Oide

Tacú leis an bhFoghlaim Ghairmiúil i measc Ceannairí Scoile agus Múinteoirí

Supporting the Professional Learning of School Leaders and Teachers

Leaving Certificate Agricultural Science

Information Processing 2
Jan/Feb 2024

Introducing Oide

Oide

Tacú leis an bhFoghlaim Ghairmiúil i measc Ceannairí Scoile agus Múinteoirí

Supporting the Professional Learning of School Leaders and Teachers

Lárionad Ceannaireachta Scoile
CSL
Centre for School Leadership

An tSraith Shóisearach do Mhúinteoirí
JuniorCYCLE for teachers

NIPT
An Clár Náisiúnta Ionduchtaithe do Mhúinteoirí
The National Induction Programme for Teachers

PDST
Professional Development Service for Teachers | An tSeirbhís um Fhorbairt Ghairmiúil do Mhúinteoirí

Contact Details

General:

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Web: www.oide.ie
X: @oide_Ireland

Ag Science:

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School support: postprimarysupport@oide.ie
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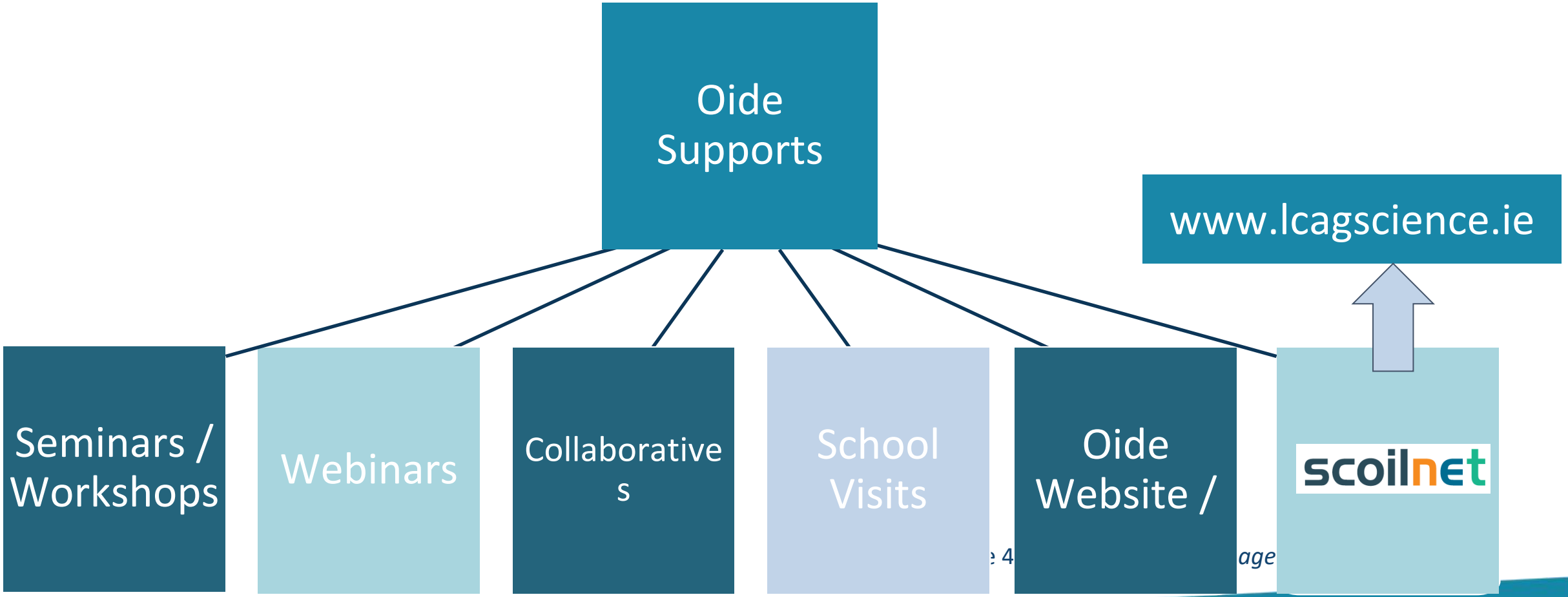
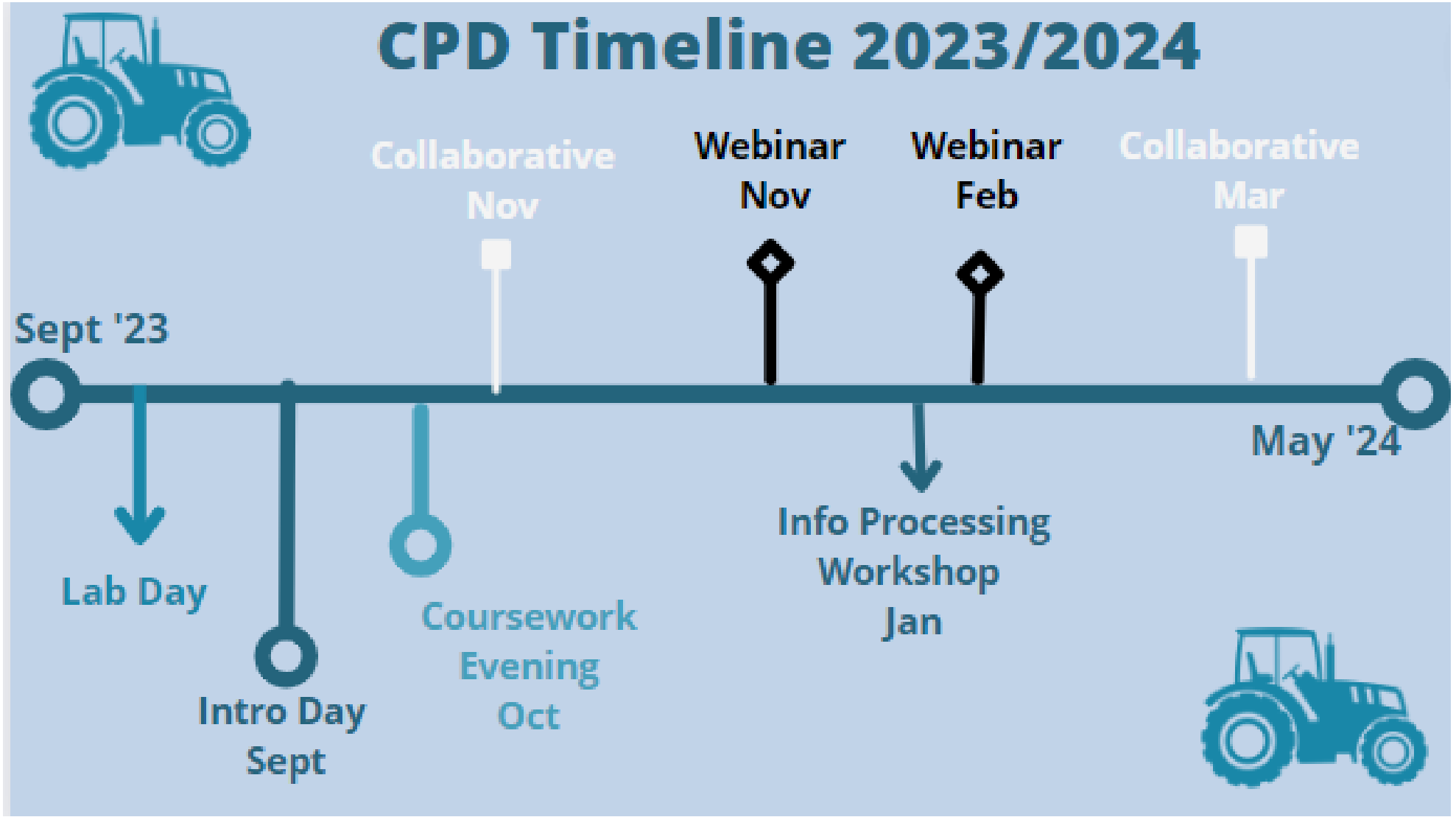
Science Resources for Teachers

Scoilnet supports primary and post primary teachers in sharing and finding useful classroom resources: www.scoilnet.ie

Leaving Certificate Agricultural Science : www.lcagscience.ie
Leaving Certificate Biology: www.pdstbiology.com/
Leaving Certificate Chemistry: pdst.ie/post-primary/sc/chemistry
Leaving Certificate Physics: https://pdst.ie/sc/physics
Junior Cycle Science: https://www.jct.ie/science/science

Oide Supports




CPD Timeline 2023/2024
Collaborative Nov
Webinar Nov
Webinar Feb
Collaborative Mar
Sept '23
May '24
Lab Day
Intro Day Sept
Coursework Evening Oct
Info Processing Workshop Jan

Oide

Overview of the Evening

Time	Outline
19:00 - 19:50	Session 1: Analysing data sets: exploring different types of graphs and data analysis that students might use
19:55 - 20:05	Tea/Coffee
20:05- 20:55	Session 2: Processing information from exam papers in tabular, graphical or pictorial form
20:55 - 21:00	Evaluation

Key Messages

Enhance and develop teachers' ability to use pedagogical approaches that better enable and better support students to:

- Interpret and analyse information in its various forms (numerical, graphical, written and pictorial) and see its relevance to their own studies.
- Use information in pictorial format to spark curiosity and act as a stimulus for hypothesising or for assessment.
- Engage with data in a diversity of forms developing students' ability to present their own primary data from investigations in varied formats.

Learning Intentions

By the end of this session participants will:

- Enhance and develop their ability to use pedagogical approaches incorporating information presented in multiple formats to support teaching, learning and assessment and development of key skills.
- Gain an understanding of the range of statistical analysis students have from engaging with Junior Cycle Maths.
- Develop an understanding of a range of possible data analysis methods that students could engage with in their investigations.

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Supporting the Professional Learning of School Leaders and Teachers

Session 1

Analysing data sets: exploring different types of graphs and data analysis that students might use

Recap on Information Processing 1

In March 2023 teachers worked on:

- Presenting data: features of quality
- Summarising scientific texts
- Referencing scientific texts
- Evaluating the reliability and validity of a scientific claim

Rationale

"Candidates should consider how best to represent their data. They should choose the type of graph, table, or other presentationa form which best suits the data they wish to display. Replication of similar information in many formats should be avoided. One judiciously chosen representation (or perhaps two – one being tabular and the other graphical) is much more effective. "

(SEC, 2021 p5)

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Coursework

Information note for four Leaving Certificate subjects with new subject specifications

- Agricultural Science – Individual Investigative Study
- Computer Science – Coursework Project
- Economics – Student Research Project
- Physical Education – Physical Activity Project

Prior Knowledge - JC Key Skills

Managing Information and Thinking

- Being curious
- Gathering, recording, organising and evaluating information and data
- Thinking creatively and critically
- Reflecting on and evaluating my learning
- Using digital technology to access, manage and share content

Skills Pathways in Investigations

Skill	Progression			
Analysing Evidence	Draw/discuss work in everyday terms Record (with support) in tables provided by the teacher	Compare results Record independently in tables provided by the teacher	Use different ways to display results Make statements about what the results show	Present results clearly Explain results clearly

(NCSE, 2008, p. 108)

Prior Knowledge - JC Maths

SP.3 carry out a statistical investigation which includes the ability to:

a. generate a statistical question

b. plan and implement a method to generate and/or source unbiased, representative data, and present this data in a frequency table

c. classify data (categorical, numerical)

d. select, draw and interpret appropriate graphical displays of univariate data, including pie charts, bar charts, line plots, histograms (equal intervals), ordered stem and leaf plots, **and ordered back-to-back stem and leaf plots**

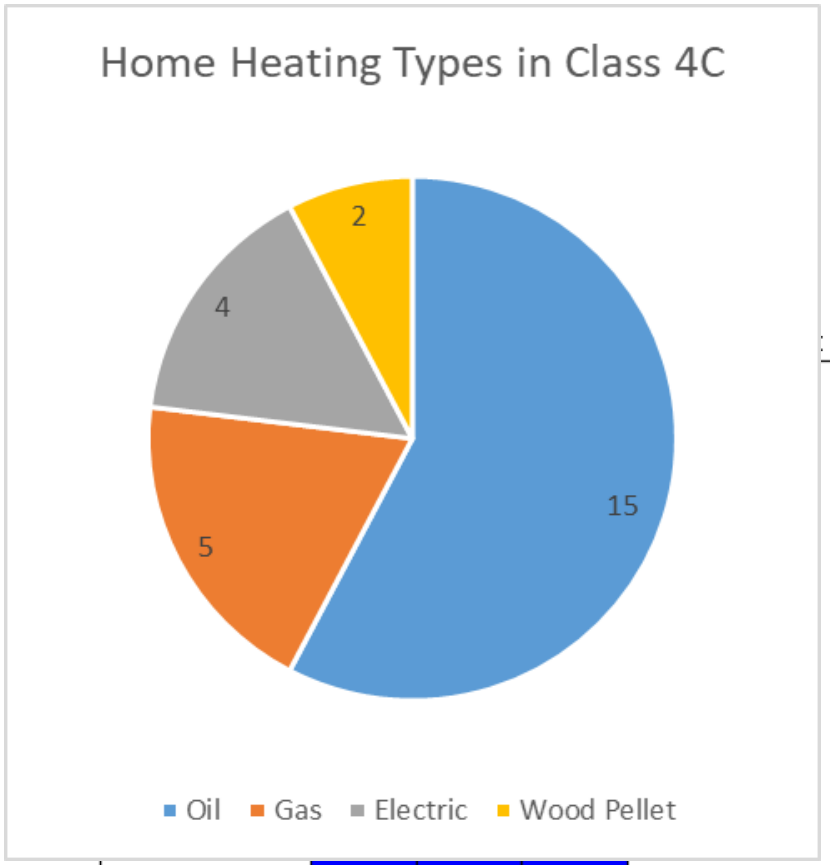
e. select, calculate and interpret appropriate summary statistics to describe aspects of univariate data. Central tendency: mean **(including of a grouped frequency distribution),** median, mode. Variability: range

f. evaluate the effectiveness of different graphical displays in representing data

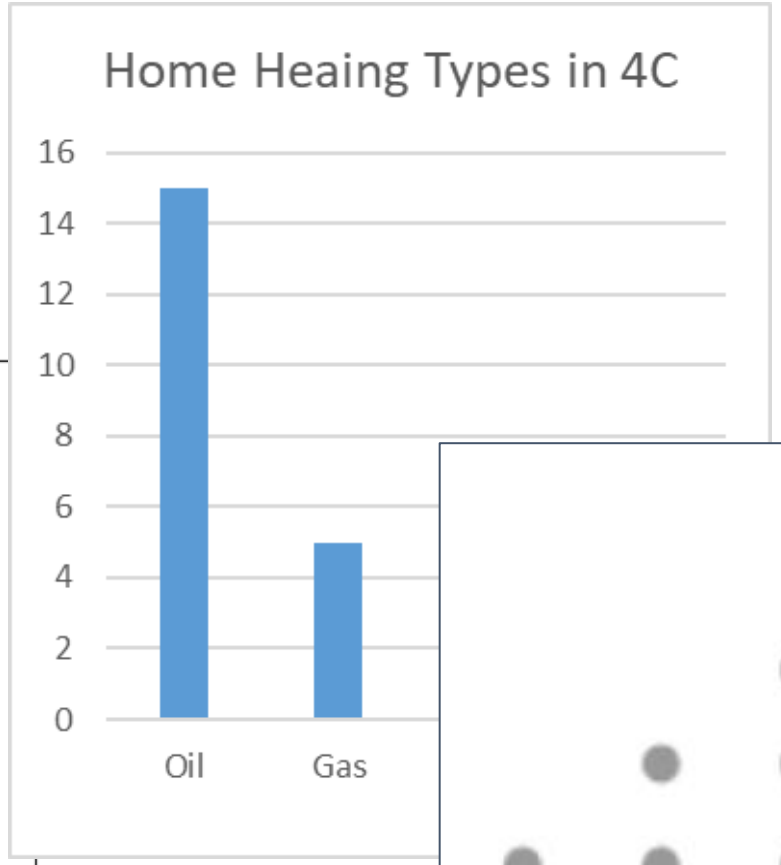
g. discuss misconceptions and misuses of statistics

h. discuss the assumptions and limitations of conclusions drawn from sample data or graphical/numerical summaries of data

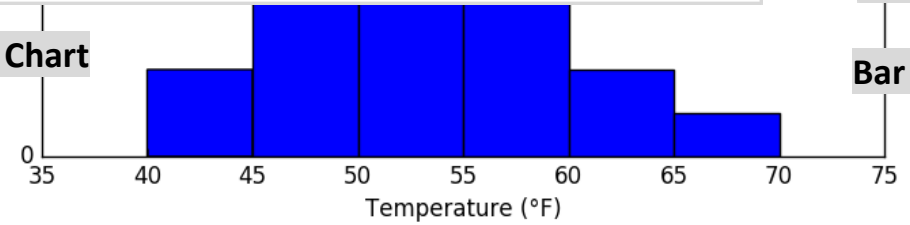
Prior Knowledge: JC Maths Graphs



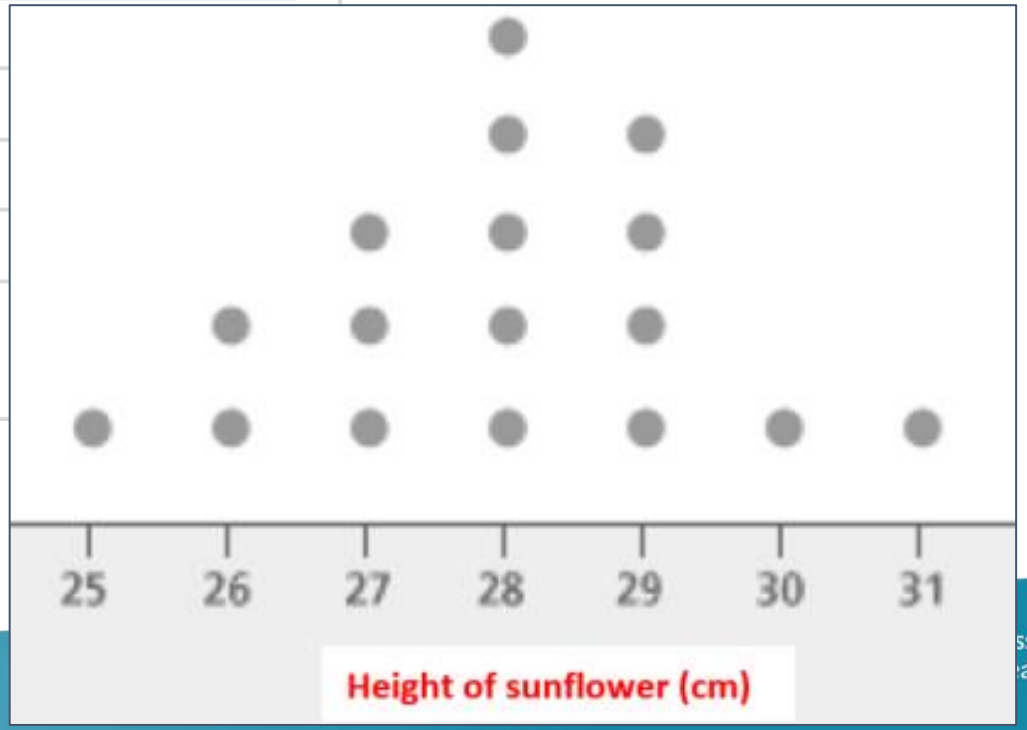
Pie Chart



Bar Chart



Histogram



Prior Knowledge: JC Maths Graphs

Energy usage in kWh each of 26 days of November in our school

65	58	72	78	68	69	81
58	74	59	67	76	65	73
66	74	67	91	76	69	69
62	64	77	73	83		

Key: 3|1 means 31

Stem and Leaf Plot

26 values in order

58	58	59	62	64	65	65
66	67	67	68	69	69	69
72	73	73	74	74	76	76
77	78	81	83	91		

Energy usage in kWh each of 26 days of November in our school

r Building

5 6 7 7 8 9 9 9

4 4 6 6 7 8

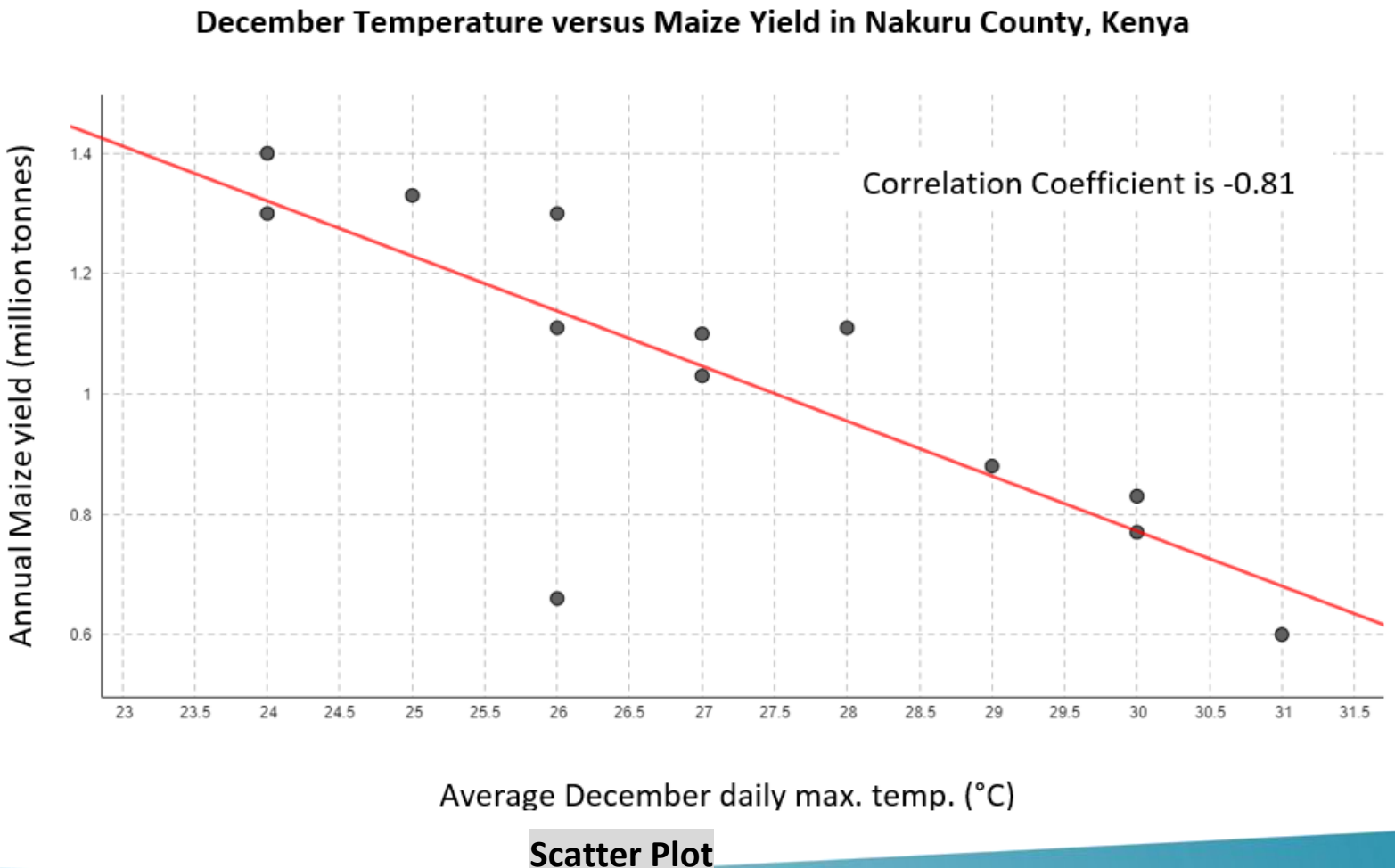
9 7 7 6 4 3 2 2 | 8 | 1 3

9 5 3 1 | 9 | 1

Key: 5|8 means 58 kWh

Back to Back Stem and Leaf Plot

Future Learning - LC Maths, SC Sciences, Economics….



Scatter Plot

- determine the relationship between variables using scatterplots
- recognise that correlation is a value from -1 to +1 and that it measures the extent of the linear relationship between two variables

Prior Knowledge - JC Maths

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Statistical Enquiry Cycle

INVESTIGA

- Is the statistical q concise?
- What are the vari be measured to a
- Is it possible to c answer the quest
- Is it possible to d required data in a
- Is an experiment study being cond

ORGANISE AND MANAGE DATA

- Is the data displayed in a table, diagram, chart and/or graph?
- Is the data summarised numerically, graphically, diagrammatically and/or with words?
- Is the display/summary method most appropriate?

GATHERING DATA

An tSraith Shóisearach do Mhúinteoirí

JuniorCYCLE for teachers

ORGANISE AND MANAGE DATA

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- Is the data summarised numerically, graphically, diagrammatically and/or with words?
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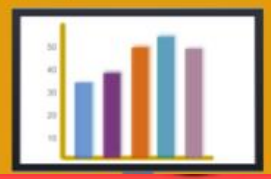
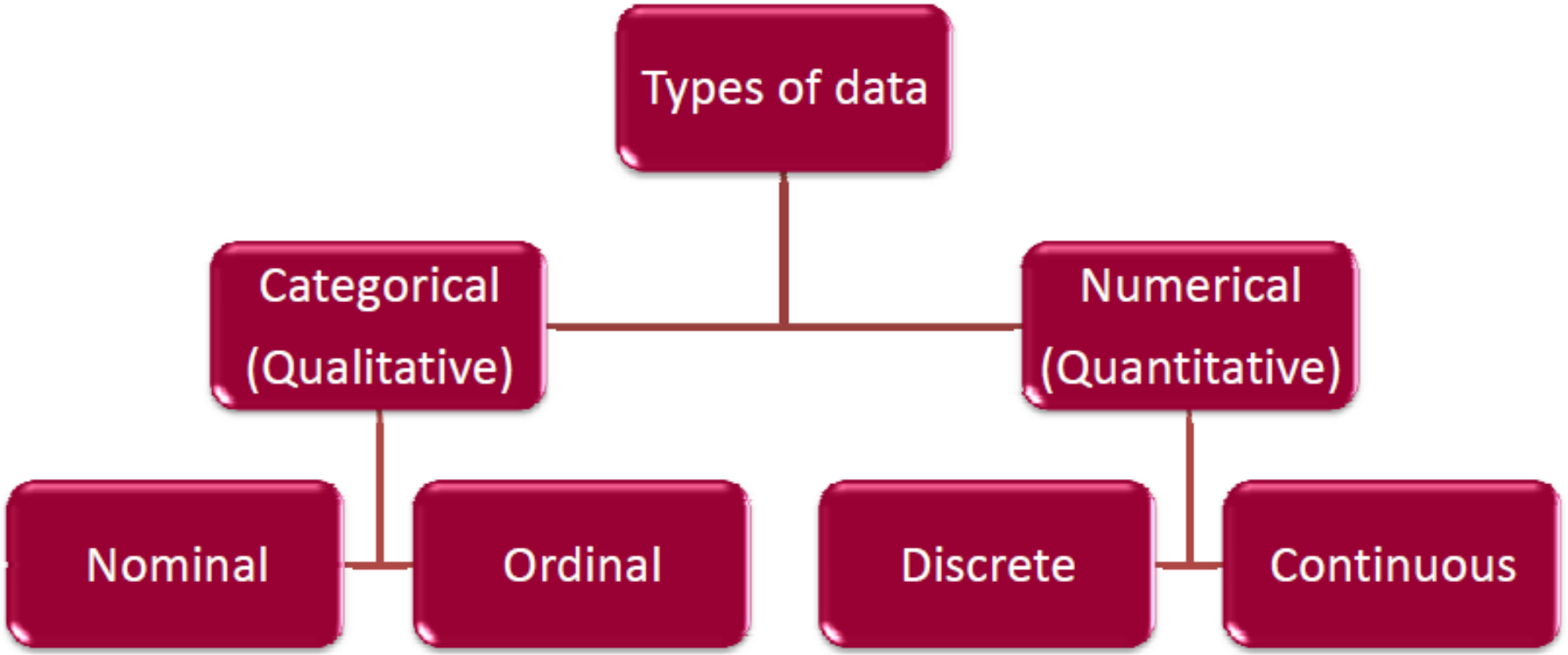


ANALYSE AND INTERPRET DATA

- Is the data, display and/or summary connected to the statistical question?
- How could the investigation be improved?

rofessional
ol Leaders

Types of Data



(Project Maths Development Team, 2008)

Presenting Data

How data should be represented depends on the type of data, and the purpose of the investigation.

		Bar chart	Frequency Table	Histogram	Line of fit	Pie chart	Scatter plot	Stem plot
Single variable	Categories	✓	✓			✓		
	Discrete Variable	✓	✓			✓		✓
	Continuous Variable		✓	✓				✓
Paired Variable	Discrete		✓		✓		✓	
	Continuous		✓		✓		✓	

Students could try out different representations, using bar charts, stem plots, histograms, scatter plots etc. and see which is best and why. Using software here could help.

Stem-and-leaf diagrams – Rationale for use

- All data points are displayed
- Students study stem and leaf plots from 1st year (Maths)
- Applicable to many SPAs on the course, and therefore common variables measured in the IIS
- Compares 2 data-sets side by side for brief analysis of range/spread/outliers
- Offers a second type of visual representation that is not just repeating what can be seen on a bar chart
- Can be typed up in Word easily, no need for Excel

Ag Science Example 1

A student completed an IIS by measuring the biomass of PRG above the ground under 3 different conditions:

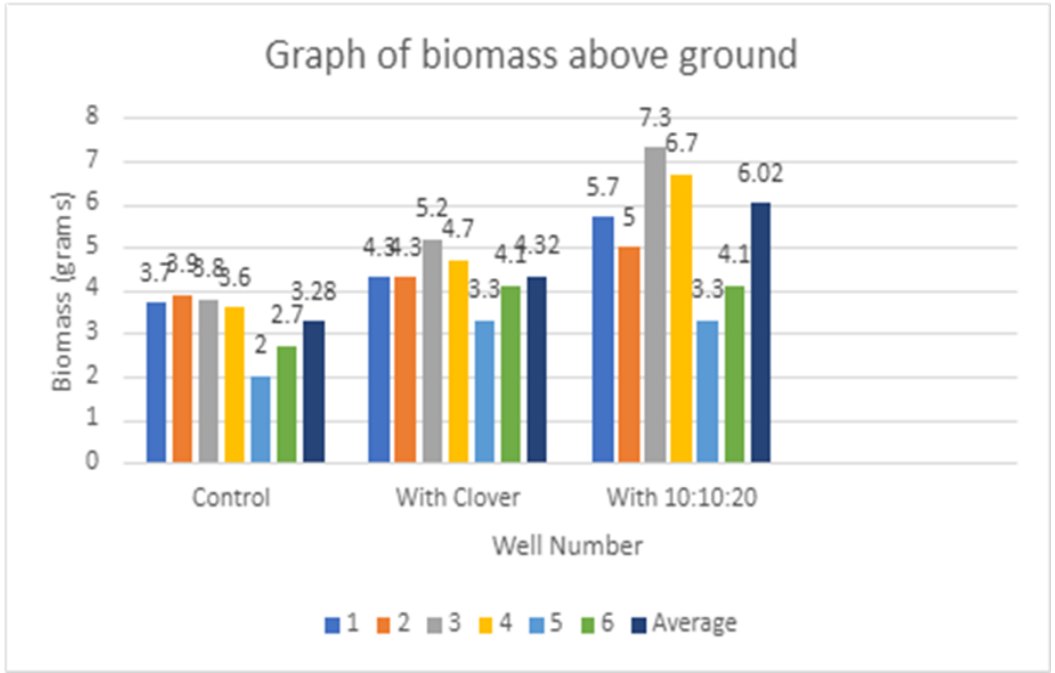
a) no addition (the control)
b) with clover
c) with 10-10-20

The student then decided to analyse the data for all 3 treatments to identify:

1-The median value
2-the maximum and minimum values
3-any outliers
4-compare the range of data

Ag Science Example 1

	Sample Number	Biomass above ground	Average
Control	1	3.7 grams	3.28 grams
	2	3.9 grams	
	3	3.8 grams	
	4	3.6 grams	
	5	2.0 grams	
	6	2.7 grams	
	Sample Number	Biomass above ground	Average
Grass with clover	1	4.3 grams	4.32 grams
	2	4.3 grams	
	3	5.2 grams	
	4	4.7 grams	
	5	3.3 grams	
	6	4.1 grams	
	Sample Number	Biomass above ground	Average
Grass with 10:10:20	1	5.7 grams	6.02 grams
	2	5.0 grams	
	3	7.3 grams	
	4	6.7 grams	
	5	5.3 grams	
	6	6.1 grams	



Spreadsheet software's recommended chart (first on list).
What does it tell us?

Ag Science Example 1

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	4	6.7 grams	
	5	5.3 grams	
	6	6.1 grams	

Stem and Leaf of biomass above the ground (g)

Control	Stem	Grass with clover
70	2	
6789	3	3
	4	1337
	5	2
	6	
	7	

Avg:3.28g Avg:4.32g

Control	Stem	Grass with 10-10-20
70	2	
6789	3	
	4	
	5	037
	6	17
	7	3

Avg:3.28g Avg:6.02g

Key: 3 | 3= 3.3

Stem and leaf diagram.
What does it tell us?

Box Plots – Rationale For Use

- Allows for display of statistical parameters on the graph without adding on another graph
- Can compare as many sets of data as you have or want
- Demonstrates innovation in IIS if used correctly
- Can be hand drawn easily, Excel not necessary
- Allows students to demonstrate strong maths skills
- Often used in Agricultural science research findings

Ag Science Example 2

A student completed an IIS by measuring the biomass of PRG above the ground under 3 different conditions:

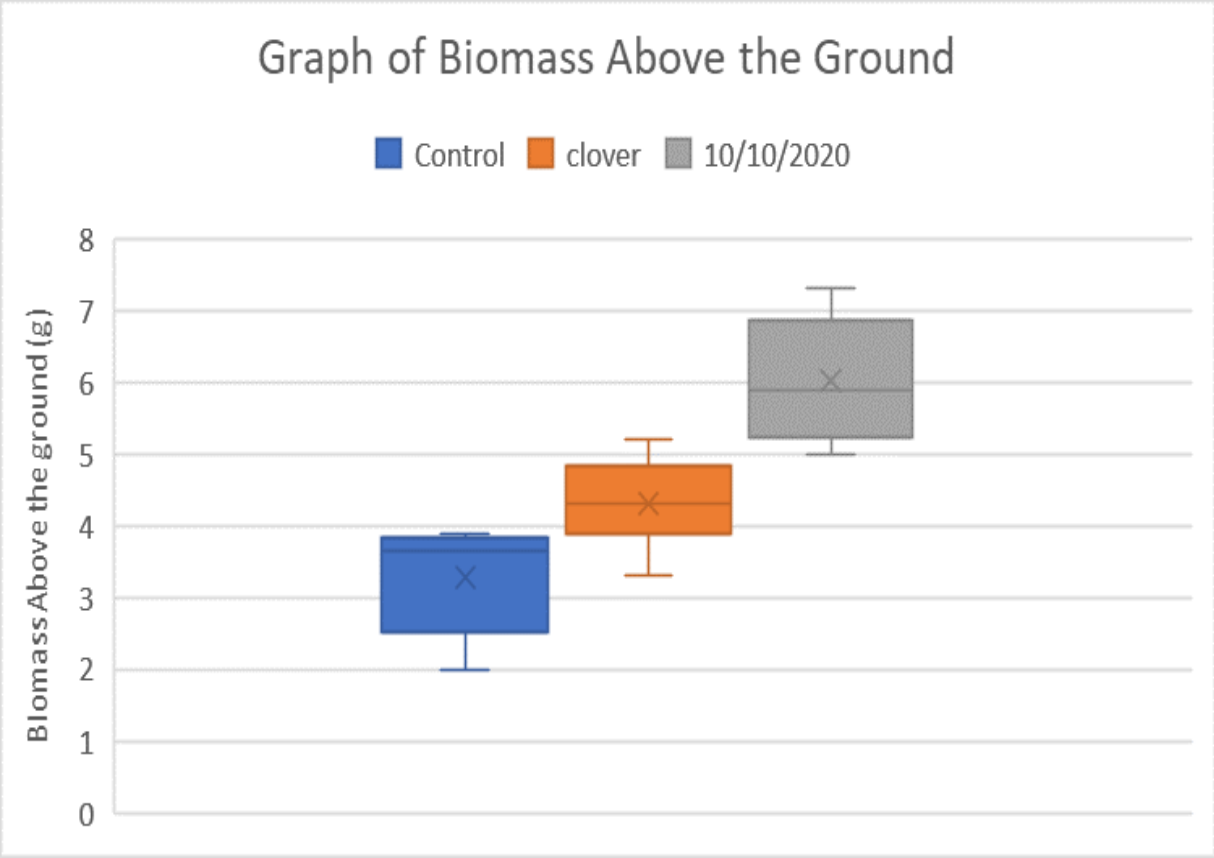
a) no addition (the control)
b) with clover
c) with 10-10-20

The student then carried out some basic statistical analysis to include
-listing the min, max and median values
-calculating the mean and interquartile range

Sample No	Control	clover	fertilizer 10-10-20
1	3.7	4.3	5.7
2	3.9	4.3	5
3	3.8	5.2	7.3
4	3.6	4.7	6.7
5	2	3.3	5.3
6	2.7	4.1	6.1
Min	2	3.3	5
Max	3.9	5.2	7.3
Mean	3.28	4.31	6.01
Median	3.65	4.3	5.9
1st Q	2.52	3.9	5.22
3rd Q	3.825	4.825	6.85
IQR	1.3	0.925	1.625

Ag Science Example 2

Where do you see the data from the table represented on the graph?



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4	3.6	4.7	6.7
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6	2.7	4.1	6.1
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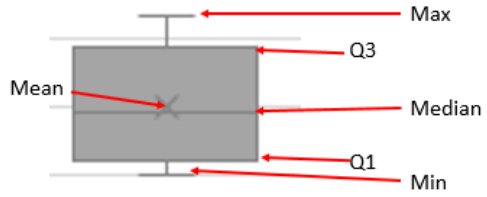
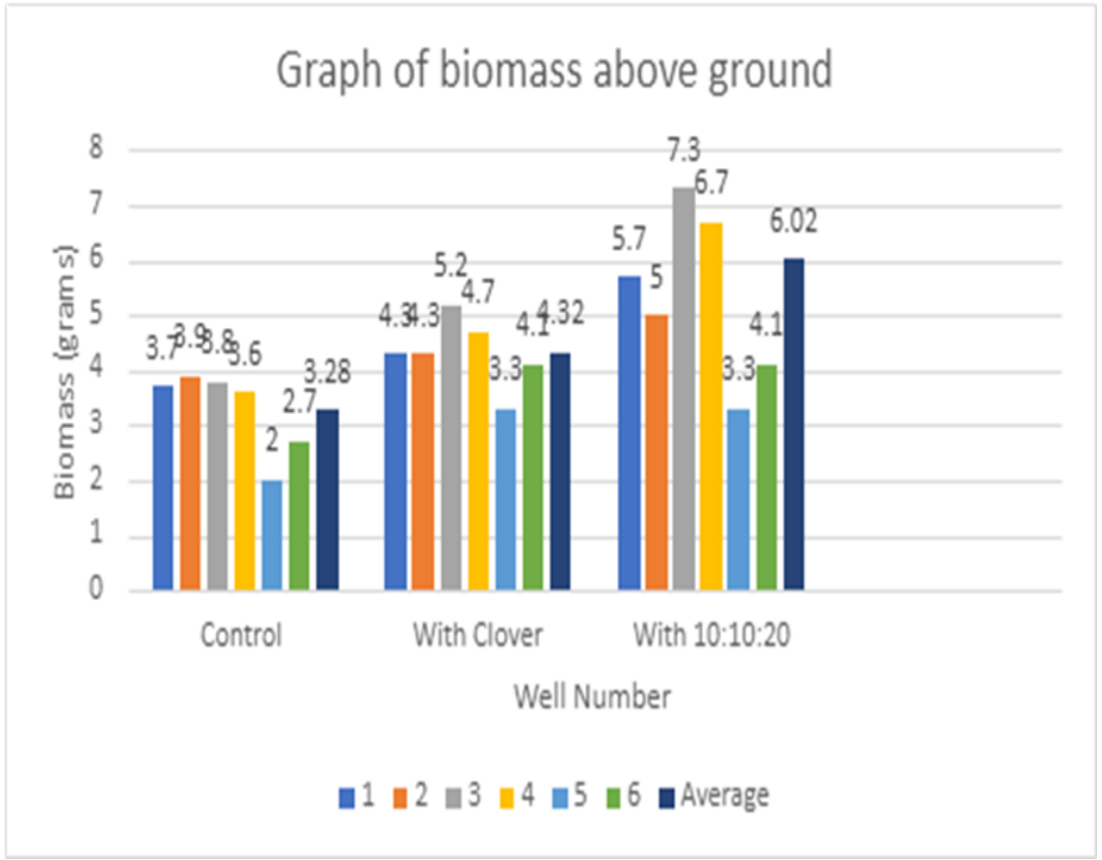
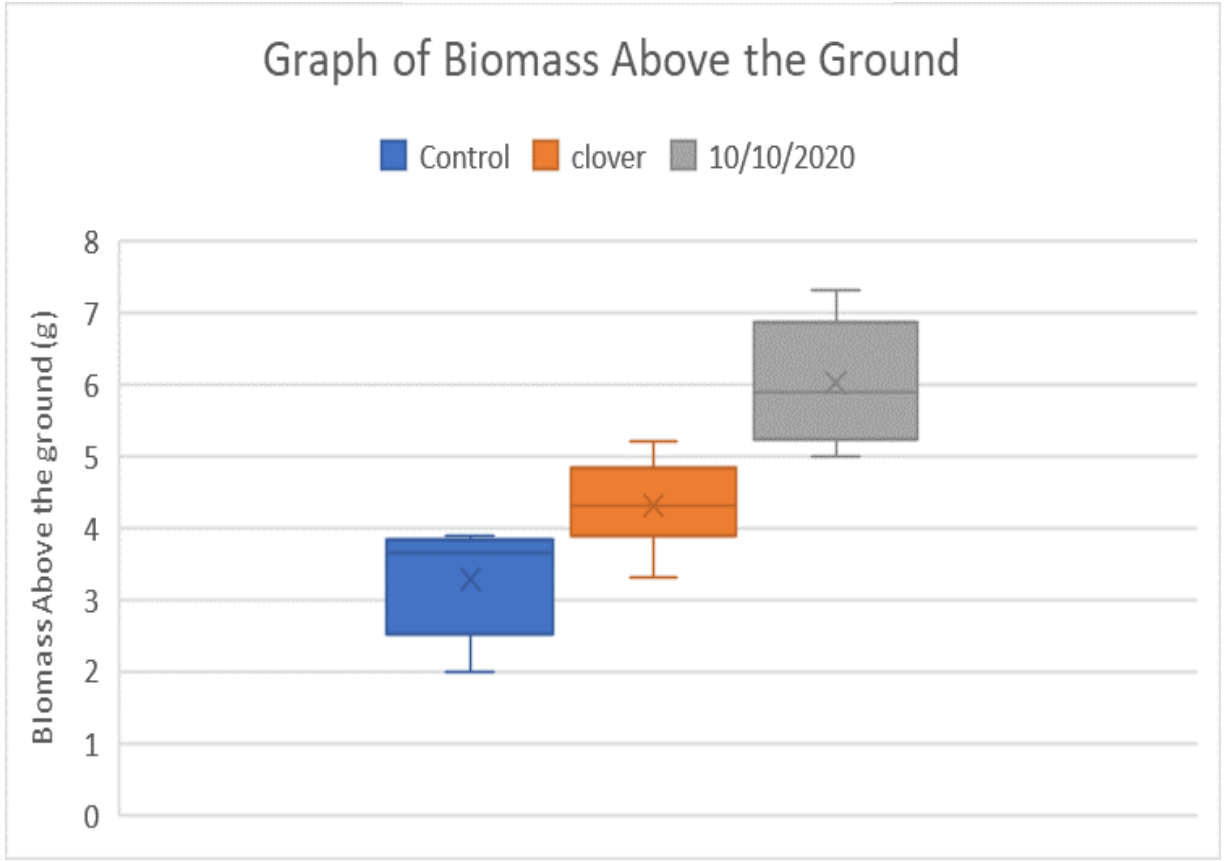
Ag Science Example 2







Activity 1

Part A: Choose appropriate graph(s) and calculation(s) to represent the data and question the reliability of the data?

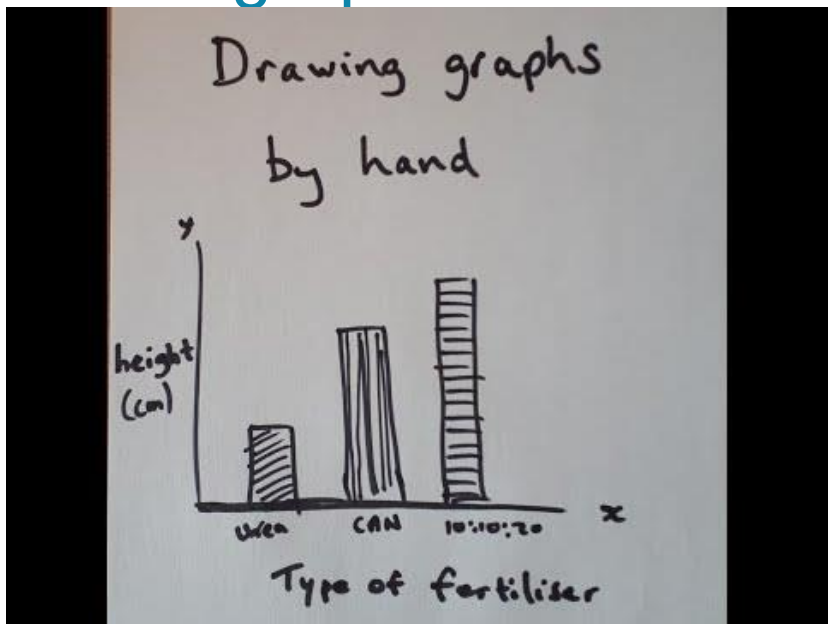
Jamboard

Part B: Consider what SPAs or other investigations might be suitable to present using stem and leaf diagrams and box plots?

Supports to Help With Data Analysis

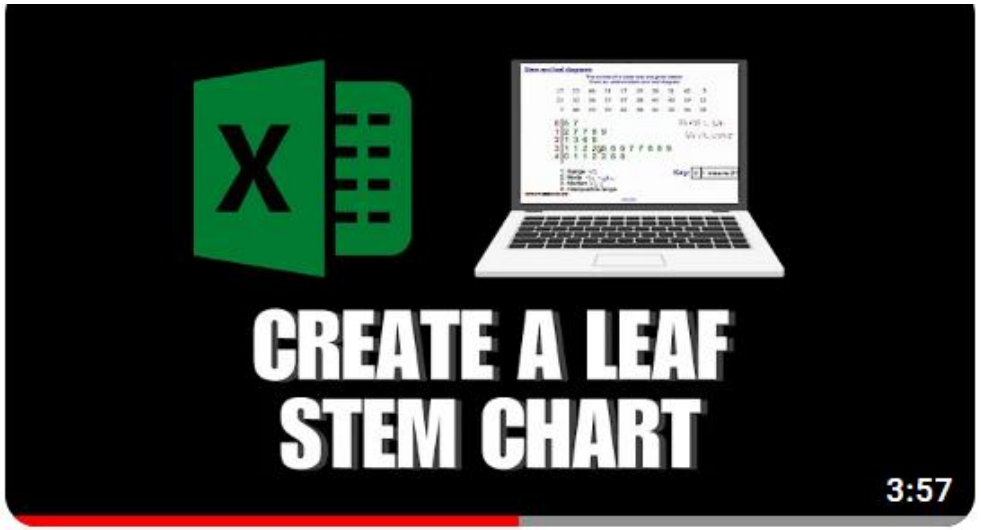
A “how-to” Guide for Excel for Teachers and Students of Agricultural Science

A “how-to” Guide for uploading images of hand-drawn graphs

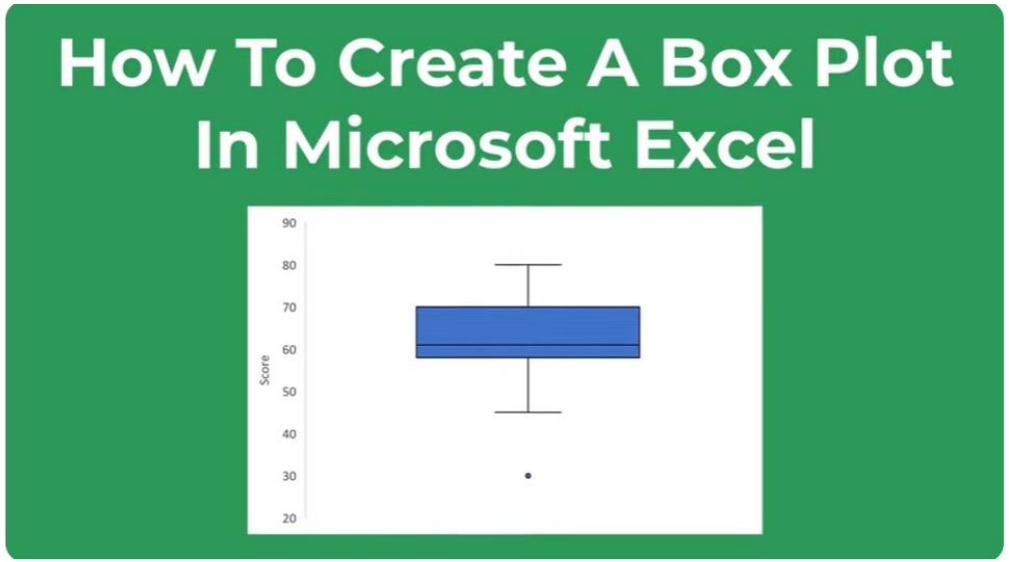


All five videos are available here. They progress in difficulty for the user as they go along.

Supports to Help With Data Analysis



How to create stem and leaf diagrams in Excel



How to create box plots in Excel

Coffee Break

Oide

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Supporting the Professional Learning of School Leaders and Teachers

Session 2

Processing information from exam papers in table, graphical or pictorial format

Rationale

"To support candidates' understanding of the use of secondary data, a range of secondary data sources could be incorporated into classroom learning. This will help to familiarise candidates with their use and how they should be interpreted, understood and analysed. "

(SEC, 2021 p5)

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Coursework

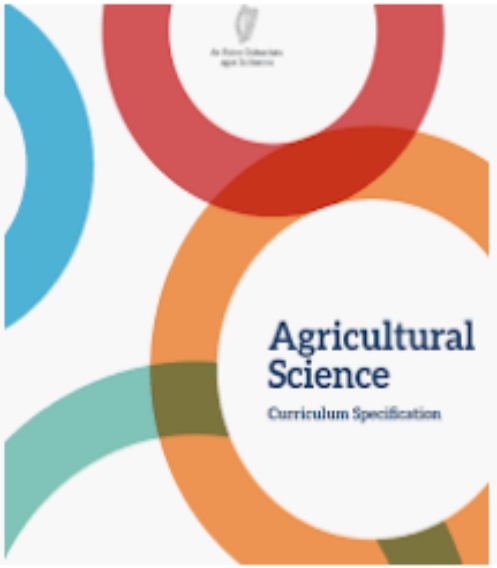
Information note for four Leaving Certificate subjects with new subject specifications

- Agricultural Science – Individual Investigative Study
- Computer Science – Coursework Project
- Economics – Student Research Project
- Physical Education – Physical Activity Project

Rationale

Learning Outcome 1.4

“Read and evaluate scientific information related to agriculture, drawing on a variety of sources: media, websites, agri-food event and other agricultural resources- including people involved in the agri-food industry.”



(NCCA, Ag Science Specification, 2019, p. 17)

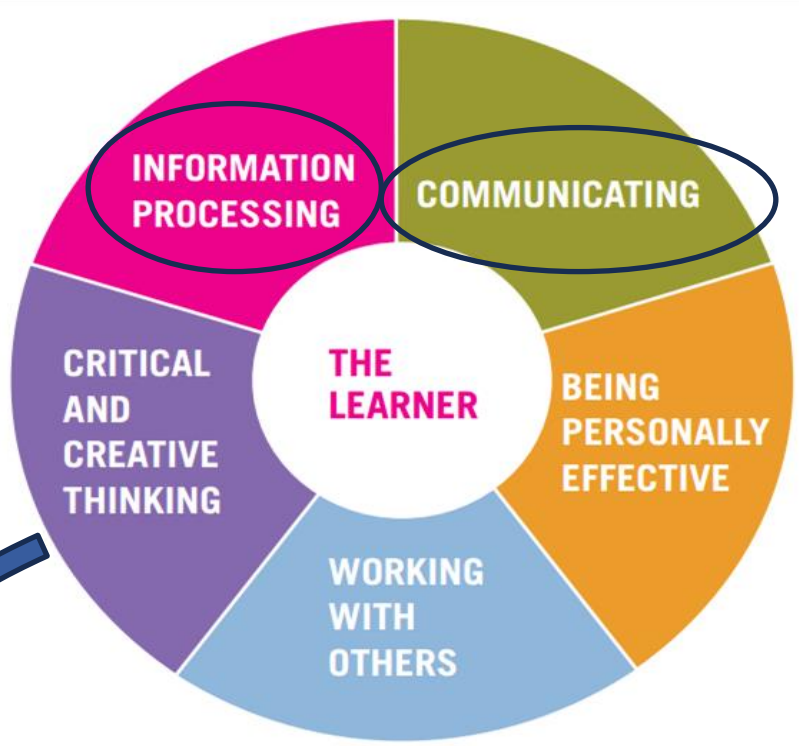
Information given in table format

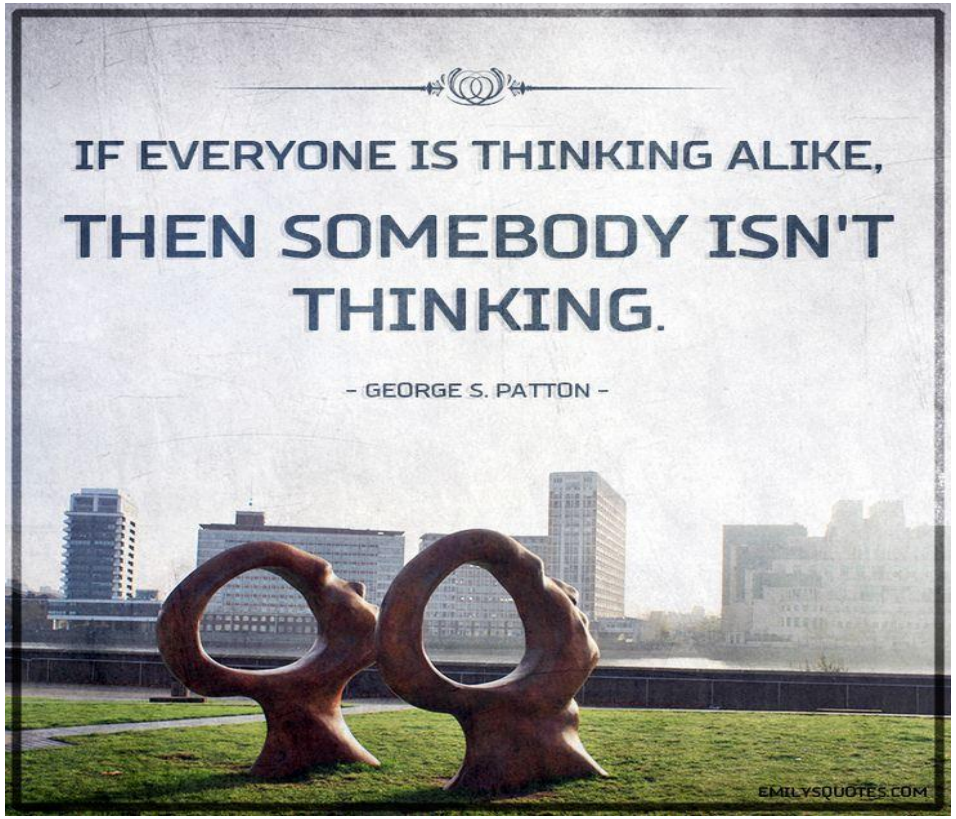
Silage Quality				
% Dry Matter Digestibility (DMD %)	75	70	65	60
Harvest date	20 May	2 June	15 June	28 June
Silage tonne Dry Matter per ha	4.6	6.0	7.0	7.7
Intake (kg/day)	9.0	8.3	7.6	7.0
Liveweight gain (kg/day)	0.83	0.66	0.49	0.31

(Adapted from Teagasc, 2021)

SEC, 2022 HL Paper,Q12 a

Engaging with Key Skills





Change the format

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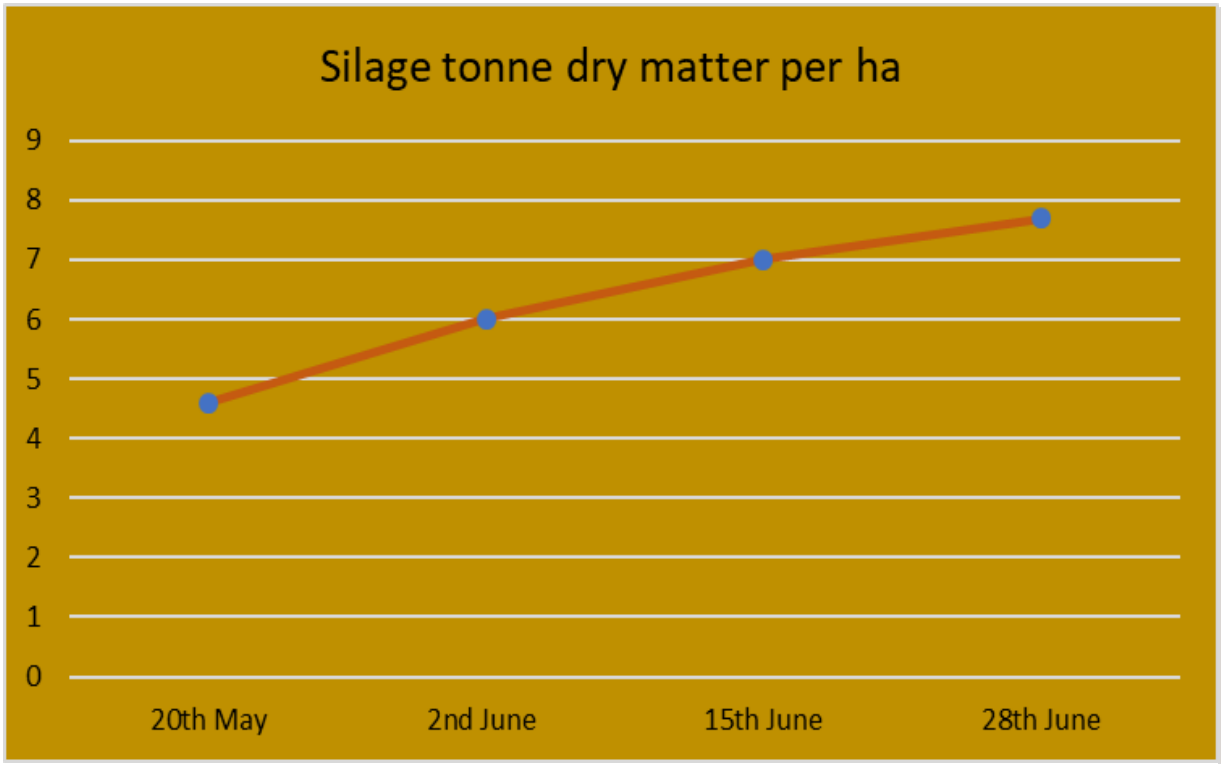

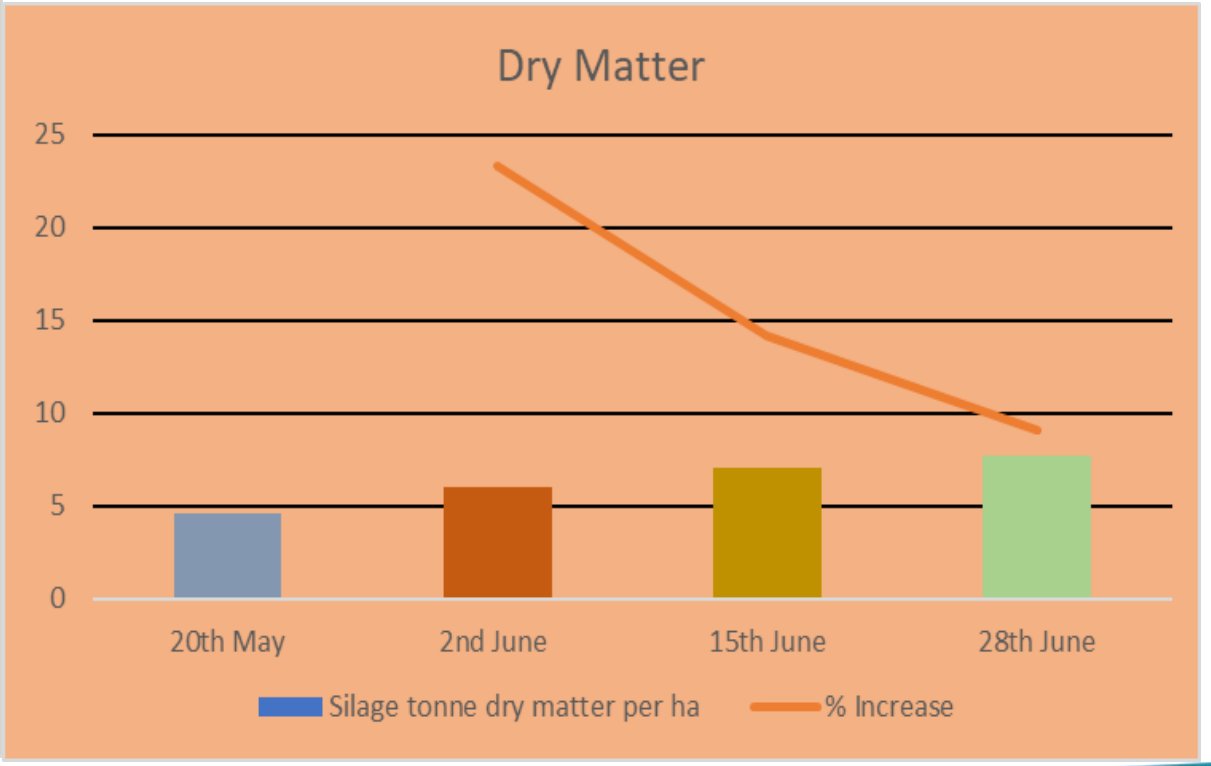

Change it again

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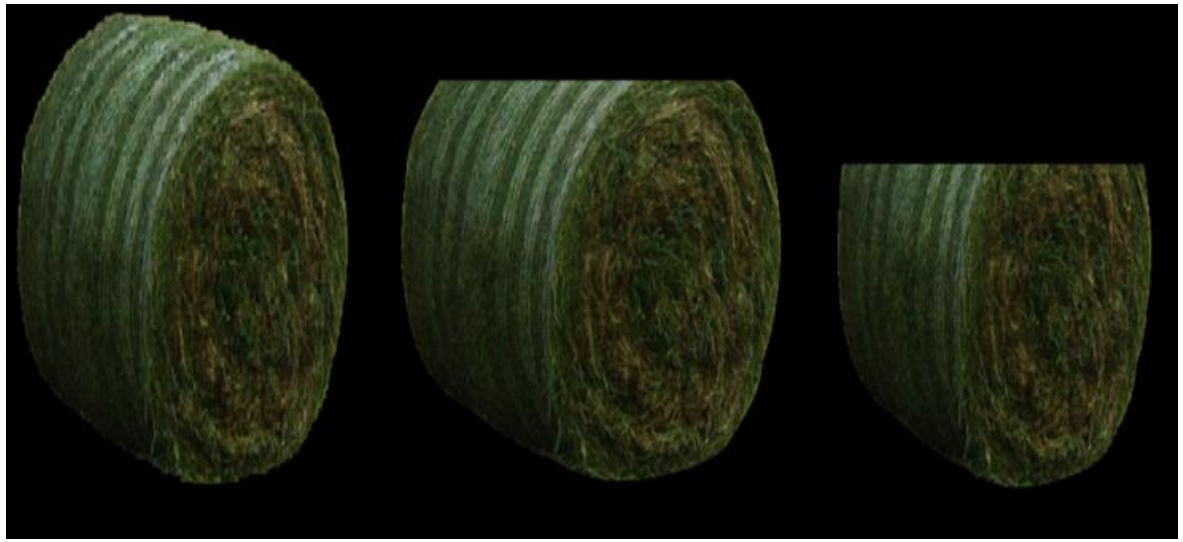
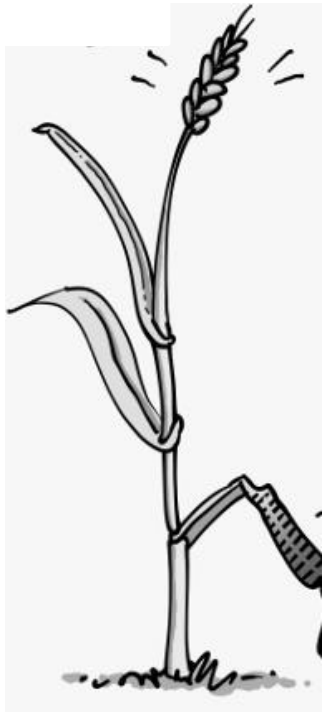


Regular silage bale

May 20th: 75% useable by the cow

June 28th: 75% useable by the cow

May 20th: 25% undigestible



June 28th: 40% undigestible

And again…

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Harvest date	20 May	2 June	15 June	28 June
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Liveweight gain (kg/day)	0.83	0.66	0.49	0.31

(Adapted from Teagasc, 2021)

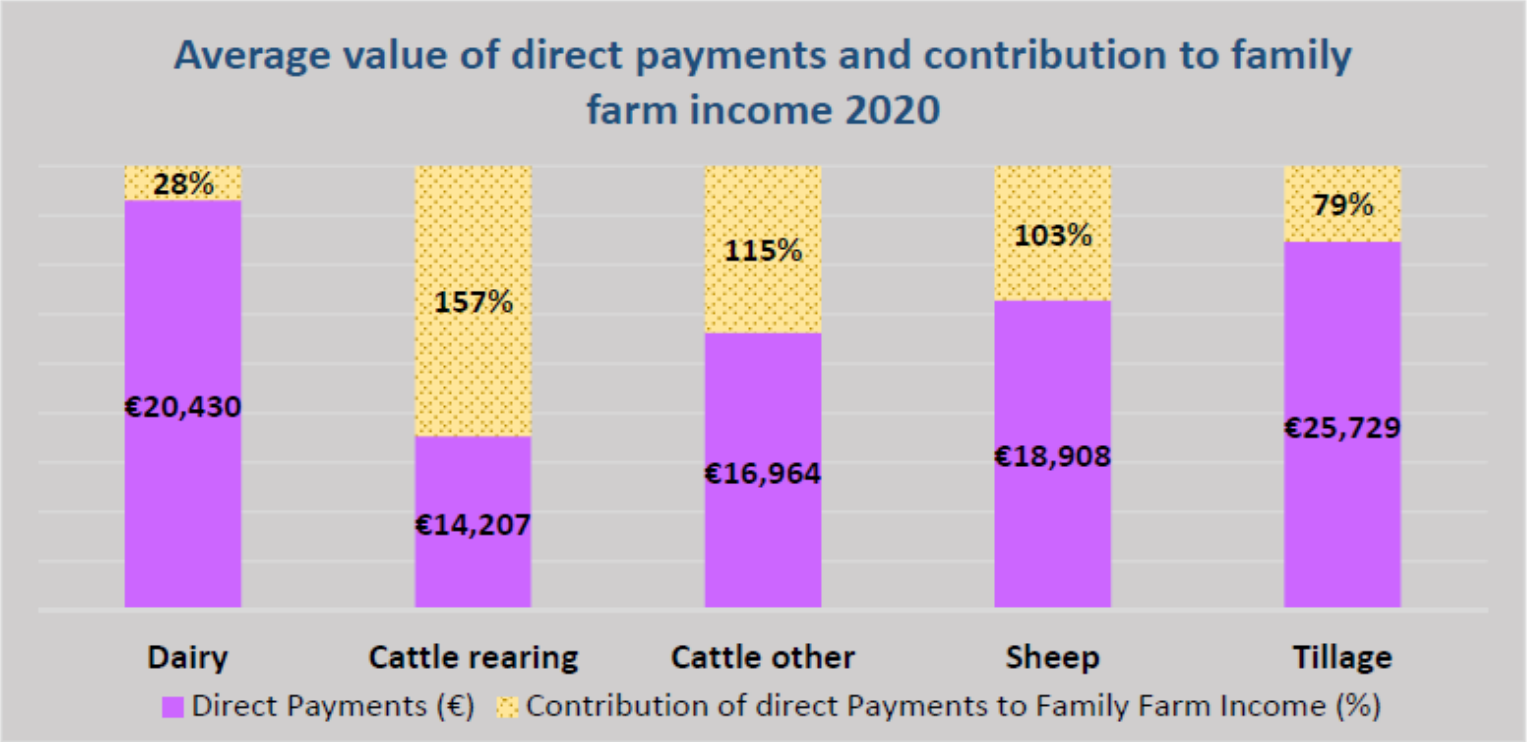
What is the key learning?
Factors that affect silage quality are

- Dry Matter %
- Dry Matter digestibility.
- Cutting Date

This affects:
Intake and Liveweight gain

Information given in graphical format

(c) Analyse the graph on the contributions direct payments from the EU made to the family farm income per agricultural enterprise.



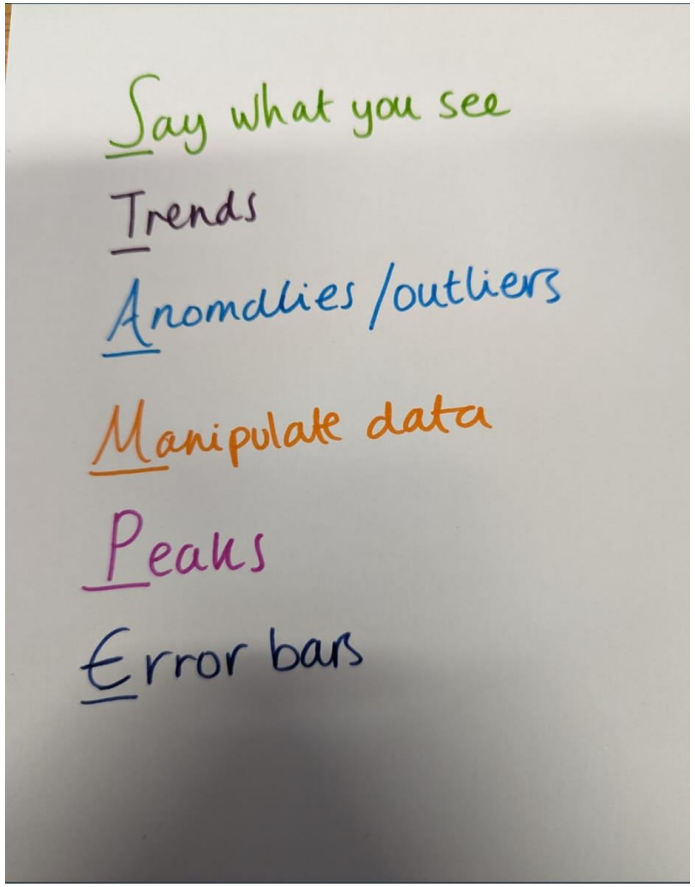
(Adapted from Teagasc National Farm Survey, 2021)

(i) Identify which enterprise relies heaviest on direct payments.
State a reason for your answer.

SEC, 2022 HL Paper,Q17 c

Approach to a dataset

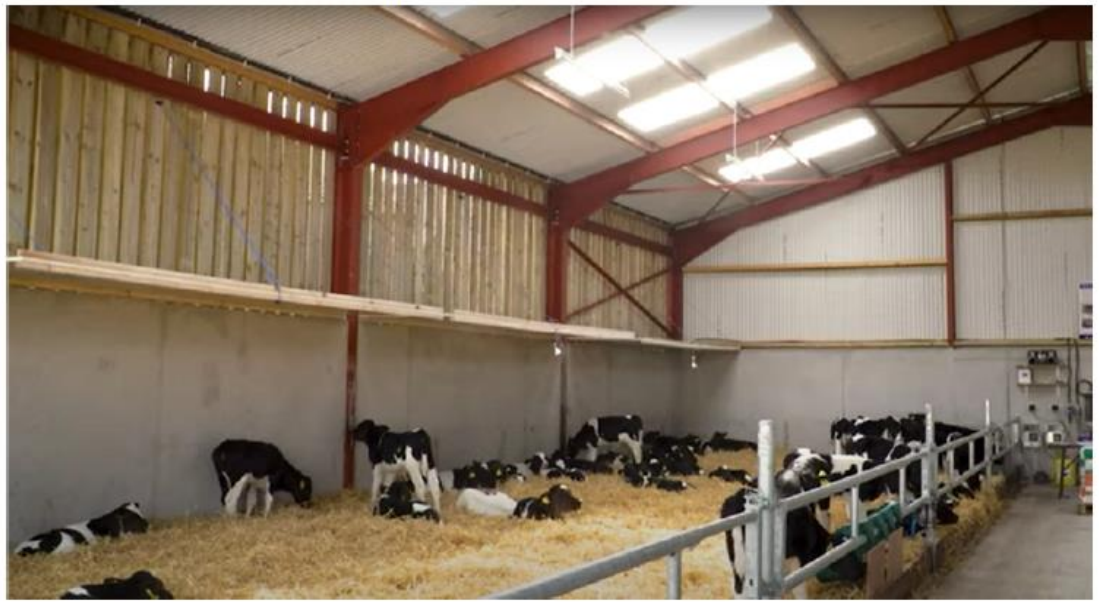
Taking a dataset and analyse the data. Answering questions such as:
What trends do you see?
What do you think is causing this trend?
Are there any outliers, anomalies?
What statistical analysis could help your analysis?
Use the acronym STAMPE for example



Information provided in pictorial format

(c) Analyse the picture of calf housing below and answer the questions which follow.

(i) Identify **three** aspects of the shed which make it a suitable environment for calves and provide a reason for each aspect identified.



SEC, 2022 HL Paper,Q14 c

Pitfalls to avoid when using pictures

1. Ensure they are not hazy or pixelated.
2. Ensure that they are not out of shape.
3. Check that the angle makes the photograph real e.g. overhead shots confuse.
4. Ensure that there is no ambiguity.
5. Consider copyright issues

Tips for using pictures as a resource

1. Get high quality photos e.g. Teagasc is a good source.
2. Get photos that show exactly what you are looking for. There are no extras in the photo.
3. Use the photo to scaffold the questions starting with easy, identify but lead to higher order questions.
4. Clarify anything that might be uncertain with captions, labels or extra information

Photos: to build curiosity

Examine the photograph shown as a prompt.

What do you notice?

What further questions do you have?

Activity 2

Part A: Work collaboratively to engage with photo-based activities.

Jamboard

Part B: Consider what areas of the specification might you use of data in various formats to support teaching, learning and assessment in the agricultural science classroom

Feedback

What was your experience of engaging with information processing in different formats this evening?

What practices from this evening's workshop will you use with your students?

How have you previously engaged with information processing in your classroom?

Supports to help with IIS

A document containing helpful information for teachers and students about completing the written report of the Individual Investigative Study.

It contains tips for completing each section as well as links to:

- Referencing tools
- Literacy supports
- SEC Information Note & Marking Criteria
- Supportive informative videos

Key Messages

Enhance and develop teachers' ability to use pedagogical approaches that better enable and better support students to:

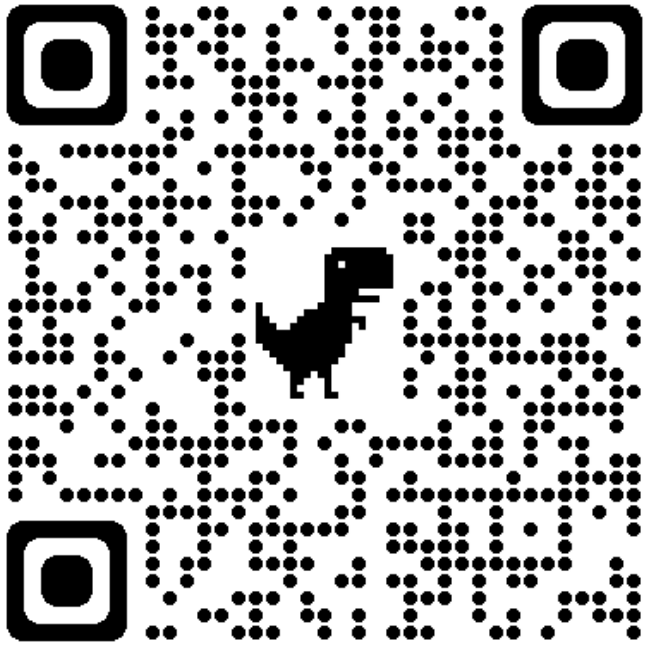
- Interpret and analyse information in its various forms (numerical, graphical, written and pictorial) and see its relevance to their own studies.
- Use information in pictorial format to spark curiosity and act as a stimulus for hypothesising or for assessment.
- Engage with data in a diversity of forms developing students' ability to present their own primary data from investigations in varied formats.

Learning Intentions

By the end of this session participants will:

- Enhance and develop their ability to use pedagogical approaches incorporating information presented in multiple formats to support teaching, learning and assessment and development of key skills.
- Gain an understanding of the range of statistical analysis students have from engaging with Junior Cycle Maths.
- Develop an understanding of a range of possible data analysis methods that students could engage with in their investigations.

Evaluation



https://forms.gle/DRcYyMeyk7WF2y7c8

References

Image on slide 38:https://emilysquotes.com/if-everyone-is-thinking-alike-then-somebody-isnt-thinking/

Image on slide 43: https://twitter.com/Nicolelogier22/status/1598705081645379584/photo/1

Image on slide 45: https://news.cgtn.com/news/3d596a4d7951444e/share_p.html

Image on slide 46: https://www.teagasc.ie/news--events/daily/grassland/grassland---mixing-it-up.php

Image on slide 47: https://www.farmersjournal.ie/beef/breeding-and-health/when-to-intervene-when-calving-the-cow-598768