

## Statistics: Making Sense of Numbers

### Unit Summary

Statistics is used in our daily life. We use statistical data to back our everyday decisions such as buying household goods, which are reliable to stock up on popular food during festivities. Many are fearful of statistics due to the complicated formulae. This unit is to help students grasp the fundamental concepts of statistics and understand what statistics mean to them in their daily lives. Students explore the question: *How do numbers influence our lives?*

Students investigate how statistical analysis is used for various industries. They choose an activity or a business in and around the school and find out how they can apply statistics to help improve their businesses. They also learn how to calculate mode, median and mean using spreadsheet application. Students present their findings to the class or business manager using a multimedia presentation.

### Curriculum-Framing Questions

- **Essential Question**  
How do numbers influence our lives?
- **Unit Questions**  
Is statistics important to us?  
How can we apply statistics in our daily lives?  
How are mode, median, and mean values derived from the data useful to us?
- **Content Questions**  
What is mode, median, and mean?  
How do you calculate mode, median, and mean?  
When do you use mode, median, and mean effectively?

### Assessment Processes

View how a variety of student-centred [assessments](#) are used in the Statistics: Making Sense of Numbers Unit Plan. These assessments help students and teachers to set goals; monitor students' progress; provide feedback; assess thinking, processes, performances, and products and reflect on learning throughout the learning cycle.

### Instructional Procedures

#### Week 1

#### Getting Started

Introduce the unit by posing a few questions related to numbers and statistical data from the [gauge students' needs presentation](#) (PPT 995KB). The discussion is used to gauge the prior knowledge of the students and their readiness to the topic.

The discussion also leads the students to the Essential Question: *How do numbers influence our lives?* Have students brainstorm the ideas and generate a list on chart paper or white board. Then, hold a whole-class discussion around the question asking students to give examples of numbers used in their lives. Keep this list visible throughout the unit.

#### At a Glance

**Year/Form:** Form 3  
**Subject(s):** Mathematics  
**Topics:** Statistics  
**Key Learnings:**  
Mode, Median, and Mean  
**Time Needed:**  
2 weeks, 4 hours per week

#### Things You Need

[Assessment Curriculum Specifications Resources](#)

## Exploring Statistics

Using [statistics introduction presentation](#) (PPT 516KB), explain to students that they will be learning about mode, median and mean. Show the statement, "Statistics is a science of collecting, organising, and analysing data". Find out from students what do they think of the statement and have them explain it in their own words.

Present the Unit Question: *Is statistics important to us?* Allow time for students to write and discuss the prompts in the presentation. Ask students if they are able to relate how statistics is used in their lives. Discuss some relevant statistical examples used in their daily lives. Some of the examples are mobile phone usage for teenagers, average number of SMS sent by Malaysians and the music top chart lists.

Discuss what is mode, median and mean. Have students brainstorm ideas why mode, median and mean is used in statistics. Show students how to obtain and analyse values of mode, median and mean from a frequency table. Ask students whether all data can be used to extract mode, median and mean. Have students name a few examples that use mode, median and mean. Ask students whether they were aware of the use of mode, median and mean in statistical data. Ask for volunteers to share responses with the whole class.

Students are encouraged to research on the topic using some of the suggested sites such as [robertniles\\*](#) and [purplemath\\*](#). Use [statistics worksheet](#) (DOC 44KB) to re-examine students' understanding on statistics as they read more about the statistical methods.

## Statistics in Our Daily Lives

Engage students to brainstorm their answers to the Unit Question: *How can we apply statistics in our daily lives?* Elicit students' responses whether statistical data has any meaning to them. Get the students to explore why some statistical data are more relevant than others.

In groups, have students investigate how statistical analysis is applied for various industries. Encourage students to select any one of the common industries, which may include the food, transportation, household goods, stationery, books, shoes and apparel. Other more specific industry could be environment, retail, engineering, construction, medical and entertainment. Using the school cooperative student assistant as an example, group members are asked to discuss whether the statistical data is useful and has meaning for the cooperative to help improve the business.

## Becoming an Expert

Show a pictogram with the choice of flowers of a group of girls as below.

Rose	🌹🌹🌹🌹🌹🌹🌹🌹
Orchid	🌸🌸🌸🌸🌸
Carnation	🌺🌺
Tulip	🌷🌷🌷🌷
🌹 represents 10 girls	

Have students calculate the mean, median and mode of the girls' favourite flower. Tell students that they need to help a florist make orders according to their calculations of the girls' favourite flower. Have students justify their decisions.

Introduce the project, *Statistics: Making Sense of Numbers* by telling students that they are going to choose an activity or a business (such as canteen, school co-op and bookshop) in their school where they can apply the statistical analysis to the school environment.

Use [project rubric](#) (DOC 57.5KB) as a guide to explain the different aspects of the project and to determine how their work measures up to expectations. Hand out [project plan](#) (DOC 70KB) to help students take ownership of their learning. The project plan guides students to identify goal, design strategy, make decision and track progress in the project.

## Gathering Data

Tell students that in order to have reliable statistical analysis, they will need to understand and remember the term, "GIGO – Garbage In, Garbage Out", where meaningless data creates meaningless statistical values. Demonstrate how statistical data relies on representative samples.

Guide students on how they can use the Internet to research the type of activity or business they would like to apply their statistical knowledge. In order to help the students optimize their research, have student focus on the following questions:

- *Is statistics important to us?*
- *How can we apply statistics in our daily lives?*
- *How are mode, median and mean values derived from the data useful to us?*
- *What type of statistical analysis can be done with the data?*
- *How can analysed statistical data be used to improve performance?*

Provide time for students to research and have them record their information using electronic template or worksheet. The worksheet helps student organise their findings for upcoming presentation.

## **Week 2**

### **Applying Statistics to Solve Problems**

After students have researched and gathered data for their selected activity or business, have them begin thinking and discussing how statistical analysis can be done with the data. Guide and assist students to identify the steps of data analysis. Distribute [spreadsheet guide](#) (DOC 321KB) to help students calculate mode, median and mean using spreadsheet application.

Ask students to prepare a [multimedia presentation](#) (PPT 1.11MB) that address:

- Overview of their study on the selected activity or business
- Graphical representation of the data
- Statistical analysis
- Recommendations to improve the activity or business

Make sure students refer to the [project rubric](#) (DOC 57.5KB) and use [presentation checklist](#) (DOC 36KB) to plan their presentations. Conduct meeting with groups to discuss the presentations. Have students create their presentations once their storyboards have been approved.

When completed, allot time for students to present their projects. Have students observe other groups' presentation using [peer presentation feedback form](#) (DOC 40.5KB). Facilitate a brief discussion after each presentation.

### **Discovering Your Journey**

As a final reflection activity, ask students use [blog\\*](#) to consider the Essential Question again: *How do numbers influence our lives?* They will compare how their thinking has changed since the beginning of the unit. Encourage students to examine their self-growth and discovery that resulted from their journey.

### **Prerequisite Skills**

- Exposure to statistics
- Basic computer knowledge
- Internet research skills

### **Differentiated Instruction**

#### **Resource Student**

- Provide extra time for research
- Consult with student frequently to check understanding and progress

#### **Gifted Student**

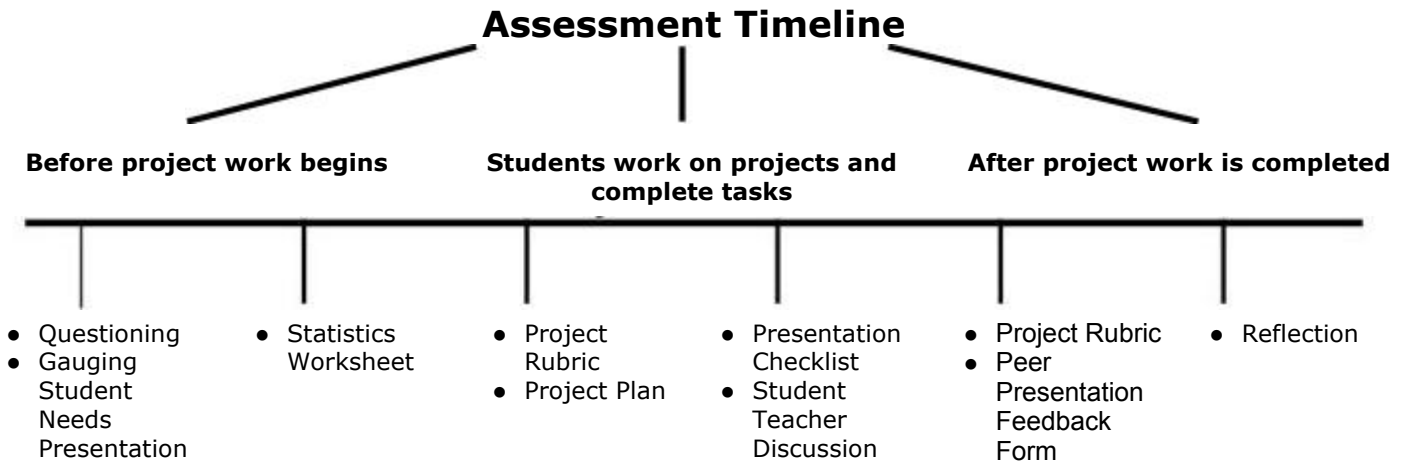
- Provide opportunity for the students to interpret statistical analysis
- Have students take on a leadership role when working with groups
- Encourage student to include more advanced technical attributes in the presentation

## Credits

This project idea has been developed by Toh Poi Seng and Yap Yih Yiu. A team of educators expanded the plan into the example you see here.

**Note:** *The hyperlinked support documents are not part of the PDF. They can be downloaded and printed individually.*

## Assessment Plan



Questioning is used throughout the unit to spark discussion, monitor learning and promote higher-order thinking skills. The unit begins with creating awareness on the use of numbers and statistics with the [presentation to gauge students' needs](#) (PPT 995KB). [Statistics worksheet](#) (DOC 44KB) is used to re-examine students' understanding on statistics. Students use the [project plan](#) (DOC 70KB) to set goals for their project and to think about their possible application of statistics.

A [project rubric](#) (DOC 57.5KB) is used by students and the teacher to guide and assess students' work. Student teacher discussion gives students an opportunity to revise and edit their work before turning in the final product. Students observe other groups' presentation using [peer presentation feedback form](#) (DOC 40.5KB). A reflection is given at the end of the unit to allow students to reflect what they have learned about statistics and how important statistics is to their lives.

Designing Effective Projects: Statistics: Making Sense of Numbers  
Content Standards and Objectives

### **Targeted State Frameworks / Content Standards / Benchmarks**

Form 3 Mathematics Syllabus.

Objective 4: Using mathematics to communicate.

Objective 5: Applying mathematical knowledge and mastery for problem solving and decision making.

Learning Area 4: Statistics II.

4.2 Understand and use the concepts of mode, median, and mean to solve problems.

### **Student Objectives / Learning Outcomes**

Students will be able to:

- Determine the mode of:
  - Sets of data.
  - Data given in frequency tables.
- Determine the mode and the respective frequency from pictographs, bar charts, line graphs and pie charts.
- Determine the median for sets of data.
- Determine the median of data in frequency tables.
- Calculate the mean of:
  - Sets of data.
  - Data in frequency tables.
- Solve problems involving mode, median, and mean.

## Materials and Resources

### Printed Materials

Text book: Mathematics Form 3

### Supplies

Chart paper

### Internet Resources

- <http://www.statistics.gov.my/>\*  
This site is published by the Department of Statistics Malaysia. It contains key statistics of Malaysia.
- <http://www.learner.org/resources/series65.html>\*  
This site offers various mathematics resources for teachers.
- <http://mathandecon.ncee.net/index.php>\*  
This site shows how mathematical processes and concepts can be used to equate classroom learning with “real world” situations.
- <http://www.blogger.com/start>\*  
This site provides instructions on how to create and post a blog.

### Technology – Hardware

- Computer
- Internet connection

### Technology – Software

- Microsoft Word\* Processing
- Multimedia Software
- Spreadsheet Software
- Internet Web Browser