

An tSraith Shóisearach do Mhúinteoirí

Junior **CYCLE** for teachers

Learning Log

Mathematics

Cluster Workshop

2019-2020



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Learning Intentions

Explore the role of collaborative planning and formative assessment on students' experience and learning of Mathematics

Explore the role of professional discussions and departmental collaboration in developing a shared understanding of the quality of students' work

Examine the use of authentic data and the Statistical Enquiry Cycle to motivate students' learning in statistics

Sample Unit of Learning

Concept: Relationships and Variables

Student Context: Second year students

Learning Outcomes: AF1 (a) (b) (c), AF4 (a) (b), AF6, AF7 (c) (d), GT1, GT2 (a) (c) (e), N3 (b)

Key Learning:

- Students should understand that there are a variety of mathematical representations that can be useful when solving problems, including:
 - understanding that different representations preserve meaning
 - understanding that different representations may expose features of a problem that others do not
 - understanding that different representations may be used in conjunction with each other
- Student should further develop their understanding of a variable, including:
 - understanding that a variable is a quantity that can vary in the context of a mathematical problem
- Students should further develop their understanding of relationships as functions, including:
 - understanding that the dependent variable is governed by the independent variable(s)
 - understanding that ordered pairs are instances of a function
 - being able to quantify the change between variables
 - being able to identify and classify the type of change between variables

Ongoing Assessment

- Can the student use the most appropriate representation(s) of a problem to analyse, interpret and present their solution(s)?
- Can students transition between a variable and a fixed unknown in context?

Learning Experiences

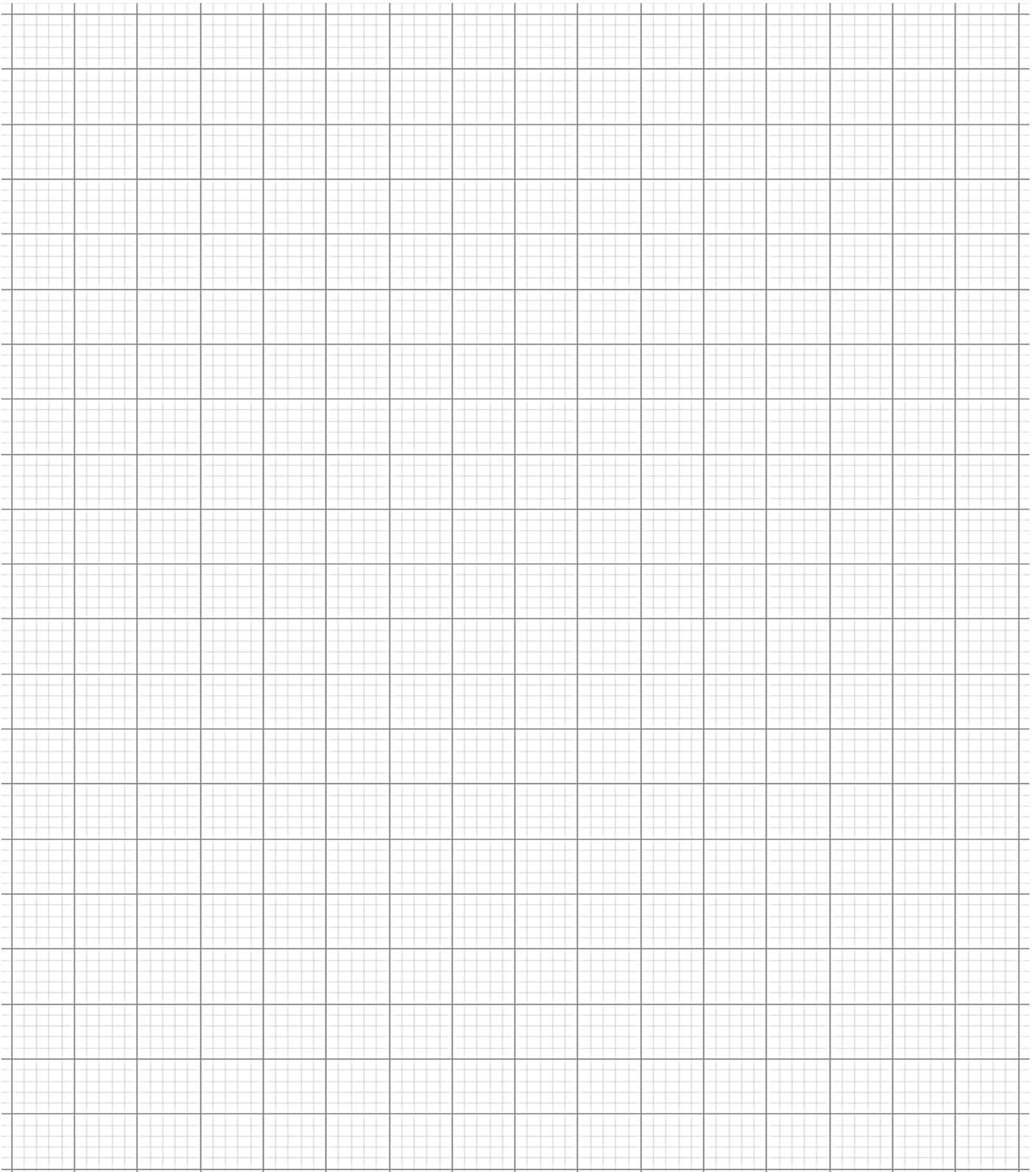
- Fencing an Enclosure task (Page 4 of this booklet)
- 'Match the Stories' (www.projectmaths.ie – Modular Course 3 (Algebra & Number, Module 1))
- Describing relationships (Page 6 of this booklet)

Notes/Reflections

Task – Fencing an Enclosure

Emily has 20 metres of fencing. She needs to form an enclosure in the garden for her dog. What is the maximum area she can enclose if all the fencing must be used?

Justify your answer.



Providing Formative Feedback on Student Work

Remember to look at the learning intentions and success criteria that were developed and used with the task.

	Student A Example	Student B Example
What are the strengths of this piece of work?		
What are the areas of development in this piece of work?		
What feedback would you give the student to move their learning forward?		

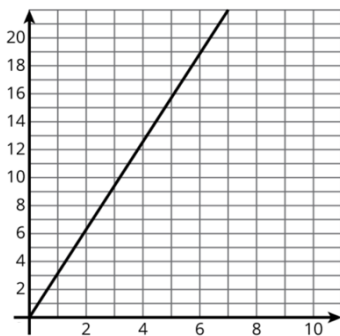
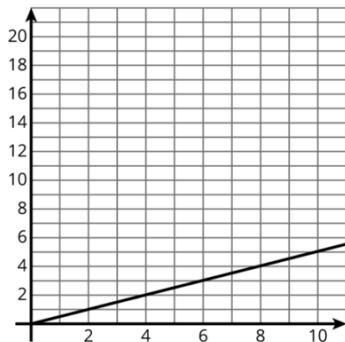
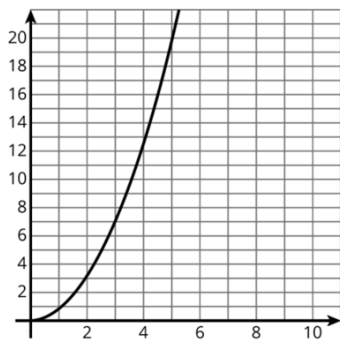
Creating Success Criteria

The task below is linked to the Sample Unit of Learning on page 3. Consider what learning intention and success criteria you could create for the task to enhance student learning.

Learning Intention:

Success Criteria:

The graphs below represent relationships between variables associated with the circle. Describe the relationships that are represented by the graphs and justify your reasoning.



Adapted from <https://openupresources.org>



How could you adapt or modify this question for your students?

Key Learning (Morning Session)



Classroom-Based Assessment (Mathematical Investigation)

For the academic year 2019/2020, the window for completion of the first Classroom-Based Assessment (Mathematical Investigation) in Mathematics is indicated below. Schools have autonomy to select a three-week period within which CBA 1 will take place.

Window for Classroom-Based Assessment One



Subject Department

Before the CBA

- Agree the three-week window in consultation with school management
- Agree the date of the SLAR meeting
- Agree the SLAR facilitator

During the CBA

- Engage in professional discussions and reflection
- Support and advise colleagues

After the CBA

- Conduct the SLAR meeting (must take place within one month of the CBA)
- Reflect on subject learning

Teacher

Before the CBA

- Develop students' problem-solving skills through engagement with:
 - Learning outcomes
 - Formative assessment
 - Rich task-based learning experiences

During the CBA

- Advise students on the problem-solving cycle
- Provide ongoing formative feedback to the student
- Identify possible samples for the SLAR meeting

After the CBA

- Assign provisional descriptors to students' work
- Participate in the SLAR meeting
- Reconsider judgement
- Report the final descriptor

Application of Features of Quality to Student Work

Applying the Features of Quality

- Review the student's sample of work.
- Judge the student's sample using the Features of Quality, beginning with the descriptor 'Yet to Meet Expectations'.
- Is there evidence which 'on balance' supports the awarding of this descriptor?
 - If yes, move to the next descriptor and compare to the Features of Quality once again.
 - If no, award the previous descriptor.
- 'Best Fit' - Move through each descriptor until you find a descriptor which best fits the students work.

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Features of Quality – Mathematical Investigation
Features of Quality are the criteria used to assess the level of student achievement in a Classroom-Based Assessment (CBA). Described below are the Features of Quality for the Mathematical Investigation.

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	Yet to Meet Expectations	In Line with Expectations	Above Expectations	Exceptional
Defining the Problem Statement	Uses a given problem statement and with guidance breaks the problem down into steps	With guidance poses a problem statement, breaks the problem down into manageable steps and simplifies the problem by making assumptions, if appropriate	With limited guidance poses a problem statement and clarifies/simplifies the problem by making reasonable assumptions, where appropriate	Poses a concise problem statement and clarifies and simplifies the problem by making justified assumptions, where appropriate
Finding a Strategy or Translating the Problem to Mathematics	Uses a given strategy	Chooses an appropriate strategy to engage with the problem	Justifies the use of a suitable strategy to engage with the problem and identifies any relevant variables	Develops an efficient justified strategy and evaluates progress towards a solution where appropriate; conjectures relationship between variables where appropriate
Engaging with the Mathematics to Solve the Problem	Records some observations/data and follows some basic mathematical procedures	mathematical procedures with minor errors; graphs and/or diagrams/ words are used to provide insights into the problem and/or solution	mathematical procedures are followed, and accurate mathematical language, symbolic notation and visual representations are used; attempts are made to generalise any observed patterns in the solution/observation	mathematical procedures are followed with a high level of precision, and a justified answer is achieved; solution/observations are generalised and extended to other situations where appropriate
Interpreting and Reporting	Comments on any solution	Comments on the reasonableness of the solution where appropriate and makes a concrete connection to the original question, uses everyday familiar language to communicate ideas	Checks reasonableness of solution and revisits assumptions and /or strategy to iterate the process, if necessary, uses formal mathematical language to communicate ideas and identifies what worked well and what could be improved	Deductive arguments used and precise mathematical language and symbolic notation used to consolidate mathematical thinking and justify decisions and solutions; strengths and/ or weaknesses in the mathematical representation/ solution strategy are identified

Source: Junior Cycle Mathematics Guidelines for the Classroom-Based Assessments and Assessment Task, November 2019.
During the CBA and SLAR meeting, teachers should refer to the most recent publication of the Assessment Guidelines available at www.curriculumonline.ie.

'When using the Features of Quality to assess the level of student achievement in a Classroom-Based Assessment, teachers use 'on-balance' judgement. The teacher should read the Features of Quality (starting with Yet to meet expectations) until they reach a descriptor that best describes the work being assessed. While it should be noted that none of the descriptors imply faultless achievement, evidence of work for the award of Exceptional should closely match the criteria for that level within the Features of Quality. Where it is not clearly evident which quality descriptor should apply, teachers must come to a judgment based on the evidence from the student's work, to select the descriptor that best matches the student's work overall. This 'best fit' approach allows teachers to select the descriptor that 'on balance' describes the work being assessed.'

(Assessment Guidelines page 7)

CBA – Descriptor Definitions

Teachers use the Features of Quality, set out in [the Assessment Guidelines pages 19 and 31], to decide the level of achievement in each Classroom-Based Assessment. The Features of Quality are the criteria used to assess the student work as best fitting one of the following Descriptors:

- **Exceptional** describes a piece of work that reflects the Features of Quality for the Classroom-Based Assessment to a very high standard. While not necessarily perfect, the strengths of the work far outstrip its flaws, which are minor. Suggestions for improvement are easily addressable by the student.
- **Above Expectations** describes a piece of work that reflects the Features of Quality for the Classroom-Based Assessment very well. The student shows a clear understanding of how to complete each area of the task. Feedback from the teacher might point to the necessity to address some aspect of the work in need of further attention or polishing, but on the whole the work is of a high standard.
- **In Line with Expectations** describes a piece of work that reflects most of the Features of Quality for the Classroom-Based Assessment well. It shows a good understanding of the task in hand and is free from significant error. Feedback might point to areas needing further attention or correction, but the work is generally competent and accurate.
- **Yet to Meet Expectations** describes a piece of work that falls somewhat short of the demands of the Classroom-Based Assessment and its associated Features of Quality. Perhaps the student has made a good attempt, but the task has not been grasped clearly or is marred by significant lapses. Feedback will draw attention to fundamental shortcomings that need to be addressed.

Assessment Guidelines pages 6 and 7

Subject Learning and Assessment Review (SLAR)

In a SLAR meeting, teachers will 'share and discuss samples of their assessments of students' work and build a common understanding about the quality of students' learning. This structured support for Classroom-Based Assessments (CBAs) will help to ensure consistency and fairness within and across schools in the appraisal of student learning'. It is through discussion that consensus about standards are reached (Framework for Junior Cycle (2015), pages 8 and 9).

Teacher

Before

- Review the Features of Quality
- Consider students' work using the Features of Quality and award a provisional descriptor
- Select samples of student work from each descriptor, where feasible, for consideration at the SLAR meeting

During

- A teacher introduces a piece of work
- The group reviews the work using the Features of Quality
- The discussion is led by the facilitator
- The focus is on a best-fit, on-balance approach
- The process is repeated for a sample at each of the other descriptor levels

After

- Adjust the provisional descriptor if necessary
- Report the final descriptor using established school protocols
- Reflect on the SLAR meeting

Facilitator

Before

- Collect samples of work from teachers for each grade descriptor, where feasible
- Develop a running order for the SLAR meeting
- Organise the location, time and resources for the SLAR meeting

During

- Open the meeting and review the protocols for the meeting
- Facilitate, direct and progress the discussion
- Monitor the running order
- Model effective questioning focusing on how well the students' work best fits the Features of Quality

After

- Complete and submit facilitator's report
- Reflect on the SLAR process



Assessment

Further information on the SLAR process and relevant documents are available at:
<https://www.jct.ie/maths/assessment>

Subject Learning and Assessment Review (SLAR) Meetings

Subject Learning and Assessment Review (SLAR) meetings enable teachers to collaboratively reach consistency in their judgments of student work against common, externally set Features of Quality. Greater understanding of standards and expectations will develop over time as teachers come together in professional discussion to reflect on the quality of their own students' work.

Before the SLAR meeting

- Teachers may find it helpful to review some of the relevant NCCA-annotated examples, the specification and assessment guidelines prior to coming to decisions about their own students' work.
- Assess students work based on the Features of Quality and give each piece of work a provisional descriptor.
- Identify one sample of student's work for each descriptor, where feasible, and have these available for discussion at the meeting.

During the SLAR meeting

- The facilitator explains that the purpose of the meeting is to support consistency of judgement about students' work and to develop a common understanding about the quality of student learning.
- The facilitator asks one member of staff to introduce a sample of work they have assessed as 'Yet to Meet Expectations'.
- The facilitator leads a general discussion on the extent to which the student's work matches the relevant Features of Quality.
- The facilitator should look to establish consensus during the discussion of examples of students work but the emphasis should be on developing teachers' professional knowledge and skills rather than on seeking unanimous agreement over every Feature of Quality in every example.
- The emphasis during the review meetings should always be on a 'best fit' approach which allows teachers to agree the descriptor that 'on-balance' is most appropriate for the work being assessed.
- Where there is a lack of agreement, the facilitator should refer to relevant annotated examples of student work provided by the NCCA and, if appropriate, examples of student work that other teachers in the group have assessed and awarded that descriptor to.
- While reasonable time should be allowed for discussion, the facilitator should use his/her professional judgement to decide when it would be appropriate to proceed to the next sample.
- If possible, there should be discussion of at least two samples for each descriptor and the facilitator should ensure that each teacher has at least one of their samples discussed during the meeting.
- The process is repeated for a piece of work at each level descriptor.
- It is important that each teacher notes the implications of the decisions made during the meeting for the rest of the student work they have already assessed, particularly in the case of descriptors where their judgement did not align with the view of the majority of teachers at the meeting.

After the SLAR Process

- In instances where the judgement of the teacher did not align with the view of the majority of teachers at the SLAR meeting, provisional descriptors should be reconsidered, and appropriate adjustments should be made.
- The facilitator completes the SLAR Facilitator Report and files appropriately.

Sharing Samples of Work for the SLAR Meeting

Mathematics teachers of second year students bring four samples of student work to the Subject Learning and Assessment Review (SLAR) meeting. **Where feasible**, these samples should contain a sample at each of the four descriptor levels. The information will be used to create a running order for our SLAR meeting. As we may not have time to discuss all the samples, please number the pieces 1 to 4, with number 1 indicating the sample that you would most like to discuss.

Date of SLAR Meeting:	
Please return this form to your SLAR Facilitator _____ by _____	
Teacher Name:	
Sample 1	<p>Format: _____ Sample Shared via: _____</p> <p>Topic/Title: _____</p> <p>Provisional Descriptor: _____</p> <p>Preference for use at SLAR: <input type="checkbox"/></p>
Sample 2	<p>Format: _____ Sample Shared via: _____</p> <p>Topic/Title: _____</p> <p>Provisional Descriptor: _____</p> <p>Preference for use at SLAR: <input type="checkbox"/></p>
Sample 3	<p>Format: _____ Sample Shared via: _____</p> <p>Topic/Title: _____</p> <p>Provisional Descriptor: _____</p> <p>Preference for use at SLAR: <input type="checkbox"/></p>
Sample 4	<p>Format: _____ Sample Shared via: _____</p> <p>Topic/Title: _____</p> <p>Provisional Descriptor: _____</p> <p>Preference for use at SLAR: <input type="checkbox"/></p>

Professional Discussion – Example 1

Consider the student's work through the lens of the Features of Quality.

Using the table below, note your thoughts in each of the four areas of activity for the Mathematical Investigation:

- What are the strengths of this piece of work?
- What are the areas for development/improvement in the work?
- What feedback would you give to this student?

Defining the Problem Statement	
Finding a Strategy or Translate the Problem to Mathematics	
Engaging with the Mathematics to Solve the Problem	
Interpreting and Reporting	

Professional Discussion – Example 2

Consider the student's work through the lens of the Features of Quality.

Using the table below, note your thoughts in each of the four areas of activity for the Mathematical Investigation:

- What are the strengths of this piece of work?
- What are the areas for development/improvement in the work?
- What feedback would you give to this student?

Defining the Problem Statement	
Finding a Strategy or Translate the Problem to Mathematics	
Engaging with the Mathematics to Solve the Problem	
Interpreting and Reporting	

Key Learning (Mid-Morning)



Central Statistics Office Website (www.cso.ie)

Most Popular Names by Year of Birth

On the homepage select **Visualisation**

Tools



Select the tile for **Baby Names of Ireland** and follow the prompts



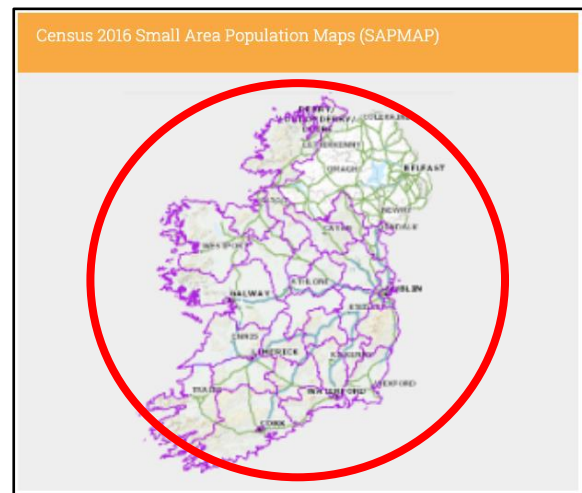
Using a SAPMAP

1) On the homepage select **Visualisation**

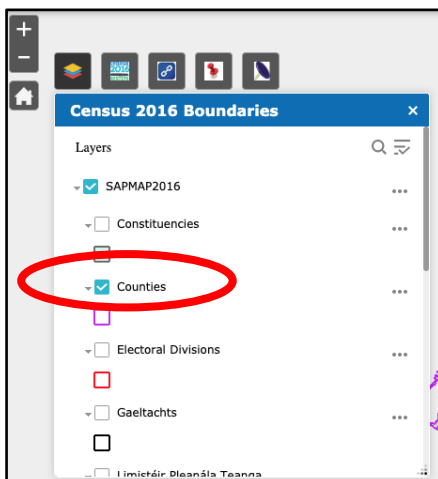
Tools



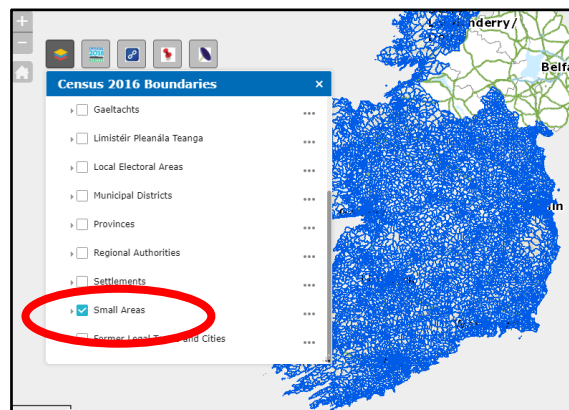
2) Select **SAPMAP**



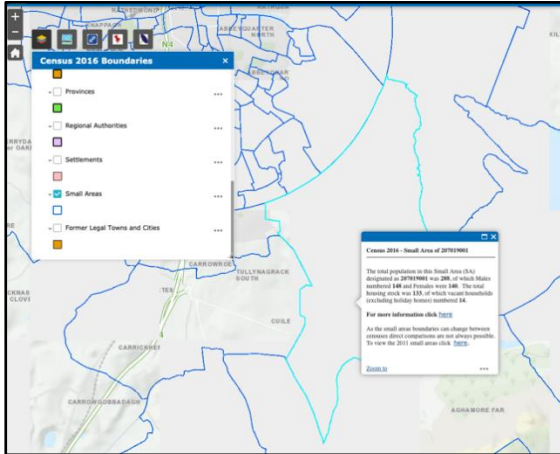
3) **Deselect** the option for counties



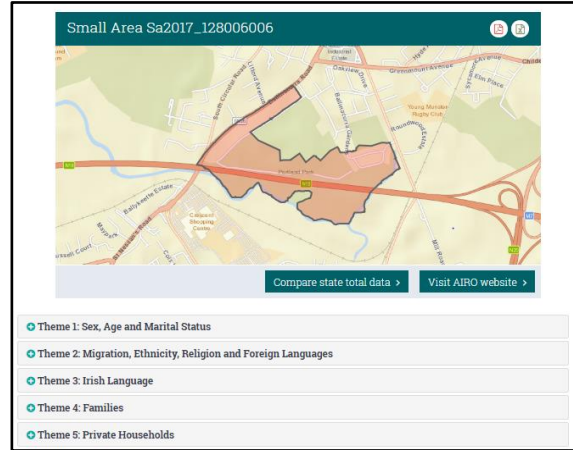
4) Select **Small Areas** and **Zoom** to find your area



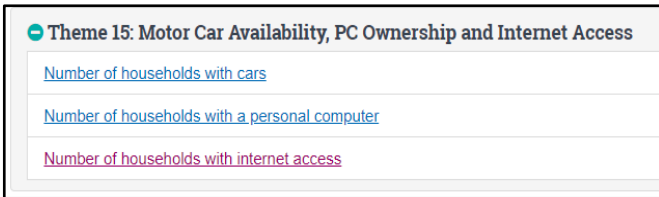
- 5) Select your area on the map and select the option for **more information**



- 6) Select one of the theme options such as **Motor Car Availability, PC Ownership and Internet Access**



- 7) Select one of the available links for a detailed breakdown for your local area

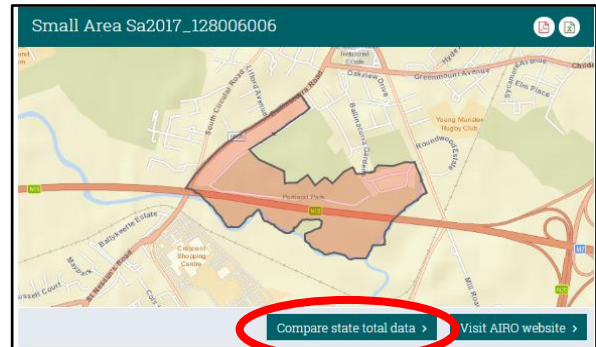


PDF Excel Print

Number of households with internet access

Internet Access	Households
Broadband	82
Other	9
No	11
Not stated	7
Total	109

- 8) Select **Compare state total data** to make a comparison with national figures



PDF Excel Print

Number of households with internet access

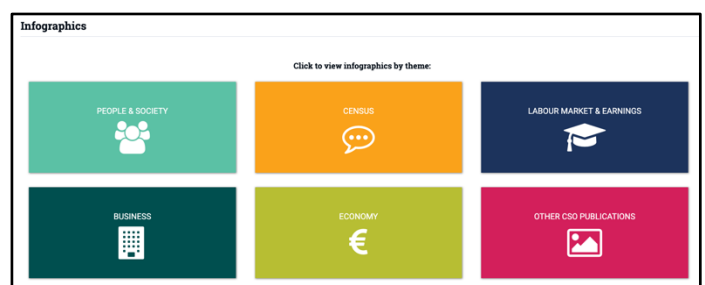
Internet Access	Households
Broadband	1,200,067
Other	131,676
No	312,982
Not stated	52,940
Total	1,697,665

Infographics

On the homepage select **Infographics**



Select a theme



Reaction Time

Using the options below, rate your perception of your hand-eye coordination.

Weak

Moderate


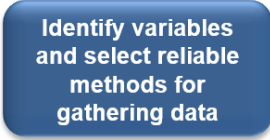
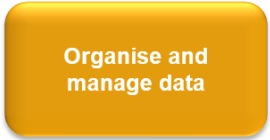

Strong

Use the spaces provided below to record your five reaction times (milliseconds) from the NRICH Maths Reaction Timer (www.nrich.maths.org/reactiontimer).

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Engaging with the Statistical Enquiry Cycle

Initial Statistical Question:

<u>Stage</u>	<u>Possible Considerations</u> <u>May Include</u>	<u>Comments/Thoughts</u>
	<ul style="list-style-type: none"> • Formulation of the question • Data collection 	
	<ul style="list-style-type: none"> • Variables • Gathering of data • Reliability • Sample 	
	<ul style="list-style-type: none"> • Displaying the data • Summarising the data 	
	<ul style="list-style-type: none"> • Statistical question • Informal inference • Sampling • Improvements to the investigation 	

Revised Statistical Question:

Statistical Enquiry Cycle



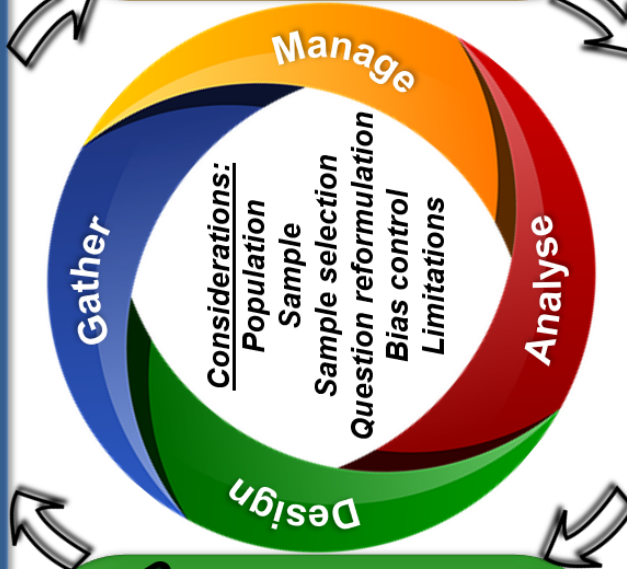
IDENTIFY VARIABLES AND SELECT RELIABLE METHODS FOR GATHERING DATA



- What variable(s) are being measured?
- How are the variable(s) being measured?
- Is the sample representative of the population?

INVESTIGATION DESIGN

- Is the statistical question posed concise?
- What are the variable(s) that may need to be measured to answer the question?
- Is it possible to collect the data that can answer the question?
- Is it possible to draw down or gather the required data in a given timeframe?
- Is an experiment, survey or observational study being conducted?



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?



ANALYSE AND INTERPRET DATA

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

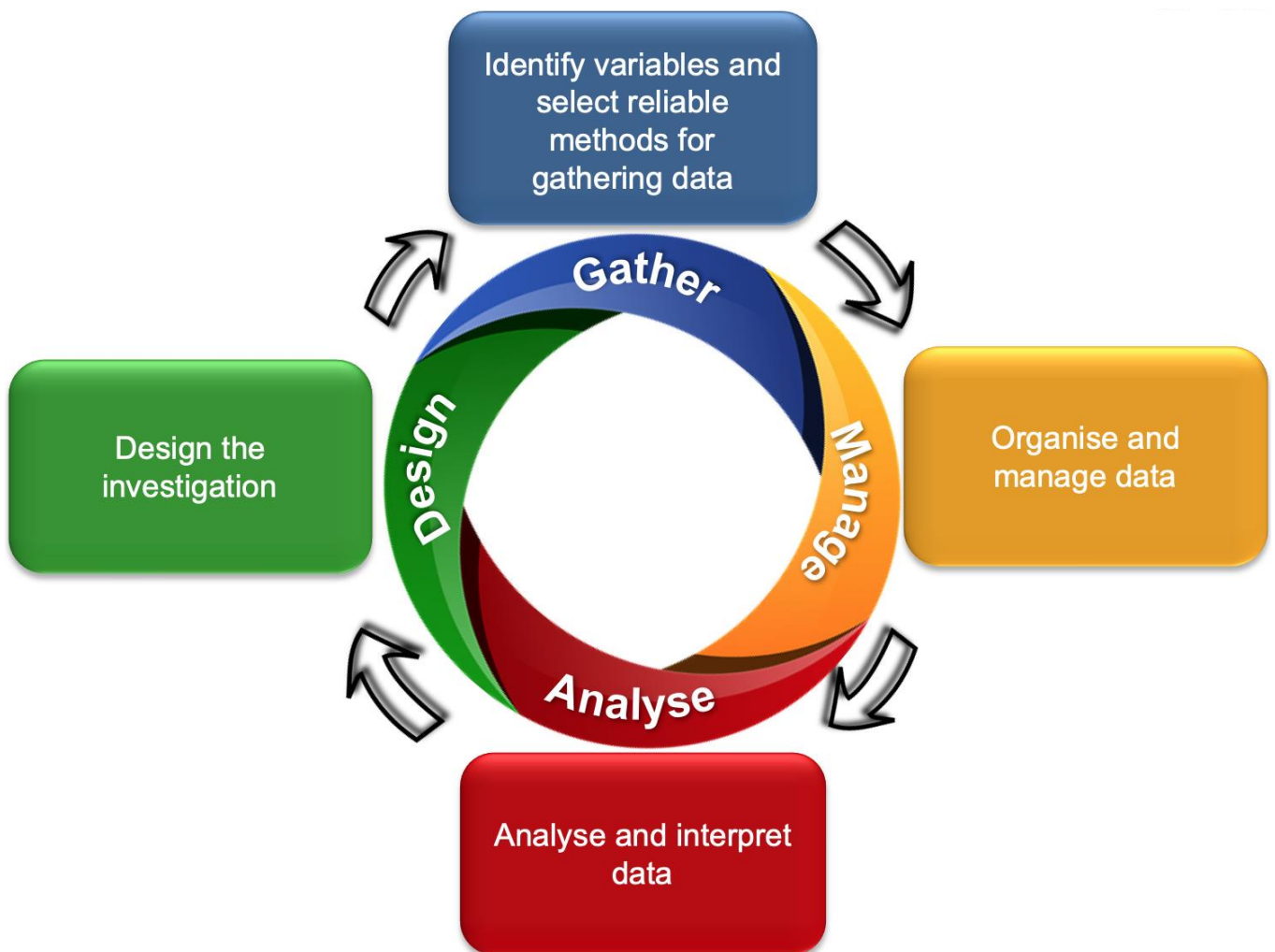


Classroom Based Assessment 2

Classroom-Based Assessment	Format	Student preparation	Completed
Statistical Investigation	A report may be presented in a wide range of formats	<p>A student will, over a three-week period follow the Statistical enquiry cycle.</p> <p>Statistical enquiry cycle: formulate a question; plan and collect unbiased, representative data; organise and manage the data; explore and analyse the data using appropriate displays and numerical summaries and answer the original question giving reasons based on the analysis section.</p>	Year Three

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Statistical Enquiry Cycle



External Assessment

Assessment Task

The Assessment Task is a written task completed by students during class time. It is not marked by the class teacher but is sent to the State Examinations Commission for marking as part of the state-certified examination in Mathematics. The Assessment Task is specified by the NCCA and is related to the learning outcomes on which the second Classroom-Based Assessment is based. In the case of mathematics, this is the Statistical Investigation. The details of the Assessment Task are outlined in the table below:

Format	Student preparation	Completed
Students complete a specified written task which is sent to the SEC for marking.	The Assessment Task will link to the Statistical Investigation.	Following completion of the second Classroom-Based Assessment in Year Three.

The Assessment Task is offered at a common level and will be allocated 10% of the marks used to determine the grade. The Assessment Task is directly related to the nature and focus of the second Classroom-Based Assessment, the Statistical Investigation, which is *to pose a question, gather and analyse data and interpret it in the context of the original question*. The knowledge and skills developed by students during this Classroom-Based Assessment emerge from their growing awareness of *statistical inquiry*.

The Assessment Task will comprise of **some or all** of the following:

- Engagement with a short stimulus in written, audio, audio-visual or multi-modal format in preparation for the written task
- A written task that tests the students in their capacity to reflect on the skills they have developed

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Final Examination

The final assessment will be offered at both Higher and Ordinary Level and will be allocated 90% of the marks used to determine the grade. At both levels there will be one examination paper. The examination will be set and marked by the State Examinations Commission (SEC). The examination will be two hours in duration and will take place in June of third year.

Grading of final examination

Grade	Range (%)
Distinction	≥90 to 100
Higher Merit	≥75 and <90
Merit	≥55 and <75
Achieved	≥40 and <55
Partially Achieved	≥20 and <40
(not graded)	≥0 and <20

Frequently Asked Questions

There is a frequently asked questions document on conducting Classroom-Based Assessments and SLAR meetings available at:

https://www.jct.ie/maths/departmental_planning

or use the QR code opposite to take you to the document.



SLAR – Further Information

Further information on the SLAR process and relevant documents are available at:

<https://www.jct.ie/maths/assessment>

or use the QR code opposite to take you to the document.



Assessment Guidelines Interactive Resource

This interactive resource can be used individually or as a subject department and is available at:

<https://www.jct.ie/maths/assessment>

or use the QR code opposite to take you to the document.



Departmental Planning

There is a range of resources related to planning available at:

https://www.jct.ie/maths/departmental_planning

or use the QR code opposite to take you to the document.



Key Learning (Afternoon)



Notes

Action Plan

Action Plan	Goal	Action	Who/When	Evaluation Criteria
Teacher's Individual Practice				
Departmental Collaborative Practice				

An tSraith Shóisearach do Mhúinteoirí

JuniorCYCLE

for teachers

Contact details:

Administrative Office:
Monaghan Ed. Centre,
Armagh Road,
Monaghan.

Director's Office:
LMETB,
Chapel Street,
Dundalk

www.metc.ie

For any queries, please contact us on one of the following:



Follow us on Twitter @JctMaths

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Email: info@jct.ie



Phone number: 047 74008

More information and resources available on our website: www.jct.ie/math

To sign up for our mailing list follow the QR code

