

Lesson Research Proposal for 1st Year Patterns

Date of lesson: 24/01/2019

School name: St. Paul's Secondary School, Monasterevin

Teacher giving lesson: Niall McGillicuddy

Associate: Ciana Ennis

Lesson plan developed by: Eimear Dempsey & Donna Walsh

1. Title of the Lesson: Matchstick Challenge

2. Brief description of the lesson

This lesson is based on first year patterns, introducing students to the concept of the general term.

3. Research Theme

We the math teachers of St. Paul's Secondary School want students to:

- Build their confidence in math and develop problem solving skills to help them become independent thinkers.
- Enjoy their learning experience and develop a sense of ownership of and responsibility for their learning.
- Improve their problem solving skills

As teachers we will respond to the needs of our students by:

- Value and engage in professional development and professional collaboration
- Develop skills in effective questioning and differentiation
- Work together to devise learning opportunities for students

4. Background & Rationale

We have found that students at junior certificate level struggle making cross strand links for example between patterns and algebra and patterns and functions and relating these topics. For example, at Junior Certificate level the terminology of a standing charge often confuses students. Following on to when given a graph students are unable to identify the standing charge.

In Junior certificate usually only a small number of students will properly understand what the general term of a pattern actually is and how it is formed. We feel by allowing the students develop and understand the concept of the general term it will benefit their understanding of patterns.

5. Relationship of the Unit to the Syllabus

Related prior learning Outcomes	Learning outcomes for this unit	Related later learning outcomes
1 st – 4 th class students should be able to recognize patterns and numbers and explain a rule for them.	In first year students should be able to continue a given linear pattern, identify a common difference and discover the general term. Use the general term to solve	In 2 nd and 3 rd year students will deal with quadratic and exponential patterns, investigating and solving problems using graphs and algebra. Linking functions and graphs to patterns and

	<p>problems.</p> <p>Represent these patterns and relationships in tables and graphs</p>	<p>identifying standing charges or the start term is > 0</p>
--	---	--

6. Goals of the Unit

Students can describe a pattern using words, “this pattern starts at 5 and increases by...”

Students will know how to find the start term, common difference, the general term.

Students will find different ways of finding the correct answer and will choose the best method of finding it whether it's graphing, formula or listing.

7. Unit Plan

How the research lesson fits into the larger unit plan, helping to show the bigger picture of the whole unit and the progression of learning. Clarify where the research lesson will be taught.

Lesson	Brief overview of lessons in unit
1	Investigate non-number patterns
2	What is a linear pattern, start term, common difference, tables
3	Research lesson
4	More work on finding the general term
5	Graphing and problem solving

8. Goals of the Research Lesson:

Looking at the goals of the research lesson itself from two perspectives:

- a. Mathematical goals
 - Students will learn that there are several ways of solving problems.
 - Students can find the general term.
 - Students will understand the use of the general term/formula.
- b. Key Skills and Statements of Learning

a) Key Skills and Statements of Learning

1. Being Literate: Through Ceardaiocht, students will have the opportunity to express their ideas clearly and accurately.
2. Managing myself: Students will be able to reflect on their own learning and identify the most efficient way of solving the problem.
3. Staying well: By allowing all students to achieve to some degree, students will feel

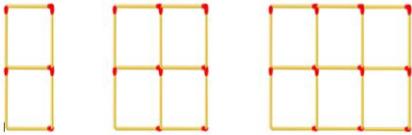
- positive about their learning and grow in confidence.
4. Managing information and thinking: Students creative and critical thinking skills will be encouraged and extended.
 5. Being Numerate: Students will develop a positive attitude towards investigating, reasoning and problem solving.
 6. Being creative: During Ceardaíocht, students will solve the problem in a number of different ways.
 7. Working with others: Students will learn with and from each other by discussing different approaches to solving the problem.
 8. Communicating: Students will present, discuss and debate their mathematical thinking.

This lesson also meets the following JC Statements of Learning:

15. The student recognises the potential uses of mathematical knowledge, skills and understanding in all areas of learning.
17. The student's devises and evaluates strategies for investigating and solving problems using mathematical knowledge, reasoning and skills.

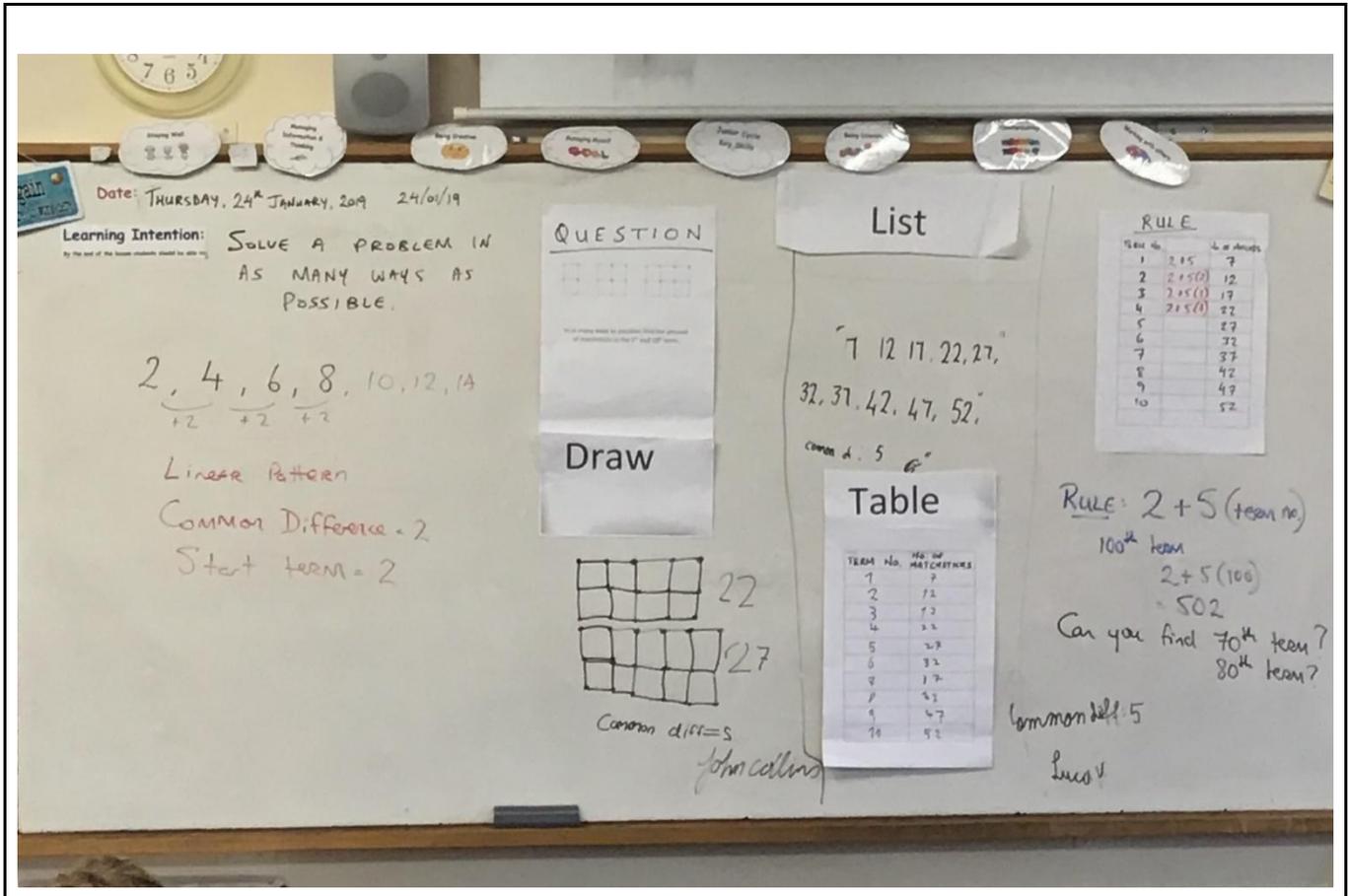
9. Flow of the Research Lesson:

Steps, Learning Activities	Teacher Support	Assessment
<p>Introduction: Recap student's prior knowledge (5mins) Using the information, we have learned to date.</p> <p>The teacher will show a pattern 2,4,6,8,</p>	<p>Is it a pattern and why? (it goes up in 2s...) -What do we call that? (common difference) -What is this? (start term) -How can we put this into a sentence? (we start at blah and go up by blah each time?) -What are the next 3 terms?</p>	<p>Check students understanding of prior knowledge.</p>
<p>Posing the Task Today's lesson we will use all the information we have been taught to date.</p> <p>Problem posed:</p>	<p>Teacher distributes worksheet to teacher</p>	<p>Do students understand the task? Can you explain what it is you have to do? Are students keen to start the task?</p>

 <p>In as many ways as possible; find the amount of matchsticks in the 5th and 10th term.</p>		
<p>Student Individual Work (10minutes) Students' responses</p> <ol style="list-style-type: none"> 1. Draw the patterns 2. Count the number of match sticks (number pattern) 3. Complete a table 4. Describe in words 5. Draw a graph (notice that it is linear) 	<p>Teacher observes students working. If students are finished they can be encouraged to see if there are other ways of answering the question. Did you use the resources? Teacher looks for well answered work.</p>	<p>Are the students able to complete the problem, o</p>
<p>Ceardaíocht /Comparing and Discussing (20 mins) Teacher will choose a student to begin the discussion; someone who</p> <ol style="list-style-type: none"> 1. Drew the pattern 2. Listing the numbers 7, 12, 17, 22, 27 3. Table 	<p>Response 1: How did you come up with the fourth and fifth pattern? Response 2: How did you turn it into numbers? How did you find the next term? What did you notice when you listed the numbers? What do we call this? Response 3: What did you notice about the pattern?</p>	
<p>Enhancing student learning Enhance learning to find a rule/ formula that could be used to find any term in this pattern.</p>	<p>Can we break up the first term? We see here that we add on 5 each time, can we write the first term as a number with 5 added on? Is there a rule we could maybe find a rule so that we could find any term in the pattern?</p>	
<p>Summing up & Reflection (5mins) Students are asked to reflect on what they think is the best way of solving the problem?</p>	<p>Which do you all think is the best way of answering this question? Why?</p>	

10. Board Plan

Carefully plan the board work before the lesson takes place to decide on the order of the solutions and the links that will be made at the board. Put an image or a diagram of the pre-prepared board work here.



11. Evaluation

The teachers involved in this lesson proposal planned and discussed how best to observe the lesson. The classroom will be divided into 3 sections. Each observer will observe one section of the classroom. The teacher facilitating this lesson will provide a seating plan to allow notes to be taken on student work and record data to be discussed at the post lesson review.

During the observation teachers will note what was the first and most common approaches students used. Will students develop a rule themselves to find the 10th term.

During the ceardaiocht section will student recognise the benefits of using a rule to find any term? This will allow us to assess their true understanding of the general term.

Observers will take photos of students work during the lesson.

12. Reflection

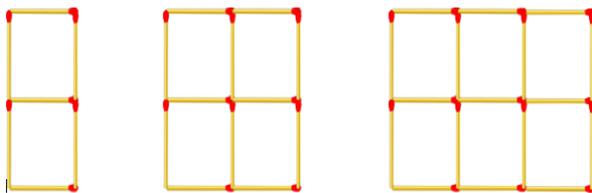
Overall the group felt there was a very positive atmosphere in the classroom and all students were engaged and attempted to solve the problem. We had expected most students to draw out the terms however we noted that students began to draw out the terms however each term was getting too big to draw, students stopped and moved to listing the number of matchsticks. The listing method was the

most common approach used by students. Another common approach was students drew out a table. However, some students did try draw the terms in the table rather count the number of match sticks. This was something we didn't expect to see.

During the lesson there was some meaningful conversations, one observer noted a conversation between some students of why we can't just find the common difference and multiply by 10. Students were trying to find a rule.

One student was able to develop the general term during 10 minutes given to find the 5th and 10th term. During the ceardaiocht section students were asked what was the most efficient way of solving the problem, majority said the table was the most efficient as it was easy to read.

At the end of the class students again were asked about the best way of solving the problem. Students identified using a rule would be the quickest, however one student commented it depended on what term, it might be easier to list if it was a small term. A large term number the rule method would be the best. One misconception or area we would improve on this lesson would be we used 2,4,6 at the beginning of the lesson and the problem had matches made into boxes 2, 4. Students counted boxes rather than matches. We felt that maybe we should have used a different pattern at the beginning of the lesson rather than 2,4,6,8.



In as many ways as possible; find the amount of matchsticks in the 5th and 10th term.

