A Guide to Data Handling

Teaching Approach

The videos included in Grade 10 Data Handling do not need to be watched in any particular order. Summaries of the skills and contexts of each video are in this document, allowing you to find something appropriate quickly and easily. In total there is roughly 60 minutes of video. On average each video is 8 minutes and would easily fit into a lesson with time to discuss the content and do some related work.

You will find a selection of tasks covering the required skills in the task video. These tasks have not been linked to the videos so that they can be used without viewing them.

When teaching data handling, it is tempting to stick to the basic skills and not to put them in context. Show learners graphs in newspapers and discuss statistics on political websites and in commercials. The learners will have covered the basic skills in previous grades, so use this time to teach them how to question the data presented to them.
Video Summaries
Some videos have a ‘PAUSE’ moment, at which point the teacher or learner can choose to pause the video and try to answer the question posed or calculate the answer to the problem under discussion. Once the video starts again, the answer to the question or the right answer to the calculation is given.

Mindset suggests a number of ways to use the video lessons. These include:
- Watch or show a lesson as an introduction to a lesson
- Watch or show a lesson after a lesson, as a summary or as a way of adding in some interesting real-life applications or practical aspects
- Design a worksheet or set of questions about one video lesson. Then ask learners to watch a video related to the lesson and to complete the worksheet or questions, either in groups or individually
- Worksheets and questions based on video lessons can be used as short assessments or exercises
- Ask learners to watch a particular video lesson for homework (in the school library or on the website, depending on how the material is available) as preparation for the next day's lesson; if desired, learners can be given specific questions to answer in preparation for the next day's lesson

Collecting Data

1. Designing a Questionnaire
   This video focuses on the data collection including drawing up a questionnaire and briefly on how to choose a suitable sample.

2. Data Collection Methods
   This video covers some of the work on Collecting Data. It focuses on interviews, questionnaires and observations as well as sample section techniques.

3. Discrete and Continuous Data
   This video covers work out of the topic Classifying and Organising Data. A Mindset presenter, Keke, discusses the difference between discrete and continuous data within real contexts.

4. Tallies and Frequency Tables
   This video covers work out of the topic Classifying and Organising Data. Sigra is part of a committee that is organising a fund raising concert at her school. They have collected data in a questionnaire relating to transport food and favourite bands. Now that Sigra has the raw data, she needs to interpret it and does so through tallies and a frequency table.

5. Working with Grouped Data
   This video covers work from Classifying and Organising Data and Interpreting and Analysing Data. It looks at important skills like defining the intervals and accurate plotting of graphs.
Mean, Median, Mode and Range

1. Measures of Central Tendency
   This video includes work from Classifying and Organising Data and Summarising Data. It explores the three measures of central tendency.

2. Measures of Dispersion
   This video covers works from Summarising Data.

Representing Data

1. Pie Charts
   This video covers work from the topic Representing Data. In this video we go through the process of plotting pie charts. The strengths and weaknesses in pie charts are discussed, as well as how to interpret them.

2. Histograms
   This video covers work from the topic Representing Data. Discrete and continuous data is discussed, however if you need a more in depth explanation, please watch the Discrete and Continuous Data video in this series.

3. Bar Graphs
   This video covers work from the topic Representing Data.

4. Line and Broken Line Graphs
   This video covers work from the topic Representing Data. A Mindset presenter, Keke discusses the two graphs giving examples of where and when to use them.

Interpreting Data

1. Interpreting Represented Data
   This video covers work from the topics Representing Data and Interpreting and Analysing Data. It analyses the different types of graphs such as bar graphs, histograms, pie charts, line and broken line graphs.

2. Misuse of Data Handling
   This video covers work from the topics Representing Data and Interpreting and Analysing Data. It shows how data can be biased because of the way it’s collected and representation can be altered to enforce a point of view.

3. Avoiding Bias in Sample Selection
   This video covers work from the topics Collecting Data and Interpreting and Analysing Data. It goes through various methods to choose samples.
4. **Avoiding Bias in Survey Questions**
   This video covers work from the topics Developing Questions, Collecting Data and Interpreting and Analysing Data. Macguyver has developed some questions for survey but has phrased his questions in a way that leads the participants of the survey to answer in a particular way.

5. **Graphs that Misrepresent Data**
   This video covers work from Representing Data and Interpreting and Analysing Data. The video looks at various 2D and 3D graphs to show how data can be misrepresented to support a particular view point.

6. **Statistics in Media and Politics**
   This video focuses on work from Interpreting and Analysing Data. ‘Graphs that Misrepresent Data’ focuses on data representation, ‘Statistics in Media and Politics’ focuses on how data in both statistic and graph form, can be misused or misrepresented to support a viewpoint.

7. **Using Statistics to Present Opposing Views**
   This video covers work from the section Interpreting and Analysing Data. In this video, two learners are given the same set of data and told to present opposing viewpoint using it. They draw graphs and discuss how the same set of statistics support these differing arguments.
## Resource Material

### Collecting Data

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>2. Data Collection Methods</td>
<td><a href="http://prezi.com/vijvu05p40pl/veydon-school-maths-10y1/">http://prezi.com/vijvu05p40pl/veydon-school-maths-10y1/</a></td>
<td>A Prezi presentation on different types of sampling. This is more advanced than what is required in Mathematical Literacy, but may interest and stretch the class.</td>
</tr>
<tr>
<td>4. Tallies and Frequency Tables</td>
<td><a href="http://prezi.com/0cqgak2ivter/handling-data-smarties/">http://prezi.com/0cqgak2ivter/handling-data-smarties/</a></td>
<td>A Prezi presentation which facilitates a class activity in which each learner should have a box of Smarties and tally the various colours.</td>
</tr>
</tbody>
</table>

### Mean, Median, Mode and Range

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><a href="http://www.youtube.com/watch?v=7KErv2bWbPE&amp;feature=related">http://www.youtube.com/watch?v=7KErv2bWbPE&amp;feature=related</a></td>
<td>An interesting video of a lecture where various methods of central tendency are used to calculate golf scores. The work is not applicable to CAPS but would enrich the class.</td>
</tr>
<tr>
<td></td>
<td><a href="http://studyjams.scholastic.com/studyjams/jams/math/data-analysis/mean-average.htm">http://studyjams.scholastic.com/studyjams/jams/math/data-analysis/mean-average.htm</a></td>
<td>Mean; step by step approach to data analysis plus there are little games and fun activities to be tried.</td>
</tr>
<tr>
<td>2. Measures of Dispersion</td>
<td><a href="http://www.youtube.com/watch?v=LA0vCzQJb8w&amp;feature=related">http://www.youtube.com/watch?v=LA0vCzQJb8w&amp;feature=related</a></td>
<td>A song made by a Maths class explaining mean, median, mode and range on YouTube.</td>
</tr>
<tr>
<td>Representing Data</td>
<td>URL</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>1. Pie Charts</strong></td>
<td><a href="http://www.slideshare.net/cassum/questionnaire-analysis-7898828">http://www.slideshare.net/cassum/questionnaire-analysis-7898828</a></td>
<td>A presentation involving many pie charts relating to a questionnaire on magazines people read. This could be used to discuss the results and interpret the pie charts.</td>
</tr>
<tr>
<td><strong>1. Interpreting Represented Data</strong></td>
<td><a href="http://www.youtube.com/watch?v=jguYUbclv8c&amp;feature=related">http://www.youtube.com/watch?v=jguYUbclv8c&amp;feature=related</a></td>
<td>A YouTube clip on the dangers of accepting data without looking at it critically.</td>
</tr>
<tr>
<td><strong>2. Misuse of Data Handling</strong></td>
<td><a href="http://prezi.com/vijyu05p40pl/veydon-school-maths-10y1/">http://prezi.com/vijyu05p40pl/veydon-school-maths-10y1/</a></td>
<td>A Prezi presentation on different types of sampling. This is more advanced than what is required in Mathematical Literacy, but may interest and stretch the class.</td>
</tr>
<tr>
<td><strong>3. Avoiding Bias in Sample Selection</strong></td>
<td><a href="http://www.mathsisfun.com/data/quartiles.html">http://www.mathsisfun.com/data/quartiles.html</a></td>
<td>This site focus on quartiles has printable worksheets and maths games.</td>
</tr>
<tr>
<td><strong>5. Graphs that Misrepresent Data</strong></td>
<td><a href="http://en.wikipedia.org/wiki/Misuse_of_statistics">http://en.wikipedia.org/wiki/Misuse_of_statistics</a></td>
<td>This Wikipedia link discusses how statics can be misused.</td>
</tr>
<tr>
<td><strong>7. Using Statistics to Present Opposing Views</strong></td>
<td><a href="http://www.youtube.com/watch?v=oGGYtw_plj8&amp;feature=related">http://www.youtube.com/watch?v=oGGYtw_plj8&amp;feature=related</a></td>
<td>A YouTube clip with multiple statistics which will provide for interesting debate in class and could lead to other projects.</td>
</tr>
</tbody>
</table>
Task

Question 1
Thirty learners were asked, ‘What is most important to you?’ and they were given four things to choose from. Here are their answers.

- ukudla = food
- impilo = health
- uthando = love
- ithemba = faith or hope

1.1 Organise the data in a frequency table.
1.2 Represent the data on a bar graph.
1.3 Comment on your findings.

Question 2
Decide whether these are discrete or continuous amounts or measurements:

- Distance
- Height
- Number of cars
- DJs on the radio
- Age of mountains
- Volume of water

Question 3
Fifty bean plants were measured in centimetres to see how tall they were. The heights were rounded to the nearest centimetre. Draw a histogram to represent the data.

<table>
<thead>
<tr>
<th>Height of bean plants (cm)</th>
<th>Number of plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 - 24</td>
<td>2</td>
</tr>
<tr>
<td>25 - 29</td>
<td>6</td>
</tr>
<tr>
<td>30 - 34</td>
<td>14</td>
</tr>
<tr>
<td>35 - 39</td>
<td>16</td>
</tr>
<tr>
<td>40 - 44</td>
<td>10</td>
</tr>
<tr>
<td>45 - 49</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
</tr>
</tbody>
</table>
Question 4
Represent this data about transport on a bar graph:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk</td>
<td>25</td>
</tr>
<tr>
<td>Taxi</td>
<td>57</td>
</tr>
<tr>
<td>Car</td>
<td>15</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
</tr>
</tbody>
</table>

Question 5

5.1 In what ways is this graph misleading?
5.2 What is the possible intention of the person who produced this graph?

Question 6
The data below shows the number of hours in a week twenty five teenagers spent watching tv. Their times, correct to the nearest hour, were:

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 17 | 14 | 18 | 19 | 12 | 6  | 15 | 13 | 12 | 10 | 11 | 16 | 10 |
| 15 | 30 | 22 | 7  | 12 | 24 | 5  | 25 | 8  | 9  | 16 | 27 |

6.1 Arrange the data in ascending order.
6.2 Calculate the mean (average) time teenagers spent watching tv. Round your answer to the nearest hour.
6.3 What does this mean tell us about the time teenagers spent watching tv?
6.4 The median of the data is 14. What does this tell us about the time these teenagers spent watching tv?
6.5 Why can’t we generalise and say that on average, everyone in South Africa spends an average time of 15 hours watching tv?
Question 7
The following pie chart shows the type of lunches bought at the school tuckshop by 50 learners.

TUCKSHOP MEALS SOLD

7.1 How many of the learners bought pies?
7.2 Estimate what fraction of learners bought burgers.
7.3 Estimate what fraction of learners bought hotdogs.

Question 8
A group of learners have gone on a school camp for a week. At the end of the camp, they were giving the following survey slip:

<table>
<thead>
<tr>
<th>Survey (please circle the applicable answer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender:</td>
</tr>
<tr>
<td>Age:</td>
</tr>
<tr>
<td>How homesick did you feel during the camp?</td>
</tr>
<tr>
<td>None</td>
</tr>
</tbody>
</table>

8.1 Sibongile is a 15 year old girl who felt lots of homesickness on the camp. Which options would she choose on the survey slip?
The camp leader has summarised the data from all the completed survey forms in the table below. Use this summary to answer the questions that follow.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>13-14</th>
<th>15-16</th>
<th>17-18</th>
<th>Female</th>
<th>13-14</th>
<th>15-16</th>
<th>17-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td>3</td>
<td>4</td>
<td>2</td>
<td></td>
<td>2</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>A little</td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>A lot</td>
<td></td>
<td>9</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>An unbearable amount</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.2 How many males and how many females participated in the survey?

8.3 The camp leader wrote in his report: “more than one out of every two teenagers either feel a lot or an unbearable amount of homesickness”. Show how the camp leader could have come to this conclusion.

8.4 Do boys experience homesickness equally or differently to girls? Substantiate your answer using the information in the table.

The camp leader illustrated his report with the following graph:

8.5 What impression does the graph create about the number of male and female participants?

8.6 Is this impression correct? Substantiate your response.

8.7 What has the camp leader done with the graph to create that impression?
Task Answers

Question 1

1.1.

<table>
<thead>
<tr>
<th></th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ithemba</td>
<td>### /</td>
<td>7</td>
</tr>
<tr>
<td>Impilo</td>
<td>### ### /</td>
<td>11</td>
</tr>
<tr>
<td>Uthando</td>
<td>### /</td>
<td>7</td>
</tr>
<tr>
<td>Ukudla</td>
<td>###</td>
<td>5</td>
</tr>
</tbody>
</table>

1.2.

What learners say is important to them

1.3. Most learners say that ‘impilo’ or ‘life’ is the most important for them. Only 5 out of the 30 learners say that food is the most important thing for them. An equal number of learners said that love and faith were important to them.

Question 2

Distance - continuous
Height – continuous
Number of cars – discrete
DJ’s on the radio – discrete
Age of mountains – continuous
Volume of water - continuous
Question 3

5.1. The graph’s y-axis does not start at zero and has been stretched from 45% and 50% giving the illusion of a big improvement in marks.

5.2. This is probably a learner who is trying to show an improvement in their marks to their parents.

Question 4

6.1. 5; 6; 7; 8; 9; 10; 10; 11; 12; 12; 13; 14; 15; 15; 16; 16; 17; 18; 19; 22; 24; 25; 27; 30

6.2. Mean

\[ \frac{5 + 6 + 7 + 8 + 9 + 10 + 10 + 11 + 12 + 12 + 12 + 13 + 14 + 15 + 15 + 16 + 16 + 17 + 18 + 19 + 22}{25} \]

\[ = \frac{373}{25} \]

\[ = 14.92 \]

\[ = 15 \text{ hours} \]

6.3. This tells us that teenagers spent 15 hours on average watching tv during that week.
6.4. This tells us that 50% of the teenagers spent more than 14 hours per week watching tv and 50% of the learners spent less than 14 hours watching tv.

6.5. 25 teenagers participated in the survey which means it is a fair representation of what time teenagers spend watching tv, but not what adults nor children do.

**Question 7**

7.1. \( \frac{28}{100} \times 50 = 14 \) learners

7.2. \( \frac{1}{4} \) OR 0,25

7.3. \( \frac{1}{2} \) OR 0,5

**Question 8**

8.1.

8.2. Males = 4 + 1 + 9 + 4 + 3 + 1 + 3 + 1 + 3 + 4 + 2 = 35  
Females = 5 + 4 + 4 + 7 + 4 + 6 + 3 + 6 + 8 + 2 + 4 + 7 = 60

8.3. The total number of students who took part in the survey: 35 + 60 = 95  
The students who ticked ‘a lot’ or ‘an unbearable amount’: 9 + 4 + 3 + 7 + 4 + 6 + 4 + 1 + 5 + 4 + 4 = 51  
\( \frac{51}{95} \) cannot be simplified any further and as a result, the counsellor used the simpler fraction of \( \frac{1}{2} \) to express his results. \( \frac{1}{2} = 50\% \) and \( \frac{51}{95} = 53,7\% \).

8.4. Boys who feel homesick: \( \frac{9 + 4 + 3 + 4 + 1}{35} = \frac{21}{35} = 60\% \)  
Girls who feel homesick: \( \frac{7 + 4 + 6 + 5 + 4 + 4}{60} = \frac{30}{60} = 50\% \)  
This shows that boys tend to feel more homesick than girls.

8.5. The graph creates the impression that there were far more girls participating in the survey than boys.

8.6. No. There were just over half as many boys (35) as girls (60) which means the boys bar should be half the size of the girls.

8.7. The camp leader did not start the x-axis at zero and as a result, the boys bar’s shortness is unnecessarily emphasized. If the x-axis started at zero, the boys bar would be just over half as big as the girls bar.
Acknowledgements

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