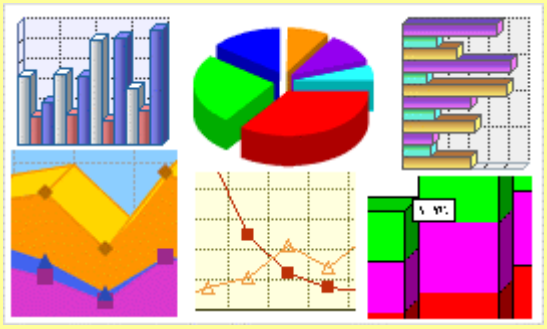
NQF Level: 2 US No: 9009

Learner Guide

Primary Agriculture

The use of statistics & probability to investigate life related problems



My name: . . . . . .

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Department:
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AgriSETA

Before we start...

Dear Learner - This Learner Guide contains all the information to acquire all the knowledge and skills leading to the unit standard:

Title:	Apply basic knowledge of statistics and probability to influence the use of data and procedures in order to investigate life related problems			
US No:	9009	**NQF Level:** 2	**Credits:** 3	

The full unit standard will be handed to you by your facilitator. Please read the unit standard at your own time. Whilst reading the unit standard, make a note of your questions and aspects that you do not understand, and discuss it with your facilitator.

This unit standard is one of the building blocks in the qualifications listed below. Please mark the qualification you are currently doing:

Title	ID Number	NQF Level	Credits	Mark
National Certificate in Animal Production	48976	2	120	❒
National Certificate in Mixed Farming Systems	48977	2	120	❒
National Certificate in Plant Production	48975	2	120	❒

Please mark the learning program you are enrolled in:

Are you enrolled in a:	Y	N
Learnership?	❒	❒
Skills Program?	❒	❒
Short Course?	❒	❒

Your facilitator should explain the above concepts to you.

You will also be handed a Learner Workbook. This Learner Workbook should be used in conjunction with this Learner Guide. This Learner Guide contains all the information, and more, as well as the activities that you will be expected to do during the course of your study. Please keep the activities that you have completed and include it in your **Portfolio of Evidence**. Your PoE will be required during your final assessment.

What is assessment all about?

You will be assessed during the course of your study. This is called *formative assessment*. You will also be assessed on completion of this unit standard. This is called *summative assessment*. Before your assessment, your assessor will discuss the unit standard with you.

Assessment takes place at different intervals of the learning process and includes various activities. Some activities will be done before the commencement of the program whilst others will be done during programme delivery and other after completion of the program.

The assessment experience should be user friendly, transparent and fair. Should you feel that you have been treated unfairly, you have the right to appeal. Please ask your facilitator about the appeals process and make your own notes.

How to use the activity sheets...

Your activities must be handed in from time to time on request of the facilitator for the following purposes:

- The activities that follow are designed to help you gain the skills, knowledge and attitudes that you need in order to become competent in this learning module.
- It is important that you complete all the activities and worksheets, as directed in the learner guide and at the time indicated by the facilitator.
- It is important that you ask questions and participate as much as possible in order to play an active roll in reaching competence.
- When you have completed all the activities and worksheets, hand this workbook in to the assessor who will mark it and guide you in areas where additional learning might be required.
- You should not move on to the next step in the assessment process until this step is completed, marked and you have received feedback from the assessor.
- Sources of information to complete these activities should be identified by your facilitator.
- **Please note** that all completed activities, tasks and other items on which you were assessed must be kept in good order as it becomes part of your **Portfolio of Evidence** for final assessment.

Enjoy this learning experience!

How to use this guide ...

Throughout this guide, you will come across certain re-occurring "boxes". These boxes each represent a certain aspect of the learning process, containing information, which would help you with the identification and understanding of these aspects. The following is a list of these boxes and what they represent:

What does it mean? Each learning field is characterized by unique terms and **definitions** – it is important to know and use these terms and definitions correctly. These terms and definitions are highlighted throughout the guide in this manner.

You will be requested to complete **activities**, which could be group activities, or individual activities. Please remember to complete the activities, as the facilitator will assess it and these will become part of your portfolio of evidence. Activities, whether group or individual activities, will be described in this box.

Examples of certain concepts or principles to help you contextualise them easier, will be shown in this box.

The following box indicates a **summary** of concepts that we have covered, and offers you an opportunity to ask questions to your facilitator if you are still feeling unsure of the concepts listed.

My Notes ...

You can use this box to jot down questions you might have, words that you do not understand, instructions given by the facilitator or explanations given by the facilitator or any other remarks that will help you to understand the work better.

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What are we going to learn?

What will I be able to do?

When you have achieved this unit standard, you will be able to:

- Apply various techniques to organise and represent data in order to model situations for specific purposes.
- Give opinions on the implications of the modeled data for the required purpose.

Learning Outcomes

At the end of this learning module, you must is able to demonstrate a basic knowledge and understanding of:

- Methods for selecting, organizing data and calculating statistics
- The meaning of concepts such as centre and spread
- Techniques for representing and drawing conclusions from statistics.

What do I need to know?

It is expected of the learner attempting this unit standard to demonstrate competence against the unit standard:

- Mathematics and Communications at NQF level 1.

My Notes ...

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Session 1 Techniques to organize and represent data

After completing this session, you should be able to:
SO 1: Apply various techniques to organise and represent data in order to model situations.

In this session we explore the following concepts:

- select and use data from tables
- record and organise data
- calculate statistical data
- use scales to represent statistical data
- represent data

1.1 Data table

We often have to gather information to establish the trends and reality of situations. Data tables assist us to organize this information logically so that it can be applied to the purpose it was intended for. Data tables are similar to a register or record of events or items that give us information and the information is given to use in rows and columns. A row is any horizontal collection of data while a column is any vertical collection of data.

Example

Number of students	African	Coloured	Asian	*White*
Male	56	45	78	12
Female	68	52	62	14
Total	**124**	**97**	**140**	**26**

Row

Column

■ Interpretation of Data.

The interpretation of data is very simple if you are able to work through it systematically. The most important features of data are:

- frequency
- average
- modus
- median
- range

♦ Frequency

Frequency is the number of times a certain value appears in a series of data.

Example: In the series of data below, the number 5 appears 6 times, therefore the frequency of 5 is 6. It is the value that appears most often in the series:

3; 5; 3; 7; 5; 6; 5; 9; 5; 2; 4; 4; 5; 5; 8

If we put this series of data in a table, then the frequency would be much clearer:

Number	Tally	Frequency
0		0
1		0
2	I	1
3	I I	2
4	I I	2
5	~~I I I I~~ I	6
6	I	1
7	I	1
8	I	1
9	I	1
10		0
		15

Note: When you are using the tally system to determine the frequency, you will draw a line for every time something occurs, i.e. I. When it occurs four times, you draw four lines, i.e. I I I I, but when you reach the fifth occurrence, you do not draw the fifth line next to the other four, but you draw a line through the other our lines to show that you have reached 5, i.e. ~~I I I I~~. It makes it much easier to count when you reach the end.

♦ **Average**

Adding together all the values and then dividing it by the number of items calculate the average of a set of data. The average is also known as the **mean**.

Example:

We will use our previous set of data:

3; 5; 3; 7; 5; 6; 5; 9; 5; 2; 4; 4; 5; 5; 8

To calculate the average, we first add together all the values:

3 + 5 + 3 + 7 + 5 + 6 + 5 + 9 + 5 + 2 + 4 + 4 + 5 + 5 + 8 = 126

Then we count how many items are there, i.e. 15

3,	5;	3;	7,	5;	6;	5;	9;	5;	2,	4,	4,	5,	5,	8	126
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Number of Items

Average	**=**	(Sum of all the values)	÷	(number of items)	
	=	126	÷	15	
	=	8,4			

♦ **Mode**

The mode is the **number** that occurs most frequently in the series of data. In the series of data below, the mode is **5**.

3; 5; 3; 7; 5; 6; 5; 9; 5; 2; 4; 4; 5; 5; 8

♦ **Median**

The median in a series of data is the number that is exactly in the middle, or halfway between two numbers in the middle.

Example:

From our set of data:

3; 5; 3; 7; 5; 6; 5; 9; 5; 2; 4; 4; 5; 5; 8

We re-arrange it in chronological (numerical) order:

2; 3; 3; 4; 4; 5; 5; 5; 5; 5; 5; 6; 7; 8; 9

The **median** in this set of data is 5.

♦ **Range**

The range is the difference between the highest number and the lowest number in a set of data.

The **range** in the set of data we have been using as an example will be as follows:

lowest number 2; 3; 3; 4; 4; 5; 5; 5; 5; 5; 5; 6; 7; 8; 9 highest number

Range = Highest Number – Lowest Number

= 9 – 2

= 7

■ Frequency table

A frequency table is the diagram that shows the number of times a particular incident took place.

Example:

In a learnership class, the following scores were achieved for an assessment of a learning programme by the 15 learners in the class:

56%	29%	65%	74%	42%
38%	92%	43%	98%	23%
64%	81%	66%	68%	69%

The facilitator wants to find answers to the following questions:

Which percentage appears most frequently?

Which percentage appears least frequently?

How many learners scored more than 80%?

How many learners scored less than 50%?

The first step would be to set up a frequency table:

Percentage	Tally	Frequency
0-10		0
11-20		0
21-30	I I	2
31-40	I	1
41-50	I I	2
51-60	I	1
61-70	~~I I I I~~	5
71-80	I	1
81-90	I	1
91-100	I I	2
		15

Now we have a better idea of what the answers to the questions may be:

1. Which percentage appears most frequently? Between 61% and 70%
2. Which percentage appears least frequently? Between 0% and 20%
3. How many learners scored more than 80%? $^{3}/_{15}$
4. How many learners scored less than 50%? $^{5}/_{15}$

This information can now be used by the facilitator for various purposes, i.e.

- A third of the class got less than 50%. Do these learners need more support?
- The average learner can be expected to score between 61% and 70% for this learning assessment.

Stem-and-Leaf table

A stem-and-leaf method is similar to tally counting. Instead of using tallies, the given data is divided (by a vertical line) into stems on the left and leaves on the right.

Example:

24 Learners obtained the following marks out of 50 for a test.

49	38	31	27	20	48	37	31
23	41	33	10	15	34	22	35
21	39	31	27	20	19	35	26

The first digit forms the stem and the second digit the leaf.

The stem-and-leaf table will look like this:

1	0; 5; 9;	3
2	0; 0; 1; 2; 3; 6; 7; 7;	8
3	1; 1; 1; 3; 4; 5; 5; 7; 8; 9;	10
4	1; 8; 9;	3
	24	

Stem **Leaf**

Check the total:
3 + 8 + 10 + 3 = 24

All data is shown on the table even if it appears many times.

From this stem-and-leaf table, we can conclude the following information:

- the frequency of learners who got 31marks is 3
- the average mark of the learners lies between 30 and 35
- the range is: 49 – 10 = 39

Please complete Activity **1** at the end of the session

My Notes ...

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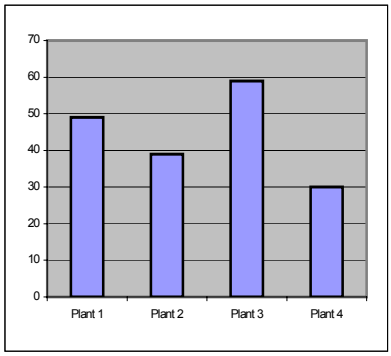
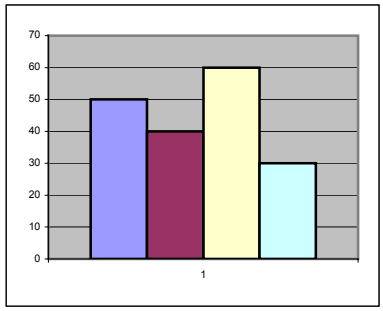
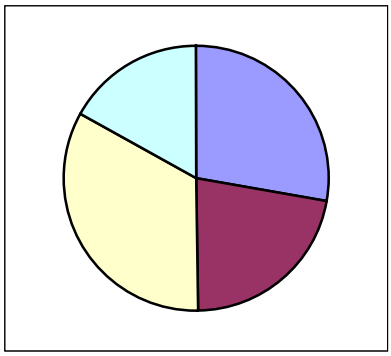
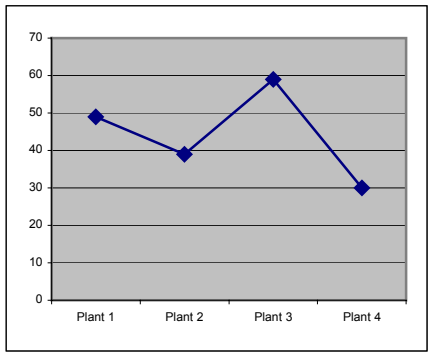
1.2 Graphs

Graphs are visual representations of what is written in a data table. There are many types of graphs that we can use and it usually depends on what you need to represent and to whom the representation is made.

Example

Bar graph	**Histogram**
	
Pie Chart	**Broken Line Graphs**
	

Pictograms

Pictograms are graphs that show us data by using identical pictures instead of figures and lines.

Example

Susie has counted how many telephone calls the people in her department make during the day. This is the data she has collected:

Name	08:00 – 10:00	10:00 – 12:00	12:00 – 14:00	14:00 – 16:00	Total
Janie	15	16	17	15	63
Henry	13	14	1	16	77
Thea	12	11	12	12	47
Malvin	13	10	13	13	49
Thys	11	12	11	10	44

She decides to draw up a pictogram to show the data she has collected. First she rounds off the number of phone calls to the nearest ten:

Name	Total	Rounded off
Janie	63	60
Henry	77	80
Thea	47	50
Malvin	49	50
Thys	44	40

And then she uses a scale.

= 10 Telephone calls

Finally she draws up a pictogram to show the number of calls made by each person.

Name	Total Telephone Calls for the Day
Janie	
Henry	
Thea	
Malvin	
Thys	

The pictogram shows the number of telephone calls made in a visual and graphic way.

Bar Graphs and Histograms

A bar graph and a histogram can be used when the data needs to be grouped into periods and the frequency of each period needs to be clarified.

The difference between the bar graph and the histogram is that when we draw a histogram, we do not leave spaces between the columns as with the bar graph. (Learning tip: the words *bar graph* have a space. Bar graphs have spaces. The word *histogram* has no space, the actual graph has no spaces.)

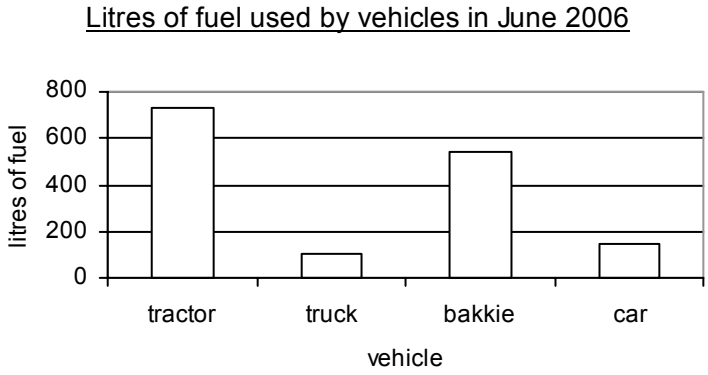
Bar graphs are used when the data classes are not continuous e.g. in comparing the annual yield of carrots, tomatoes and potatoes of a vegetable farm. There is no intermediate between carrots and tomatoes. The classes are different from each other.

Example of a bar graph:

A farmer wants to compare the amount of fuel used by a number of vehicles on his farm. He has summarized the data in a table.

Vehicle	Tractor	Truck	Bakkie	Car
Litres of fuel used in June 2006	730	100	545	150

He must construct a bar graph, because a truck is very different to a car.



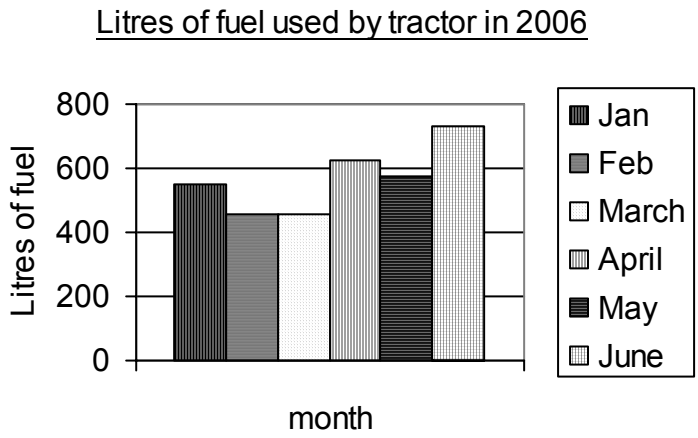
Histograms are used if the data classes are continuous. For example, a farmer wants to see how many tons of carrots a certain field produced per year from 2000 to 2006. There are no spaces between the bas, because 2000 borders on 2001. Time is continuous. He could also use a line graph.

Example of a histogram:

The same farmer wants to compare the amount of fuel used by his tractor each month from January to June.

Month	Jan	Feb	March	Apr	May	June
Litres of fuel used by tractor	550	456	458	624	576	730

He must draw a histogram because time is continuous.



Example of a histogram with frequency classes

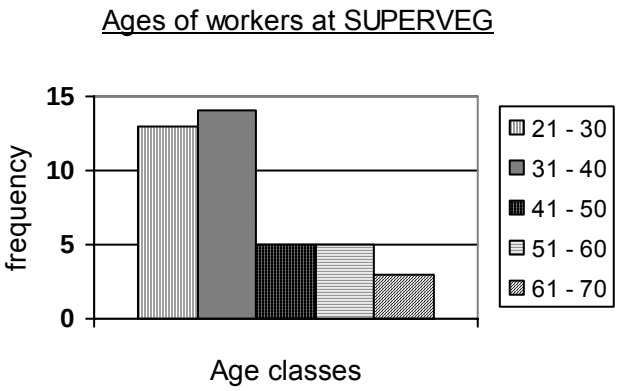
The owner of SUPERVEG has collected the following statistic with regards to the age of the workers.

24	56	45	32	45	65	21	34	23	26
38	26	39	40	51	36	25	39	27	52
43	61	55	63	25	26	34	26	25	36
39	44	36	45	54	38	31	29	22	34

He puts this into a frequency table

Age	Tally	Frequency
0-20		0
21-30	~~1111~~ ~~1111~~ 111	13
31-40	~~1111~~ ~~1111~~ 1111	14
41-50	~~1111~~	5
51-60	~~1111~~	5
61-70	111	3
		40

He then draws a histogram using the information he has gathered.



■ Pie Graphs

Pie graphs are graphs that represent the data as segments of a circle. The various data will take up a certain angle of the total angles in a circle (360º).

Example

In a community, a researcher named Janet is collecting information about how many people have access to telephones. She goes about asking questions to the community and arrives home with the following data:

Frequency Table

Details	Tally	Frequency
Home Telephone	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 III	33
Cellphone	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 II	42
Public Phone	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	50
No Access	𝍸 𝍸 𝍸 𝍸 III	23
		148

Janet now calculates the percentage and the segment of 360º that she will use to draw up the pie graph:

Calculation table

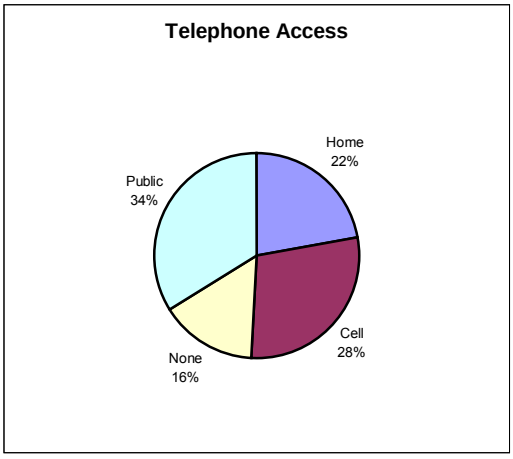
Description	Percentage of Total	Degrees of 360º
Home Telephone	$^{33}/_{148}$ x 100 ≈ 22,3%	$^{33}/_{148}$ x 360º ≈ 80º
Cellphone	$^{42}/_{148}$ x 100 ≈ 28,4%	$^{42}/_{148}$ x 360º ≈ 102º
Public Phone	$^{50}/_{148}$ x 100 ≈ 33,8%	$^{50}/_{148}$ x 360º ≈ 122º
No Access	$^{23}/_{148}$ x 100 ≈ 15,5%	$^{23}/_{148}$ x 360º ≈ 56º

She checks her calculations:

Percentage 22,3 + 28,4 + 33,8 + 15,5 = 100

Degrees 80 + 102 + 122 + 56 = 360

Now she can draw her Pie Graph:



If you measure the angles of the different segments, you will find that they are exactly as worked out in the calculation table.

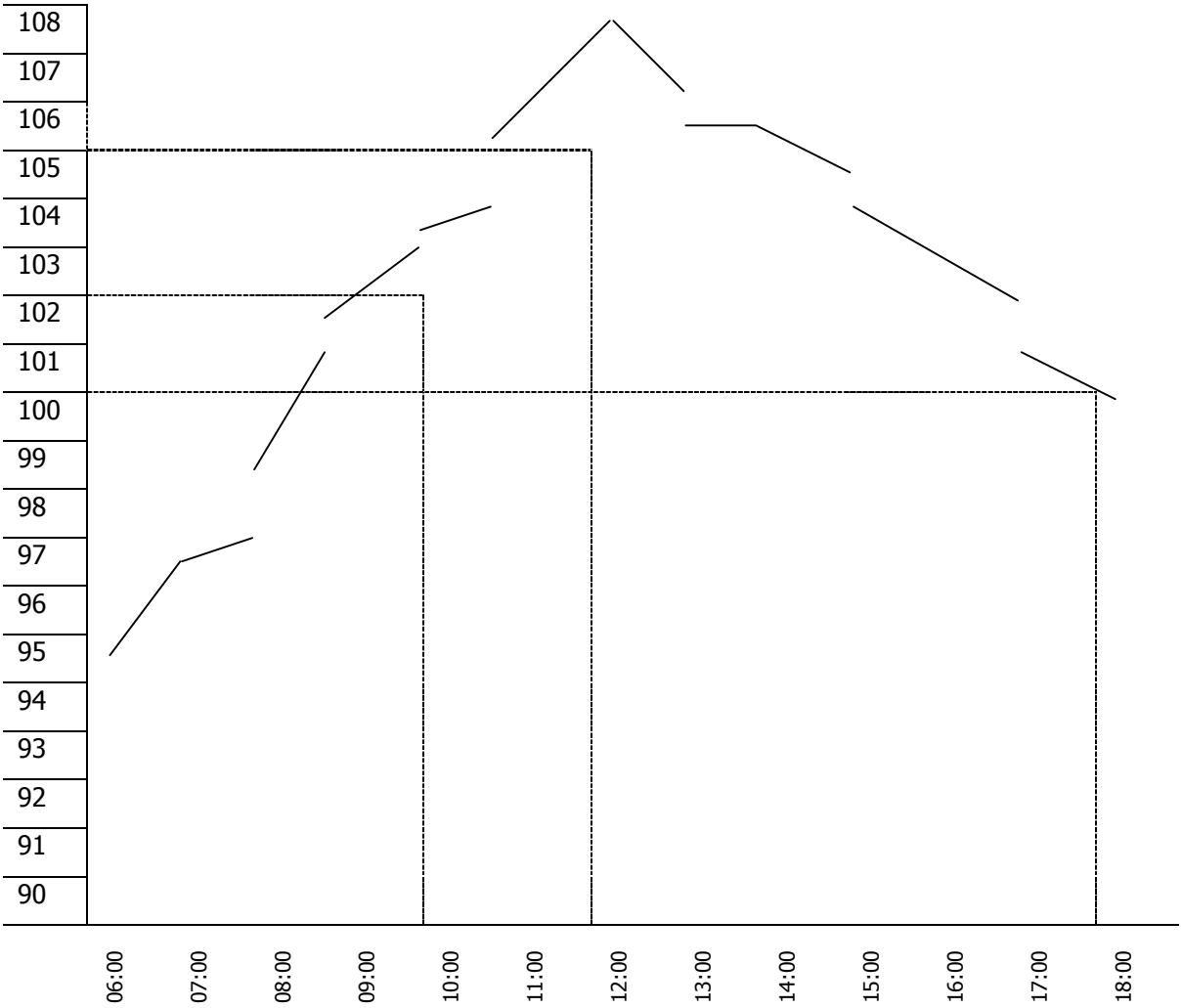
Broken Line Graphs

When we were drawing the bar graph and histogram, we used the whole column to show our data. With a broken line graph, we will only use points, not full columns.

Example

At WITWAT Manufacturing, the production manager has collected data with regards to the temperature at which a certain machine runs over a 12 hour period.

Broken Line Graph of Machine Temperature



If the production manager wants to see what the temperature on the machine was at different times, then he can read it from the graph, i.e.:

- At 09:00 the temperature of the machine was 102º
- At 11:30 the temperature of the machine was 105º
- At 17:30 the temperature of the machine was 100º

He can also read the following information from the graph:

- at what time the machine is running at the highest temperature
- at what time the machine is running at the lowest temperature
- at what time the machine if running at 100º, etc.

1.3 Probability

Probability is the possibility or chance that something might occur.

We work out probability by dividing the number of successful outcomes by the total number of possible outcomes.

Example

Every Saturday night we watch the lotto and the winner of the game show gets to draw a ball from a variety of balls in a round canister. We want to work out what the probability is of the winner drawing the red ball, which will make him the winner of a car.

First we have to find out how many balls are in the canister:

5 green balls

6 yellow balls

1 red ball (the winning ball)

There are 5 + 6 + 1 = 12 balls in the canister

$$\text{Probability (P)} = \frac{\textit{number of successful outcomes}}{\textit{total number of possible outcomes}}$$

Probability (Green ball) = $^{5}/_{12}$

Probability (Yellow ball) = $^{6}/_{12}$

Probability (Red ball) = $^{1}/_{12}$

So the chance of the winner drawing a red ball is 1 out of 12.

Please complete Activity **2** at the end of the session

My Notes ...

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1

SO 1

Individual Activity:
Answer the questions below

My Name:
. . . . . .
My Workplace:
. . . . . .
My ID Number:

1. The weather Bureau collected data from 25 weather stations in the Free State area concerning the number of hours of bright sunshine during January and June 2005.

Hours of bright sunshine January 2005						Hours of bright sunshine June 2005					
211	221	193	182	210	227	152	142	132	164	152	105
214	207	205	206	194	207	115	105	121	126	171	121
217	171	225	181	189	192	117	136	104	121	126	126
209	209	175	169	189	203	119	142	135	148	139	147
206						131					

a) Draw up a frequency table (tally format) for both January and June. Use the class intervals 100 – 109, 110-119 etc

b) What is the modal class for January? .....

c) What is the modal class for June? .....

d) What can you conclude if you compare the two modal classes calculated above? .....

e) Calculate the mean for both January and June.

f) Calculate the range for both January and June.

g) What conclusion can you reach if you compare the ranges calculated in f)? Is your conclusion the same as the conclusion that you reached in d)?

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2. A farmer kept count of the number of litres of milk his cows produced per day.

35, 47, 34, 46, 62, 41, 35, 47, 51, 56, 73, 38, 41, 44, 51, 45, 74

a) Determine suitable class intervals. .....

b) Construct a stem-and-leaf diagram to show the data.

c) Determine the modal class of your distribution.....

d) On how many days were less than 40l of milk produced? .....

e) Rewrite the numbers in ascending (from smallest to biggest) and determine the median value.

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f) Give a reasonable explanation why the amount of milk produced varied so much from day to day.

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Facilitator comments:

Assessment:

ACTIVITY

2

SO 1

Individual Activity:
Answer the questions below

My Name:
. . . . . .
My Workplace:
. . . . . .
My ID Number:

1. In a Mathematics examination 40 learners scored the following marks in percentages (%):

61	43	92	78	94	66	63	59	29	82
39	68	89	95	96	45	48	49	35	54
69	84	83	85	74	73	83	59	74	72
85	36	25	63	63	83	40	54	67	84

a) Draw up and complete a frequency table.

b) How many learners obtained more than 80%?

.....

c) 60% is the accepted competency pass mark. How many learners are not yet competent?

.....

d) Show the data on a stem-and-leaf table. Answer the following questions:

- What is the median of the group?

  .....

- What is the mode of the group?

  .....

- What is the group average for mathematics?

  .....

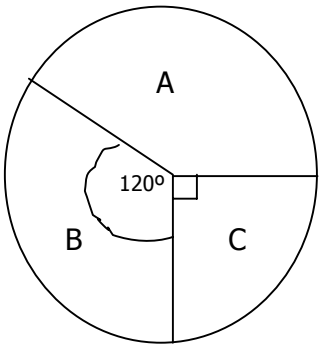
e) Draw a histogram using the frequency table.

2. In an election there were three candidates: A, B and C. The number of votes cast for each candidate is represented in the pie chart below. Candidate A got 1170 votes.

a. How many votes did candidate B get?

b. How many people voted altogether?

c. What percentage of the votes went to candidate C?



3. There are 52 playing cards in a pack of cards. What is the probability that the first card to be drawn is .....

   a. a queen

   .....

   b. an Ace

   .....

   c. a heart

   .....

   d. the king of clubs

   .....

4. A tour operator is given the following temperatures, in degrees Celsius, of the following places in South Africa, in the middle of winter:

Johannesburg	= 14
Durban	= 24
Port Elizabeth	= 20
Bloemfontein	= 14
Springbok	= 15
Kimberley	= 12
Cape Town	= 20

a. Draw a bar graph to represent this data.

b. What is the range of this data?

.....

c. What is the median temperature?

.....

d. What is the mean temperature?

.....

Facilitator comments:

Assessment:

Concept (SO1)	I understand this concept	Questions that I still would like to ask
Questions about sets of data that can be dealt with through statistical methods are identified correctly.		
Existing tables are understood correctly through a proper application of row and column headings.		
Raw data or statistics in the body of tables are used correctly.		
Effective methods to record and organise data are used to solve problems.		
Calculations of statistics are correct.		
Appropriate statistics are used to answer questions.		
Scales used in graphical representations and tables are consistent with the data, are correct, clear and appropriate to the situation and target audience.		

My Notes ...

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Session 2 Implications resulting from modeled data

After completing this session, you should be able to:
SO 2: Give opinions on the implications of the modelled data for the required purpose.

In this session we will use the information given to us in graphs to determine what it means and how it is useful to us by exploring the following concepts:

- ♦ determine the trend from a data model
- ♦ justify the trend you have identified
- ♦ explain a graph in written or oral format

2.1 The language of graphs

Graphs give us a lot of information that is relevant to our lives. When you open up the newspaper, there is bound to be some form of a graph in it to communicate a message to you or to prove a point that has been made.

■ Trends

Often we can determine the relationship between the data we have and the events that occur.

Example

Rebecca has a small spaza shop in her community. She sells the usual things such as bread, milk, cigarettes and sweets. One of the things that she sells is ice cream. When it is hot, she sells more ice cream than when it is cold. She decides to find out if there is a relationship between her ice-cream sales and the temperature.

Rebecca carefully follows the weather report everyday and then records her sales of ice-cream for the day – Rebecca's shop is not open on a Sunday.

Rebecca records the following information:

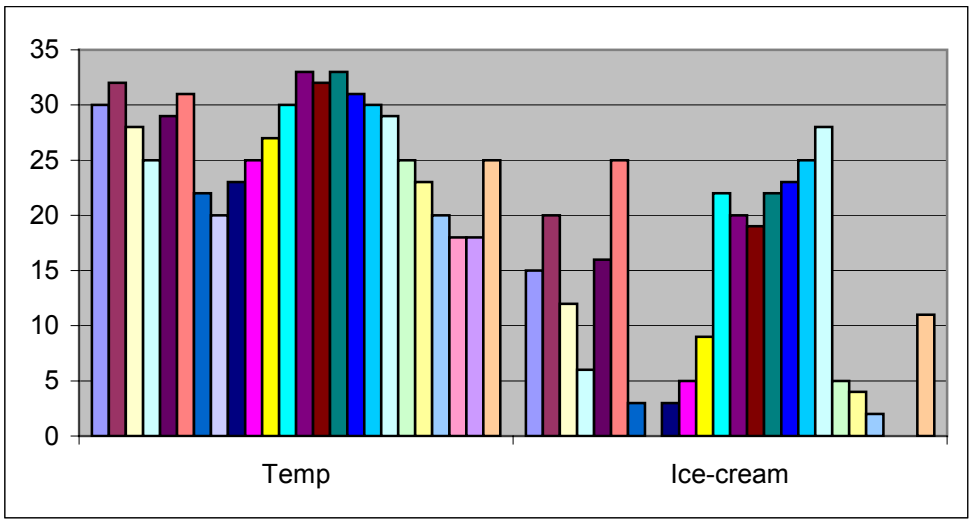
Week 1	Mo	Tu	We	Th	Fr	Sa
Temp	30	32	28	25	29	31
Weather	Sun	Sun	Sun	Rain	Sun	Sun
Ice-cream	15	20	12	6	16	25

Week 2	Mo	Tu	We	Th	Fr	Sa
Temp	22	20	23	25	27	30
Weather	Rain	Rain	Rain	Sun	Sun	Sun
Ice-cream	3	0	3	5	9	22

Week 3	Mo	Tu	We	Th	Fr	Sa
Temp	33	32	33	31	30	29
Weather	Sun	Sun	Sun	Sun	Sun	Sun
Ice-cream	20	19	22	23	25	28

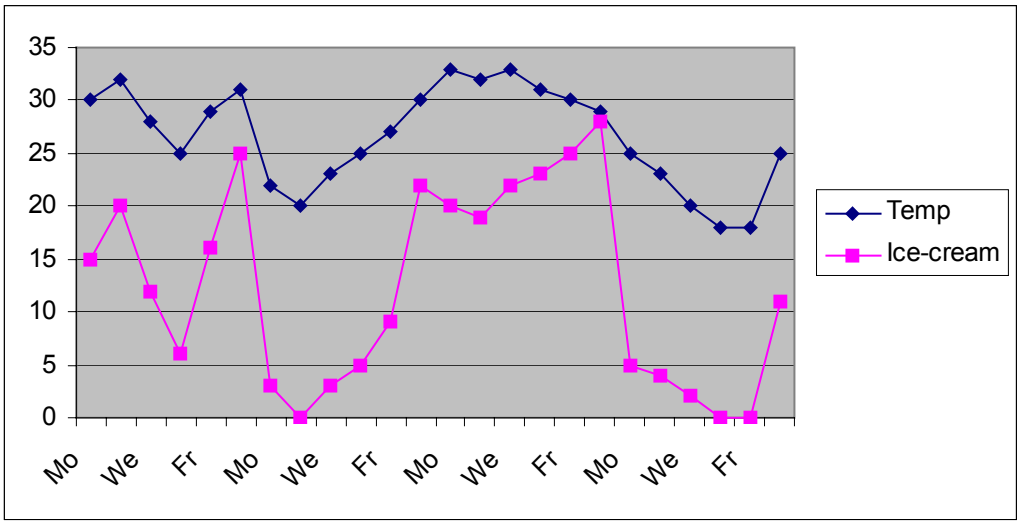
Week 4	Mo	Tu	We	Th	Fr	Sa
Temp	25	23	20	18	18	25
Weather	Rain	Rain	Rain	Rain	Rain	Sun
Ice-cream	5	4	2	0	0	11

Rebecca decides to use a histogram to see what the relationship is between the information that she has gathered.



	Temp	Ice-cream
Mo	30	15
Tu	32	20
We	28	12
Th	25	6
Fr	29	16
Sa	31	25
Mo	22	3
Tu	20	0
We	23	3
Th	25	5
Fr	27	9
Sa	30	22
Mo	33	20
Tu	32	19
We	33	22
Th	31	23
Fr	30	25
Sa	29	28
Mo	25	5
Tu	23	4
We	20	2
Th	18	0
Fr	18	0
Sa	25	11

The histogram looks confusing and she decides to redo the data on a broken line graph:



The broken line graph shows the similarity between the temperature and the ice-cream sales. If you look at the temperature line, you can see that on the first Thursday the temperature was about 25º and on this Thursday Rebecca sold only 6 ice-creams. However, on the first Saturday the temperature was 31º and she sold 25 ice creams.

You can see a similar curve in the ice-cream sales line as in the temperature line. Rebecca should hope for hot sunny days to improve her ice-cream sales.

We can now establish a trend:

- the hotter the temperature, the more the ice-cream that is sold
- the cooler the temperature, the less the ice-cream that is sold
- on a sunny day Rebecca sells more ice-cream
- on a rainy day Rebecca sells less ice-cream

Rebecca can take this information a step further. She can look at what the average price of her ice-creams are, i.e.

- suckers R2.00
- chocolate ice-cream R3.50
- cones R5.00

Average = (2 +3,5 + 5) ÷ 3
= 10,5 ÷ 3
= R3.50

She can now work out how much money she brings in with her ice-cream sales alone:

Total Income = Ice-creams sold (one month) x average price of ice-cream:

	Ice-creams sold						
Week 1:	15	+ 20	+ 12	+ 6	+16	25	= 94
Week 2:	3	+ 0	+ 3	+ 5	+ 9	+ 22	= 42
Week 3:	20	+ 19	+ 22	+ 23	+ 25	+ 28	= 137
Week 4:	5	+ 4	+ 2	+ 0	+ 0	+ 11	= 22
							= 295

Rebecca can now calculate her income from ice-cream sales for this month:

Total income = 295 x 3.50

= R1 032.50

From this information Rebecca can:

- Determine her stock levels for ice-cream for one month
- Negotiate better bulk discount for ice-cream that she buys from the ice-cream supplier
- Prepare for ice-cream sales by keeping an eye on the weather report

Should Rebecca do this over a period of 12 months, she is able to plan ahead for her business.

My Notes ...

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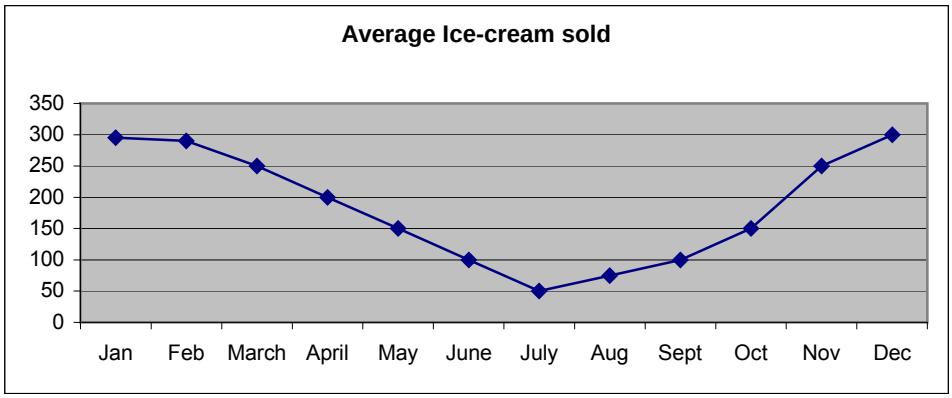
Example

Rebecca has summarized her monthly data for the past 12 months as follows:

Month	Average Temperature	Average Ice-cream sold
January	27º	295
February	26º	290
March	25º	250
April	24º	200
May	21º	150
June	18º	100
July	16º	50
August	17º	75
September	19º	100
October	20º	150
November	25º	250
December	29º	300



Rebecca can see that over a period of one year, she sells more ice-cream in summer, when it is hot, than in winter, when it is cold. She will therefore plan her stock accordingly.

Please complete Activity **3** at the end of the session

My Notes ...

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3

SO 2

Individual activity:
Complete the questions below

My Name:
. . . . . .
My Workplace:
. . . . . .
My ID Number:

1. The pictograph below shows the number of hours of sunshine per month in 1998 from January to June in Cape Town.

Jan	✷	✷	✷	✷	✷	✷	✷	✷	✷	✷	✷
Feb	✷	✷	✷	✷	✷	✷	✷	✷	✷	✷	✷
March	✷	✷	✷	✷	✷	✷	✷	✷	✷		
April	✷	✷	✷	✷	✷	✷	✷				
May	✷	✷	✷	✷	✷	✷					
June	✷	✷	✷	✷	✷	✷					

✷ = 1 Hr

a) Which month had the most hours of sunshine?

.....

b) Which month had the least hours of sunshine?

.....

c) Which month had 9 hours of sunshine?

.....

d) How many hours of sunshine did May have?

.....

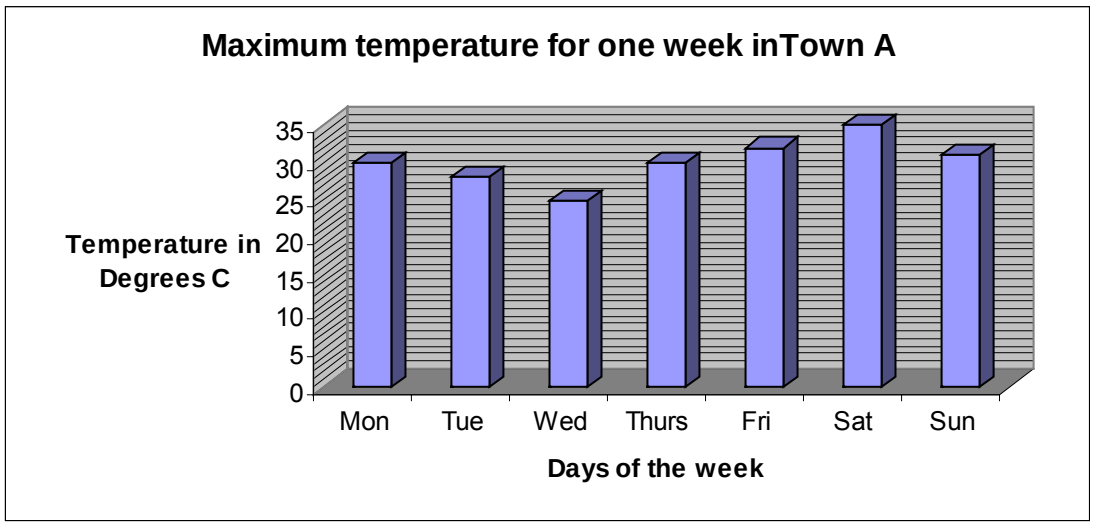
e) How many hours of sunshine did June have?

.....

f) How many hours of sunshine were there altogether in the whole period January to June?

.....

2. In this bar graph the highest daily temperature for one week in a town is shown.



a) Which was the hottest day of the week?

.....

b) Which was the coolest day of the week?

.....

c) What was the temperature on Friday?

.....

d) On which day was the temperature 29ºC?

.....

e) On which day was the temperature 31ºC?

.....

f) What was the average temperature for the week shown?

.....

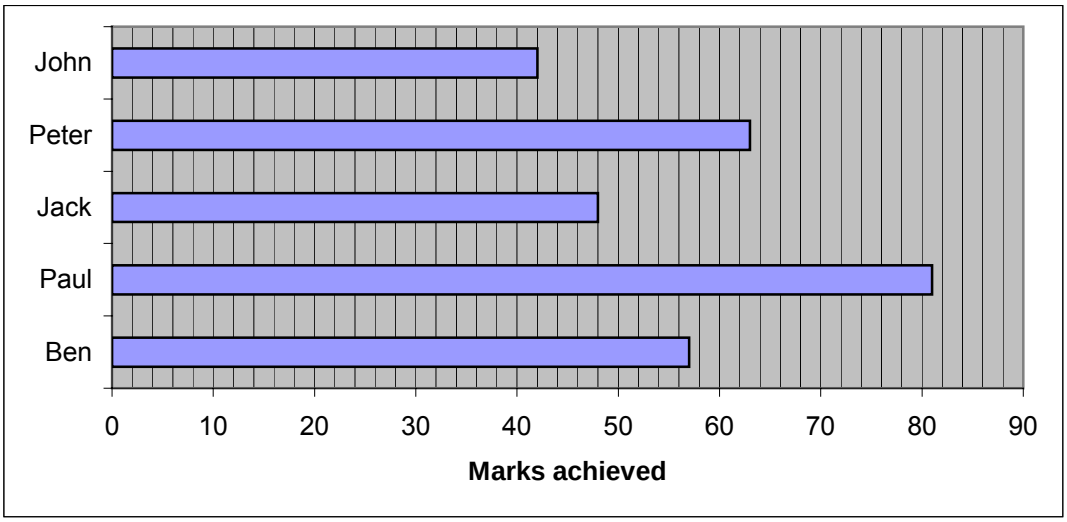
.....

g) Is this the correct type of graph? Justify your answer.

.....

.....

3. This graph shows the number of baskets of tea leaves harvested in one week by various workers.



a) Who harvested the most tea?

.....

b) Who harvested the least tea?

.....

c) How many baskets full did Paul harvest?

.....

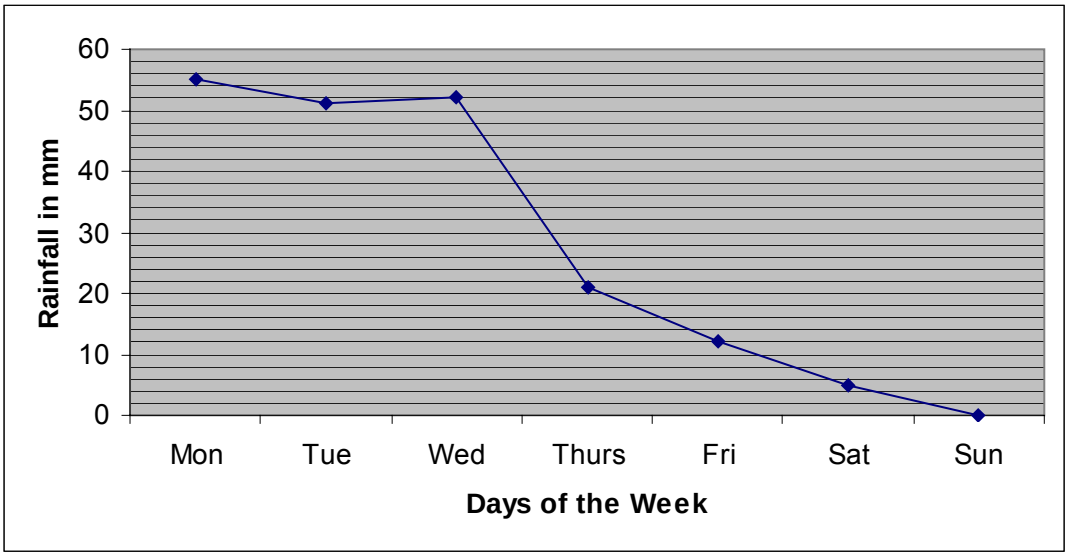
d) How many baskets full did peter harvest?

.....

e) Those who harvested less than 50 baskets got less pay. Who were they?

.....

4. The graph underneath shows the amount of rainfall in a certain area from Monday to Saturday.



a) Which day had the most rainfall?

.....

b) Which day had the least rainfall?

.....

c) How much rainfall fell on Thursday?

.....

d) Which day had 52 mm of rainfall?

.....

e) What was the average rainfall for the 6 days?

5. The following stem-and-leaf diagram shows the total number of points scored in a series of basketball games.

160	2
170	1
180	2, 7
190	5, 7, 2
200	9, 4, 8, 0
210	5, 9, 7, 0, 3, 3
220	4, 9

a) How many scores of 170 were registered?

.....

b) How many scores of 213 were registered?

.....

c) What was the lowest score?

.....

d) What was the highest score?

.....

e) What were the common most scores?

.....

f) Were most scores above or below 200?

.....

Facilitator comments:

Assessment:

Concept	I understand this concept	Questions that I still would like to ask
Verbal (written or oral) explanation of findings is based on the representation of the data.		
Trends, group profiles and attitudes are justified.		
Appropriate information is extracted from representations in order to answer questions.		

My Notes ...

1. To what extent did you apply and adapt generic information you learned in this module to your specific outlet in your work experience? Discuss and describe.

_____

_____

_____

_____

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2. What do you think was particularly helpful to you in your workplace experience?

_____

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- Where do you need to improve?

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- What will you charge?

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3. Did the practical experience on-site make you want o adjust the theory you learned? If so, what would you adjust and how would this change what you would to in the future?

_____

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Assessment Feedback Form

Comments / Remarks	
Feedback to learner on assessment:	
Feedback from learner to assessor:	
Learner's Signature:	**Date:**
Assessor's Signature:	**Date:**

Am I ready for my test?

- Check your plan carefully to make sure that you **prepare in good time**.
- You have to be found **competent** by a qualified **assessor** to be declared competent.
- Inform the assessor if you have any **special needs** or requirements **before** the agreed date for the test to be completed. You might, for example, require an interpreter to translate the questions to your mother tongue, or you might need to take this test orally.
- Use this worksheet to help you prepare for the test. These are **examples** of **possible questions** that might appear in the test. All the information you need was taught in the classroom and can be found in the learner guide that you received.

1. ***I am sure*** *of this and understand it well*
2. ***I am unsure*** *of this and need to ask the Facilitator or Assessor to explain what it means*

Questions	1. I am sure	2. I am unsure
Question 1		
A farmer wants to see how well his sheep do on different feeds. Before he starts his experiment, he determines the mass of his sheep. The results are shown in the table below in kilograms: 65 72 54 58 67 92 74 77 83 68 73 81 70 95 56 74 85 66 93 60 78 60 82 77 76 85 59 71 a) Construct a frequency table to show these data. b) What was the mass of the lightest sheep? c) What was the mass of the heaviest sheep? d) Comment on the distribution of masses. e) Construct a stem-and-leaf plot and answer the following questions. f) The median. g) The mode. h) The mean (average) mass.		

Question 2

This table shows how an agriculture student spends his day.

Activity	College	Sleeping	Sports	Eating	Other
No. of hours	8	8	3	1	4

a) Show this information on a pie chart.
b) Start by working out the fractions and then change it to degrees.

Question 3

1) The following table shows a student's Mathematics Test results.

	Geometry	Statistics	Graphs	Exponents	Factorization	Percentage	Integers
Test no.	1	2	3	4	5	6	7
% obtained	52	67	74	60	74	85	94

a) Show this data on a Broken line graph.
b) What is the mean?
c) Which tests were above average?

Question 4

When you throw a dice, what is the probability to throw a:

a) Six.
b) Four
c) And even number.
d) A number larger than 4.

Checklist for practical assessment ...

Use the **checklist** below to help you prepare for the part of the practical assessment when you are observed on the **attitudes** and **attributes** that you need to have to be found competent for this learning module.

Observations	Answer Yes or No	Motivate your Answer (Give examples, reasons, etc.)
Can you identify problems and deficiencies correctly?		
Are you able to work well in a team?		
Do you work in an organised and systematic way while performing all tasks and tests?		
Are you able to collect the correct and appropriate information and / or samples as per the instructions and procedures that you were taught?		
Are you able to communicate your knowledge orally and in writing, in such a way that you show what knowledge you have gained?		
Can you base your tasks and answers on scientific knowledge that you have learnt?		
Are you able to show and perform the tasks required correctly?		
Are you able to link the knowledge, skills and attitudes that you have learnt in this module of learning to specific duties in your job or in the community where you live?		

- The assessor will complete a checklist that gives details of the points that are checked and assessed by the assessor.
- The assessor will write commentary and feedback on that checklist. They will discuss all commentary and feedback with you.
- You will be asked to give your own feedback and to sign this document.
- **It will be placed together with this completed guide in a file as part of you portfolio of evidence.**
- The assessor will give you feedback on the test and guide you if there are areas in which you still need further development.

Paperwork to be done ...

Please assist the assessor by filling in this form and then sign as instructed.

Learner Information Form				
Unit Standard	**Apply basic knowledge of statistics and probability to influence the use of data and procedures in order to investigate life related problems.**			
Program Date(s)				
Assessment Date(s)				
Surname				
First Name				
Learner ID / SETA Registration Number				
Job / Role Title				
Home Language				
Gender:	Male:		Female:	
Race:	African:	Coloured:	Indian/Asian:	White:
Employment:	Permanent:		Non-permanent:	
Disabled	Yes:		No:	
Date of Birth				
ID Number				
Contact Telephone Numbers				
Email Address				
Postal Address			Signature:	

Bibliography

■ **Books:**

Gray, D.E, 2004. *Doing research in the real world*. Sage . London.
'Life skills' by Edna Rooth

Terms & Conditions

Acknowledgements

Project Management:

M H Chalken Consulting

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Ms S Mallick

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

REGISTERED UNIT STANDARD:

Apply basic knowledge of statistics and probability to influence the use of data and procedures in order to investigate life related problems

SAQA US ID	UNIT STANDARD TITLE		
9009	Apply basic knowledge of statistics and probability to influence the use of data and procedures in order to investigate life related problems		
SGB NAME		**REGISTERING PROVIDER**	
SGB for Math Literacy, Math, Math Sciences L 2 -4			
FIELD		**SUBFIELD**	
Field 10 - Physical, Mathematical, Computer and Life Sciences		Mathematical Sciences	
ABET BAND	**UNIT STANDARD TYPE**	**NQF LEVEL**	**CREDITS**
Undefined	Regular-Fundamental	Level 2	3
REGISTRATION STATUS	**REGISTRATION START DATE**	**REGISTRATION END DATE**	**SAQA DECISION NUMBER**
Reregistered	2004-12-02	2007-12-02	SAQA 1657/04

PURPOSE OF THE UNIT STANDARD

This Unit Standard is designed to provide credits towards the mathematical literacy requirement of the NQF at Level 2. The essential purposes of the mathematical literacy requirement are that, as the learner progress with confidence through the levels, the learner will grow in:
. A confident, insightful use of mathematics in the management of the needs of everyday living to become a self-managing person
. An understanding of mathematical applications that provides insight into
the learner`s present and future occupational experiences and so develop into a contributing worker

The ability to voice a critical sensitivity to the role of mathematics in a democratic society and so become a participating citizen

People credited with this Unit Standard are able to:

Apply various techniques to organise and represent data in order to model situations for specific purposes.
Give opinions on the implications of the modelled data for the required purpose.

LEARNING ASSUMED TO BE IN PLACE AND RECOGNITION OF PRIOR LEARNING

The credit value is based on the assumption that people starting to learn towards this unit standard are competent in

UNIT STANDARD RANGE

This unit standard includes the requirement to:

Identify issues suited to resolution by basic statistical methods.
Work with existing data.
Generate statistics through the use calculators and other available technology.
Represent data in the form of tables, charts and graphs.

Use statistics and representations of data to
Summarise real-life and or work related issues within the experience of the learner.
Give opinions on statistics and representations of data.
More detailed range statements are provided for specific outcomes and assessment criteria as needed.

Specific Outcomes and Assessment Criteria:

SPECIFIC OUTCOME 1

Apply various techniques to organise and represent data in order to model situations.

OUTCOME NOTES

Apply various techniques to organise and represent data in order to model situations for specific purposes.

OUTCOME RANGE

Techniques include:

Using a variety of methods to represent statistics including pie charts, bar graphs, stem and leaf plots;

Reading tables (e. g., the meaning of row and column headings and the relationship between age by gender by province);

Extracting a suitable set of data from tables and databases (e. g., census data, tables in newspapers, HIV data; weather data);

Recording and organising data into tables;

Calculating measures of centre and spread such as mean, median, mode, and range; the use of Quartiles in classifying data items ("Measures of centre and spread" should be handled via examples, which are directly related to the life or work
experiences of each learner. For example workers` wages and learners` test scores).

ASSESSMENT CRITERIA

ASSESSMENT CRITERION 1

1. Questions about sets of data that can be dealt with through statistical methods are identified correctly.

ASSESSMENT CRITERION 2

2. Existing tables are understood correctly through a proper application of row and column headings.

ASSESSMENT CRITERION 3

3. Raw data or statistics in the body of tables are used correctly.

ASSESSMENT CRITERION 4

4. Effective methods to record and organise data are used to solve problems.

ASSESSMENT CRITERION 5

5. Calculations of statistics are correct.

ASSESSMENT CRITERION 6

6. Appropriate statistics are used to answer questions.

ASSESSMENT CRITERION 7

7. Scales used in graphical representations and tables are consistent with the data, are correct, clear and appropriate to the situation and target audience.

SPECIFIC OUTCOME 2

Give opinions on the implications of the modelled data for the required purpose.

OUTCOME RANGE

Purposes include:

Determining trends in societal issues such as crime and health;

Identifying relevant characteristics of target groups such as age range, gender, socio-economic group, cultural belief, and performance;

Considering the attitudes or opinions of people on current issues relevant to the life experience of the learners;

Determining weather patterns for a given region.

ASSESSMENT CRITERIA

ASSESSMENT CRITERION 1

1. Verbal (written or oral) explanation of findings is based on the representation of the data.

ASSESSMENT CRITERION 2

2. Trends, group profiles and attitudes are justified.

ASSESSMENT CRITERION 3

3. Appropriate information is extracted from representations in order to answer questions.

UNIT STANDARD ACCREDITATION AND MODERATION OPTIONS

Providers of learning towards this unit standard will need to meet the accreditation requirements of the GENFETQA.

Moderation Option:
The moderation requirements of the GENFETQA must be met in order to award credit to learners for this unit standard.

UNIT STANDARD ESSENTIAL EMBEDDED KNOWLEDGE

The following essential embedded knowledge will be assessed through assessment of the specific outcomes in terms of the stipulated assessment criteria. Candidates are unlikely to achieve all the specific outcomes, to the standards described in the assessment criteria, without knowledge of the listed embedded knowledge. This means that the possession or lack of the knowledge can be inferred directly from the quality of the candidate `s performance against the standards.

Critical Cross-field Outcomes (CCFO):

UNIT STANDARD CCFO IDENTIFYING

Identify and solve problems using critical and creative thinking:
Give opinions, based on data and statistics, on a variety of problems and issues.

UNIT STANDARD CCFO COLLECTING

Collect, analyse, organise and critically evaluate information:
Select organise, and give opinions on statistics to make sense of situations related to the life or work of the learner.

UNIT STANDARD CCFO COMMUNICATING

Communicate effectively:
Use everyday language and mathematical language to represent data, statistics and probabilities and to communicate conclusions.

UNIT STANDARD CCFO CONTRIBUTING

Use mathematics:
Use mathematics to describe and represent situations and to solve life related problems.

UNIT STANDARD ASSESSOR CRITERIA

Assessors should keep the following general principles in mind when designing and conducting assessments against this unit standard:

Focus the assessment activities on gathering evidence in terms of the main outcome expressed in the title to ensure assessment is integrated rather than fragmented. Remember we want to declare the person competent in terms of the title. Where assessment at title level is unmanageable, then focus assessment around each specific outcome, or groups of specific outcomes.

Make sure evidence is gathered across the entire range, wherever it applies. Assessment activities should be as close to the real performance as possible, and where simulations or role-plays are used, there should be supporting
evidence to show the candidate is able to perform in the real situation.

Do not focus the assessment activities on each assessment criterion. Rather make sure the assessment activities focus on outcomes and are sufficient to enable evidence to be gathered around all the assessment criteria.

The assessment criteria provide the specifications against which assessment judgements should be made. In most cases, knowledge can be inferred from the quality of the performances, but in other cases, knowledge and understanding will have to be tested through questioning techniques. Where this is required, there will be assessment criteria to specify the standard required.

The task of the assessor is to gather sufficient evidence, of the prescribed type and quality, as specified in this unit standard, that the candidate can achieve the outcomes again and again and again. This means assessors will have to judge how many repeat performances are required before they believe the performance is reproducible.

All assessments should be conducted in line with the following well-documented principles of assessment: appropriateness, fairness, manageability, and integration into work or learning, validity, direct, authentic, sufficient, systematic, open and consistent.

UNIT STANDARD NOTES

N/A