# **Unit 3: Statistics**

### **Lesson Outline**

### **Big Picture**

Students will:

- explore, analyse, interpret, and draw conclusions from one-variable data;.
- explore, analyse, interpret, and draw conclusions from two-variable data;
- investigate and evaluate validity of statistical summaries;
- perform a culminating investigation:
  - analyse, interpret, draw conclusions, and write a report of their research;
  - present summary of finding;
  - critique presentations of their peers.

Day	Lesson Title	Math Learning Goals	Expectations
1–2 Summary Statistics (lessons not		• Recognize that the analysis of one-variable data involves the frequency of one attribute, and determine, using technology, the relevant numerical summaries (mean, median, mode, range, variance, and standard deviation).	D1.1, D1.2
	included)	• Determine the positions of individual data points within a one-variable data set using quartiles, percentiles, and <i>z</i> -scores; use the normal distribution to model one-variable data sets, and recognize these processes as strategies for one-variable data analysis.	
3-4	Graphical displays of data (lessons not included)	<ul> <li>Generate, using technology, the relevant graphical displays of one-variable data based on the type of data provided.</li> <li>Explore types of data, e.g., categorical, ordinal, and quantitative.</li> </ul>	D1.3
5	Culminating Investigation (lesson not included)	<ul> <li>Interpret, analyse, and summarize data related to the study of the problem.</li> <li>Draw conclusions from the analysis of the data, evaluate the strengths of the evidence, specify limitations, suggest follow-up problems or investigations.</li> <li>Focus on one-variable analysis.</li> </ul>	E1.4, E1.5
6–7	Interpreting Data Using Summary Statistics and Graphs ( <i>lessons not</i> <i>included</i> )	<ul> <li>Interpret and compare two related one-variable prepared data sets.</li> <li>Formulate and critique conclusions.</li> <li>Communicate conclusions orally and in writing make connections to the culminating investigation.</li> </ul>	D1.5, E 1.4 E1.5
8–9	Analysing Two Variable Data (lessons not included)	<ul> <li>Graph two numerical variables on a scatter plot.</li> <li>Determine the appropriateness of a linear model to describe the relationship between two numerical attributes.</li> <li>Recognize the meaning of the correlation coefficient, using a prepared investigation.</li> <li>Compare a quantitative and a categorical variable, e.g., gender vs. Income, using appropriate displays, e.g., stacked box plots.</li> <li>Compare two categorical variables, e.g., gender vs. colourblindness, using a contingency or summary table and computing proportions.</li> </ul>	D2.1, D2.3

Day	Lesson Title	Math Learning Goals	Expectations
10–11	Understanding Correlation (lesson for Day 10 not included)	• Explore different types of relationships between two variables, e.g., the cause-and-effect relationship between the age of a tree and its diameter; the common-cause relationship between ice cream sales and forest fires over the course of a year; the accidental relationship between your age and the number of known planets in the universe.	D2.2, D2.5, E1.4, E1.5 CGE 4b
		• Interpret statistical summaries to describe and compare the characteristics of two variable statistics.	
12–13	Interpreting and Making Inferences ( <i>lessons not</i> <i>included</i> )	<ul> <li>Perform linear regression using technology to determine information about the correlation between variables.</li> <li>Determine the effectiveness of a linear model on two variable statistics.</li> <li>Investigate how statistical summaries can be used to misrepresent data.</li> <li>Make informaces and justify conclusions from statistical</li> </ul>	D2.2, D2.4, D2.5 E1.4, E1.5
		<ul> <li>Make inferences and justify conclusions from statistical summaries or case studies.</li> <li>Communicate orally and in writing, using convincing arguments.</li> </ul>	
14	Culminating Investigation (lesson not included)	<ul> <li>Interpret, analyse, and summarize data related to the study of the problem.</li> <li>Draw conclusions from the analysis of the data, evaluate the strengths of the evidence, specify limitations, suggest follow-up problems or investigations.</li> <li>Focus on two-variable analysis.</li> </ul>	E1.4, E1.5
15	Assess Validity (lesson not included)	<ul> <li>Interpret and assess statistics presented in the media (e.g., promote a certain point of view), advertising, including how they are used or misused to present a certain point of view.</li> <li>Investigate interpretation by the media based on lack of knowledge of statistics, e.g., drug testing, false positives.</li> <li>Examine data collection techniques and analysis in the media, e.g., sample size, bias, law of large numbers.</li> <li>Scrapbook of statistical observations from the media.</li> </ul>	D3.1, D3.2 E1.5
16–17	Culminating Investigation Related to Occupations ( <i>lessons not</i> <i>included</i> )	<ul> <li>Use journalism as an example to demonstrate applications of data management in an occupation.</li> <li>Gather, interpret, and describe how the information collected in their project relates to an occupation, e.g., insurance, sports statistician, business analyst, medical researcher.</li> <li>From their projects identify university programs that explore the applications.</li> </ul>	D3.3 E1.3
18	Culminating Investigation (lesson not included)	<ul> <li>Edit and compile a report that interpret, analyses, and summarizes data related to the study of the problem.</li> <li>Draw conclusions from the analysis of the data, evaluate the strengths of the evidence, specify limitations, suggest follow- up problems or investigations.</li> </ul>	E1.4, E1.5, E2.1
19–20	Jazz/Summative		
Reserve time 10 days	Culminating Investigation (lessons not included)	<ul> <li>Present a summary of the culminating investigation to an audience of their peers.</li> <li>Answer questions about the culminating investigation and respond to critiques.</li> <li>Critique the methamatical work of others in a constructive</li> </ul>	E2.2, E2.3, E2.4
		manner.	



Application Differentiated Exploration

#### Home Activity or Further Classroom Consolidation

Use one of the other variables provided, and determine if there is a relationship, e.g., Diabetes rates vs. Age.

## **3.11.1: Anticipation Guide Two Variable Exploration**

## Instructions

- Check **Agree** or **Disagree**, in ink, in the **Before** category beside each statement before you start the Diabetes Exploration task.
- Compare your choice with your partner.
- Revisit your choices at the end of the investigation.

Before		Statement	After	
Agree	Disagree	Statement	Agree	Disagree
		<ol> <li>An individual's BMI has no effect on their chance of getting diabetes.</li> </ol>		
		<ol> <li>People in higher income brackets are more likely to have diabetes.</li> </ol>		
		<ol> <li>Diabetes rates in Ontario have stabilized over the last ten years.</li> </ol>		
		<ol> <li>Being more active decreases your chances of having diabetes.</li> </ol>		