000</td>
</tr>
<tr>
<td>2007</td>
<td>75,000</td>
</tr>
<tr>
<td>2008</td>
<td>98,000</td>
</tr>
<tr>
<td>2009</td>
<td>110,000</td>
</tr>
</tbody>
</table>

Make at least 3 questions about the graph.

V. Assignment

A. Construct a line graph based on the organized data below:

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>11</td>
<td>36</td>
</tr>
<tr>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>14</td>
<td>3</td>
</tr>
</tbody>
</table>
B. Study these data: Organize them in table form. Decide what interval to use then make a line graph.

The librarian made this report on the number of pupils by grade level who used the library for a period of one month. Grade 1 – 50; Grade 2 – 80; Grade 3 – 75; Grade 4 – 110; Grade 5 – 125 and Grade 6 – 150. What does this report means?

C. Do the following activities.

1. Measure your room temperature by the hour for 5 hours then present this data on a line graph.
2. Chart your own scores in your 5 Math quizzes. Present this data on a line graph.

Finding the Average of Data Presented in a Line Graph

I. Learning Objectives

Cognitive: Find the average of data presented in a line graph
Psychomotor: Compute the average of the data presented in a line graph
Affective: Cooperate with the other members of the group

II. Learning Content

Skills: Finding the average of data presented in a line graph
Reference: BEC PELC V.A.3.3.2
Materials: Graphs, activity cards
Value: Cooperation

III. Learning Experience

A. Preparatory Activities

1. Mental Computation

Drill on finding the average of sets of numbers
Strategy: Game

Materials: numbers in cards, which are manageable by the pupils
Mechanics:
a. Form groups of five. Each will be given a show-me-board.
b. As the teacher flashes the numbers written in cards, the pupils will write their average and flash them on their show-me-board.
c. The group who gives the correct answer first gets a point.
d. The group with the most number of points is declared the winner.
2. **Review on interpreting data presented in a line graph**

Interpret the graph below by answering the questions that follow.

**Room Temperature in 5 Days**

![Graph of Room Temperature in 5 Days]

- a. What is the title of the graph?
- b. What data is presented on the vertical axis? horizontal axis?
- c. Which day has the hottest temperature? the coldest?
- d. Was there a drop of temperature from the first day to the third day? By how much?

3. **Motivation**

What is the usual temperature in our country during:

- a. Summer days
- b. Christmas season

B. **Developmental Activities**

1. **Presentation**

**Strategy 1: Group Activity**

( Divide the class into groups.)

The teacher gives each group activity cards wherein graphs are reflected and let them interpret the graph and answer questions such as:

a) What data is presented on the x and y-axis?

b) Which is the dependent quantity? On what axis will you find it?

c) How will you find the average of this given quantities in the line graph?

d) Each group will present their solution on a manila paper followed by a short discussion or explanation of their findings.

Teacher Asks: What did each member in the group do in order to come up with a successful activity?

**Strategy 2**

(For Average and Slow pupils)

Using a Problem Opener
The principal plotted on a graph the enrolment in each grade during the SY 2002-2003. Using the graph, she wanted to know the average enrolment of the school, can you help her?

**Enrolment in a School for the SY 2002-2003**

![Graph showing enrolment in each grade](image)

a. Interpret the graph by answering the following questions:
   1) What is the title of the graph?
   2) What kind of graph is shown?
   3) What data is presented in the x and y-axes?
   4) What grade has the smallest enrolment?
   5) Which is the dependent quantity? On which axis can you find it?
   6) What grades are reflected on the graph? How many grades are there?
   7) What is the total number of pupils who joined the field trip?
   8) What is the average number of participants?

b. Lead the pupils to the idea that the total enrolment must be divided by the number of grades in order to find a number which will represent the enrolment for each grade, or in short the average enrolment.

c. Provide other graphs and let pupils find the average of the data presented in them.
2. **Fixing Skills**

   Study the line graph below.

   ![TEMPERATURE READINGS IN MANDALUYONG CITY](image)

   What is the average temperature in Mandaluyong City during 6:00 am to 3 pm. Of the day?

3. **Generalization**

   How do you find the average of data presented in a line graph?
   - Find the sum of the dependent data (data on the y-axis)
   - Divide the sum by the number of points plotted on the graph or the number of data on the x-axis.
C. Application

1. Using the given graph, find Jun’s average harvest.

![Jun's Harvest Graph]

2. The graph below shows the number of foreign visitors who arrived in the Philippines from 1994 to 1998. Can you find the average visitors in the country from 1994-1998?

![Number of Foreign Visitors Graph]
IV. Evaluation

A. Given this graph, find the average number of pupils using the computer room from Monday to Friday.

Pupils Using the Computer Room

B. Find the average sales of the Barangay Cooperative Stores for the week given the graph below.

Barangay Coop. Store Sales Record for the Week
C. Using the line graph below, find the average yearly newspaper sales of Mr. Santos.

![Newspaper Sales Graph]

V. Assignment

A. Make a line graph showing the following data and find the average number of typhoons from 1996 – 2001.


1996 – 18  
1997 – 21  
1998 – 26  
1999 – 21  
2000 – 14  
2001 – 12
LESSON GUIDES IN ELEMENTARY MATHEMATICS

Grade V

Lessons Covered:

I. Whole Numbers
   Review on:
   A. Place Value
   B. Properties
   C. Operations of Numbers
   D. Problem Solving

II. Rational Numbers
   A. Comprehension of Fractions
   B. Addition of Fractions
   C. Subtraction of Fractions
   D. Multiplication of Fractions
   E. Ratio and Proportion
   F. Comprehension of Decimals
   G. Addition and Subtraction of Decimals
   H. Multiplication of Decimals
   I. Division of Decimals
   J. Percent

III. Geometry
   A. Polygons

IV. Measurement
   A. Area
   B. Circle
   C. Volume
   D. Temperature Measure

V. Graphs
   Line Graph

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