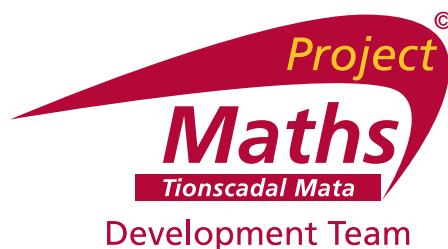


Teaching & Learning Plans

Introduction to Patterns

Junior Certificate Syllabus



The Teaching & Learning Plans are structured as follows:



Aims outline what the lesson, or series of lessons, hopes to achieve.

Prior Knowledge points to relevant knowledge students may already have and also to knowledge which may be necessary in order to support them in accessing this new topic.

Learning Outcomes outline what a student will be able to do, know and understand having completed the topic.

Relationship to Syllabus refers to the relevant section of either the Junior and/or Leaving Certificate Syllabus.

Resources Required lists the resources which will be needed in the teaching and learning of a particular topic.

Introducing the topic (in some plans only) outlines an approach to introducing the topic.

Lesson Interaction is set out under four sub-headings:

- i. **Student Learning Tasks – Teacher Input:** This section focuses on teacher input and gives details of the key student tasks and teacher questions which move the lesson forward.
- ii. **Student Activities – Possible and Expected Responses:** Gives details of possible student reactions and responses and possible misconceptions students may have.
- iii. **Teacher’s Support and Actions:** Gives details of teacher actions designed to support and scaffold student learning.
- iv. **Assessing the Learning:** Suggests questions a teacher might ask to evaluate whether the goals/learning outcomes are being/have been achieved. This evaluation will inform and direct the teaching and learning activities of the next class(es).

Student Activities linked to the lesson(s) are provided at the end of each plan.

Teaching & Learning Plan: Introduction to Patterns

Aims

- Recognise a repeating pattern
- Represent patterns with tables, diagrams and graphs
- Generate arithmetic expressions from repeating patterns

Prior Knowledge

Students should have some prior knowledge of drawing basic linear graphs on the Cartesian plane.

Learning Outcomes

As a result of studying this topic, students will be able to:

- use tables, graphs, diagrams and manipulatives to represent a repeating-pattern situation
- generalise and explain patterns and relationships in words and numbers
- write arithmetic expressions for particular terms in a sequence
- use tables, diagrams and graphs as tools for representing and analysing patterns and relations
- develop and use their own generalising strategies and ideas and consider those of others
- present and interpret solutions, explaining and justifying methods, inferences and reasoning

Catering for Learner Diversity

In class, the needs of all students whatever their level of ability are equally important. In daily classroom teaching, teachers can cater for different abilities by providing students with different activities and assignments graded according to levels of difficulty so that students can work on exercises that match their progress in learning. For less able students, activities may only engage them in a relatively straightforward way and more able students can engage in more open-ended and challenging activities. This will cultivate and sustain their interest in learning. In this T & L Plan for example teachers can provide students with the same activities but with variations on the theme e.g. draw a picture, put it in words, write a multiplication sentence, apply the algorithm. Teachers can give students various amounts and different styles of support during the class for example, providing more clues.

In interacting with the whole class, teachers can make adjustments to suit the needs of students. For example, they can ask less able students simple questions (e.g. Student Activity 1A and 1B) and reserve more challenging questions for the more able students (e.g. Student Activity 4A and 4B).

Besides whole-class teaching, teachers can consider different grouping strategies to cater for the needs of students and encourage peer interaction. Students are also encouraged in this T & L Plan to verbalise their mathematics openly and share their work in groups to build self-confidence and mathematical knowledge.

Relationship to Junior Certificate Syllabus

Topic Number	Description of topic <i>Students learn about</i>	Learning outcomes <i>Students should be able to</i>
4.1 Generating arithmetic expressions from repeating patterns	Patterns and the rules that govern them and so construct an understanding of a relationship as that which involves a set of inputs, a set of outputs and a correspondence from each input to each output. ms involving fractional amounts.	<ul style="list-style-type: none"> • use tables to represent a repeating-pattern situation • generalise and explain patterns and relationships in words and numbers • write arithmetic expressions for particular terms in a sequence
4.2 Representing situations with tables, diagrams and graphs.	Relations derived from some kind of context – familiar, everyday situations, imaginary contexts or arrangements of tiles or blocks. They look at various patterns and make predictions about what comes next.	<ul style="list-style-type: none"> • use tables, diagrams and graphs as tools for representing and analysing patterns and relations • develop and use their own generalising strategies and ideas and consider those of others • present and interpret solutions, explaining and justifying methods, inferences and reasoning

Resources Required

Unifix cubes (optional), coloured paper, graph paper

Introducing the Topic

Ask students to give you examples of patterns e.g.

- 5, 10, 15, 20
- 50, 100, 150, 200
- Apple, orange, apple, orange
- Sue, Bob, Tom, Sue, Bob, Tom, Sue

Real Life Context

The following examples could be used to explore real life contexts.

- The pattern that traffic lights follow
- The Fibonacci Sequence in nature, e.g. leaves on trees
- The pattern of the tides in the oceans
- The pattern an average school day follows



Lesson Interaction			
Student Learning Tasks: Teacher Input	Student Activities: Possible and Expected Responses	Teacher's Support and Actions	Assessing the Learning
» Today we are going to discuss patterns in mathematics; e.g. 2, 4, 6, 8 10, 20, 30, 40			
» Can anyone give me some examples of number patterns?	<ul style="list-style-type: none"> • 5,10, 15 • 3, 6, 9, 12, • 2, 4, 6, 8, 10 	» Write student examples of patterns on the board.	» Are students able to provide examples of patterns?
» Could the numbers 1, 5, 12, 13, 61 be a pattern? Give me a reason for your answer.	<ul style="list-style-type: none"> • No, because you can't predict the next number. • There isn't any logical sequence in the list of numbers. 		» Can students give a reason why this sequence of numbers could not be a pattern?
» What do you think the properties or characteristics of a pattern could be?	<ul style="list-style-type: none"> • You have to be able to predict what number comes next. • If it's a pattern then it will have a logical sequence. • Most patterns have some kind of rule that helps you figure out what the next number could be. 	» Begin to make a list of the "properties" patterns usually have on the board.	» Are students able to list the properties which define a pattern?
» Do you think patterns can only occur in numbers? What about colours? e.g. Traffic lights: red, amber, green, or letters e.g. A, B, C, A, B, C, A., could these be called patterns?	<ul style="list-style-type: none"> • Once there is a logical sequence and you can predict what comes next, then yes, colours or letters or anything could be a pattern. 		» Can students explain why patterns are not limited to "lists" of numbers? » Can students explain why almost anything could be a pattern if it has a logical predictable sequence?

Teaching & Learning Plan: Introduction to Patterns

Teacher Reflections

Student Learning Tasks: Teacher Input	Student Activities: Possible and Expected Responses	Teacher's Support and Actions	Assessing the Learning
» Can you give me an example of a pattern that doesn't contain numbers?	<ul style="list-style-type: none"> Yellow, Green, Blue, Yellow, Green, Blue. Toffee, Chocolate, Toffee, Chocolate. 	» Write these new examples of patterns without numbers on the board.	» Are students able to give examples of patterns which don't contain numbers?
<p>» We are now going to look at an activity about patterns.</p> <p>» Working in pairs, complete Student Activity 1A</p>	<ul style="list-style-type: none"> Students report back to the rest of the class on Student Activity 1A. 	<p>» Distribute Student Activity 1A.</p> <p>» Distribute resources which may be required, e.g. unifix cubes, coloured markers.</p> <p>» Circulate around the room to see what students are doing and provide help where necessary.</p> <p>» Get a selection of students to report back on the various solutions they found when completing Student Activity 1A.</p>	<p>» Can students represent the given pattern, using diagrams, or unifix cubes, or a table?</p> <p>» Are students interacting and cooperating with each other to find the solutions on Student Activity 1A?</p> <p>» Can students verbalise their thinking when reporting back to the class?</p>
» What do you think the key to the pattern in this activity was?	<ul style="list-style-type: none"> The red blocks were always odd numbers, and the black blocks were always even numbers. 		» Were students able to identify and verbalise what the key to the pattern was?

Teaching & Learning Plan: Introduction to Patterns

Teacher Reflections

Student Learning Tasks: Teacher Input	Student Activities: Possible and Expected Responses	Teacher's Support and Actions	Assessing the Learning
<ul style="list-style-type: none"> » We are now going to look at a slightly more complicated pattern. » Working in pairs, complete Student Activity 1B. 	<ul style="list-style-type: none"> • Students report back to the rest of the class on Student Activity 1B. 	<ul style="list-style-type: none"> » Distribute Student Activity 1B » Walk around the room and listen to what students are saying. Offer help, guidance where it is required. » Get a selection of students to report back on the various solutions they found when completing Student Activity 1B. 	<ul style="list-style-type: none"> » Can students represent the pattern? » Are students interacting and cooperating with each other? » Have students identified the key to this pattern and can they verbalise their thinking?
<ul style="list-style-type: none"> » We are now going to look at a sentence which might describe a number pattern. Let me give you an example. 		<ul style="list-style-type: none"> » Write the following on the board: "Starting from today, I am going to save 5 euro every day, for the next 7 days" 	
<ul style="list-style-type: none"> » Do you think that this sentence could represent a pattern? » How does this represent a pattern? » So, looking at this, how much will I have saved in 7 days? 	<ul style="list-style-type: none"> • Yes • Because you can predict the next number every time. • It has a logical sequence • 35 euro 		<ul style="list-style-type: none"> » Can students work out the answer? » Do students know if the word sentence represents a pattern? » Can students give a reason why the word sentence is a pattern?

Teaching & Learning Plan: Introduction to Patterns

Teacher Reflections

Student Learning Tasks: Teacher Input	Student Activities: Possible and Expected Responses	Teacher's Support and Actions	Assessing the Learning
» We are now going to look at another type of pattern in Student Activity 2A .	<ul style="list-style-type: none"> • Students report back to rest of class on Student Activity 2A. 	<ul style="list-style-type: none"> » Distribute Student Activity 2A to students. » Walk around the room and listen to what students are saying. Offer help, guidance where it is required. » Get a selection of students to report back on the various solutions they found when completing Student Activity 2A. 	<ul style="list-style-type: none"> » Can students represent the pattern? » Are students interacting and cooperating with each other? » Have students identified the key to this pattern and can they verbalise their thinking? » Did students realise that the start amount of money could be included in the answer to question 7?
<ul style="list-style-type: none"> » Sometimes, we can understand a pattern more easily if we can draw a graph of it. » Does everyone remember how to plot points on the coordinate plane? 	<ul style="list-style-type: none"> • Yes • No 	<ul style="list-style-type: none"> » If students are confused on how to plot points on coordinate plane, a quick recap will be required. 	<ul style="list-style-type: none"> » Are all students familiar with how to plot points on the coordinate plane?
» We are now going to look at Student Activity 2B .		» Distribute Student Activity 2B .	

Teaching & Learning Plan: Introduction to Patterns

Teacher Reflections

Student Learning Tasks: Teacher Input	Student Activities: Possible and Expected Responses	Teacher's Support and Actions	Assessing the Learning
	<ul style="list-style-type: none"> • Students report back to rest of class on Student Activity 2B. 	<ul style="list-style-type: none"> » Walk around the room and listen to what students are saying. Offer help, guidance where it is required. » Get a selection of students to report back on the various solutions they found when completing Student Activity 2B. 	<ul style="list-style-type: none"> » Can students represent the pattern? » Are students interacting and cooperating with each other? » Have students identified the key to this pattern and can they verbalise their thinking? » Were students able to correctly plot the points on the coordinate plane?
<ul style="list-style-type: none"> » Do you think that drawing a graph to show the relationship between the number of days gone by and the amount of money in the money box has any advantages? 	<ul style="list-style-type: none"> • Yes, because you can see how it increases all the time. • Yes, because you can extend the graph and find out the value for any day, without having to build a table 	<ul style="list-style-type: none"> » Write the benefits of drawing a graph on the board. 	<ul style="list-style-type: none"> » Can students explain the advantages of drawing a graph to represent a pattern?
<ul style="list-style-type: none"> » What things did you notice about this graph? 	<ul style="list-style-type: none"> • It goes up • It's a straight line • It doesn't start at zero 	<ul style="list-style-type: none"> » Write comments about the graph on the board. Introduce the phrase "linear" for a straight line graph. 	<ul style="list-style-type: none"> » Could students describe the properties of the graph?

Teaching & Learning Plan: Introduction to Patterns

Teacher Reflections

Student Learning Tasks: Teacher Input	Student Activities: Possible and Expected Responses	Teacher's Support and Actions	Assessing the Learning
<p>» To ensure that everyone is clear on how to draw a graph of a pattern, can you all complete Student Activity 2C.</p>	<ul style="list-style-type: none"> • Students report back to rest of class on Student Activity 2C. 	<p>» Distribute Student Activity 2C</p> <p>» Walk around the room and listen to what students are saying. Offer help, guidance where it is required.</p> <p>» Get a selection of students to report back on the various solutions they found when completing Student Activity 2C.</p>	<p>» Can the students complete the activity?</p> <p>» Are students able to choose a relevant scale for drawing a coordinate graph?</p> <p>» Have students identified the key to this pattern and can they verbalise their thinking?</p>
			<p>» Can students represent both patterns on the same coordinate plane?</p> <p>» Were students able to correctly plot the points on the coordinate plane?</p>
<p>» Graphs can be a very useful way of comparing two things.</p> <p>» For example, let's just look at the question on Student Activity 3A</p>		<p>» Distribute Student Activity 3A.</p>	
<p>» Before we begin the question, can you predict who might have the better deal for the most texts in a month?</p>	<ul style="list-style-type: none"> • Probably Bill, because he starts with 30 texts and gets an extra 3 free every day. 		

Teacher Reflections

Student Learning Tasks: Teacher Input	Student Activities: Possible and Expected Responses	Teacher's Support and Actions	Assessing the Learning
» The next activity we are going to look at requires you to draw a graph of 2 different patterns on the same graph paper, and compare them. When we have done this, we will know for sure which person has the better deal from the mobile phone company	<ul style="list-style-type: none"> • Students report back to rest of class on Student Activity 3A. 	<ul style="list-style-type: none"> » Walk around the room and listen to what students are saying. Offer help, guidance where it is required. » Get a selection of students to report back on the various solutions they found when completing Student Activity 3A. 	<ul style="list-style-type: none"> » Were students able to correctly complete the table? » Were students able to represent both sets of data on the same graph? » Could students correctly answer the questions in the activity? » Were students able to give a reason why Amy had the better deal for free texts each month?
» What do you think was the benefit of representing the information graphically in Student Activity 3A ?	<ul style="list-style-type: none"> • It was much easier to figure out who had the better deal • You can just extend your graph and see who gets the most texts, you don't have to keep filling in the table. 		<ul style="list-style-type: none"> » Were students able to give the benefits of drawing a graph for this question?

Teacher Reflections

Student Learning Tasks: Teacher Input	Student Activities: Possible and Expected Responses	Teacher's Support and Actions	Assessing the Learning
<p>» Now we are going to try Student Activity 3B. This time you will have to figure out how you are going to represent the information and find the answers to the questions asked.</p>	<ul style="list-style-type: none"> • Students report back to the rest of class on Student Activity 3B. 	<p>» Distribute Student Activity 3B</p> <p>» Walk around the room and listen to what students are saying. Offer help, guidance where it is required.</p> <p>» Get a selection of students to report back on the various solutions they found when completing Student Activity 3B.</p>	<p>» Were students able to construct a table to represent the data?</p> <p>» Were students able to choose an appropriate scale for the graph?</p> <p>» Could students draw both sets of data on the same axes? Were students able to answer the questions based on the graph correctly?</p> <p>» Could students verbalise their mathematical thinking?</p>
<p>» So, what have we learned about patterns so far?</p>	<ul style="list-style-type: none"> • They have to have a logical sequence • They don't always have to be numbers • You can represent them in lots of ways, e.g. tables, graphs, diagrams • Sometimes a graph is a good way to represent a pattern, because you can see what will happen over a period of time. 	<p>» Write student answers on the board.</p>	<p>» Are students able to state what they have discovered about patterns to date?</p>

Teaching & Learning Plan: Introduction to Patterns

Teacher Reflections

Student Learning Tasks: Teacher Input	Student Activities: Possible and Expected Responses	Teacher's Support and Actions	Assessing the Learning
HIGHER LEVEL MATERIAL: Student Activity 4 and Student Activity 5 contain optional activities for students taking higher level.			
<p>» Now we are going to look at a pattern containing some blocks.</p>	<ul style="list-style-type: none"> • Selection of students report back to rest of class on Student Activity 4A. 	<p>» Distribute Student Activity 4A</p> <p>» Distribute materials which may be required for task e.g. coloured blocks, or coloured paper etc</p> <p>» Walk around the room and listen to what students are saying. Offer help, guidance where it is required.</p> <p>» Get a selection of students to report back on the various solutions they found when completing Student Activity 4A.</p>	<p>» Were students able to model the pattern using coloured blocks or paper?</p> <p>» Did students successfully create a table / diagram to represent the pattern?</p> <p>» Were students able to verbalise their mathematical thinking to you and their colleagues?</p>
<p>» The final step we are going to do on patterns is to take a look at how we might represent a pattern using an algebraic formula.</p> <p>» Does everyone understand what the term "algebraic formula" means?</p>	<ul style="list-style-type: none"> • Is it when we write the formula using x's and y's? • Is it when we try to explain a pattern using algebra? 	<p>» May have to explain what the term "algebraic formula" means.</p>	

Teaching & Learning Plan: Introduction to Patterns



Teacher Reflections

Student Learning Tasks: Teacher Input	Student Activities: Possible and Expected Responses	Teacher's Support and Actions	Assessing the Learning
» We are now going to look at Student Activity 4B		<ul style="list-style-type: none"> » Distribute Student Activity 4B » Walk around the room and listen to what students are saying. Offer help, guidance where it is required. 	<ul style="list-style-type: none"> » Are students interacting and cooperating with each other to find the solutions on Student Activity 4B? » Can students accurately model the problem using the resources supplied
		<ul style="list-style-type: none"> » Get a selection of students to report back on the various solutions they found when completing Student Activity 4B. 	<ul style="list-style-type: none"> » Were students able to develop a formula which would describe the pattern? » Did students verify their equation for the pattern? » Are students able to verbalise their mathematical thinking and defend their answers?

Student Activity 1A

1. Represent this repeating pattern - red, black, red, black, red, black, – by building it with blocks or colouring it in on the number strip below:

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

2. Complete the following table based on your diagram above:

Block position number on strip	Colour
1	Red
2	Black
3	
4	
5	
6	
7	
8	
9	
10	

3. Answer the following questions:

- List the position numbers of the first 5 red blocks: _____
- What do you notice about these numbers? _____
- List the position numbers of the first 5 black blocks: _____
- What do you notice about these numbers? _____
- What colour is the 100th block? _____
- What colour is the 101st block? _____
- What position number on the strip has the 100th black block? _____
- What position number on the strip has the 100th red block? _____
- What colour will the 1000th block be? _____

Explain how you found your answer for question 8: _____

Student Activity 1B

- 1. Represent this repeating pattern – yellow, black, green, yellow, black, green – by building it with blocks or colouring it in on a number strip or drawing a table or in any other suitable way.**

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

- 1. List the numbers of the first 3 yellow blocks. Is there a pattern in these numbers?**

- 2. List the numbers of the first 3 black blocks. Is there a pattern in these numbers?**

- 3. List the numbers of the first 3 green blocks. Is there a pattern in these numbers?**

- 4. What colour is the 6th block? _____**

- 5. What colour is the 18th block? _____**

- 6. What colour is the 25th block? _____**

- 7. What colour is the 13th block? _____**

- 8. What colour will the 100th block be in the sequence? _____**

- 9. What colour will the 500th block be in this sequence? _____**

- 10. Explain how you found your answers to questions 8 and 9,**

- 11. What rule could you use to work out the position number of any of the (i) yellow blocks, (ii) black blocks, (iii) green blocks?**

Student Activity 2A

Money box problem

John receives a gift of a money box with €4 in it for his birthday. This is his starting amount. John decides he will save €2 a day. Represent this pattern by drawing a table, or a diagram, or by building it with blocks.



1. How much money will John have in his money box on the following days?

Day 5: _____ Day: 10: _____ Day 14: _____ Day 25: _____

2. By looking at the pattern in this question, can you explain why the amount of money John has on day 10 is not twice the amount he has on day 5? _____

3. How much money does John have in his money box on day 100? _____

4. Explain how you found your answer for the amount for day 100: _____

5. How much money has John actually put in his money box after 10 days? Explain how you arrived at this amount. _____

6. John wants to buy a new computer game. The game costs €39.99. What is the minimum number of days John will have to save so that he has enough money to buy the computer game? _____

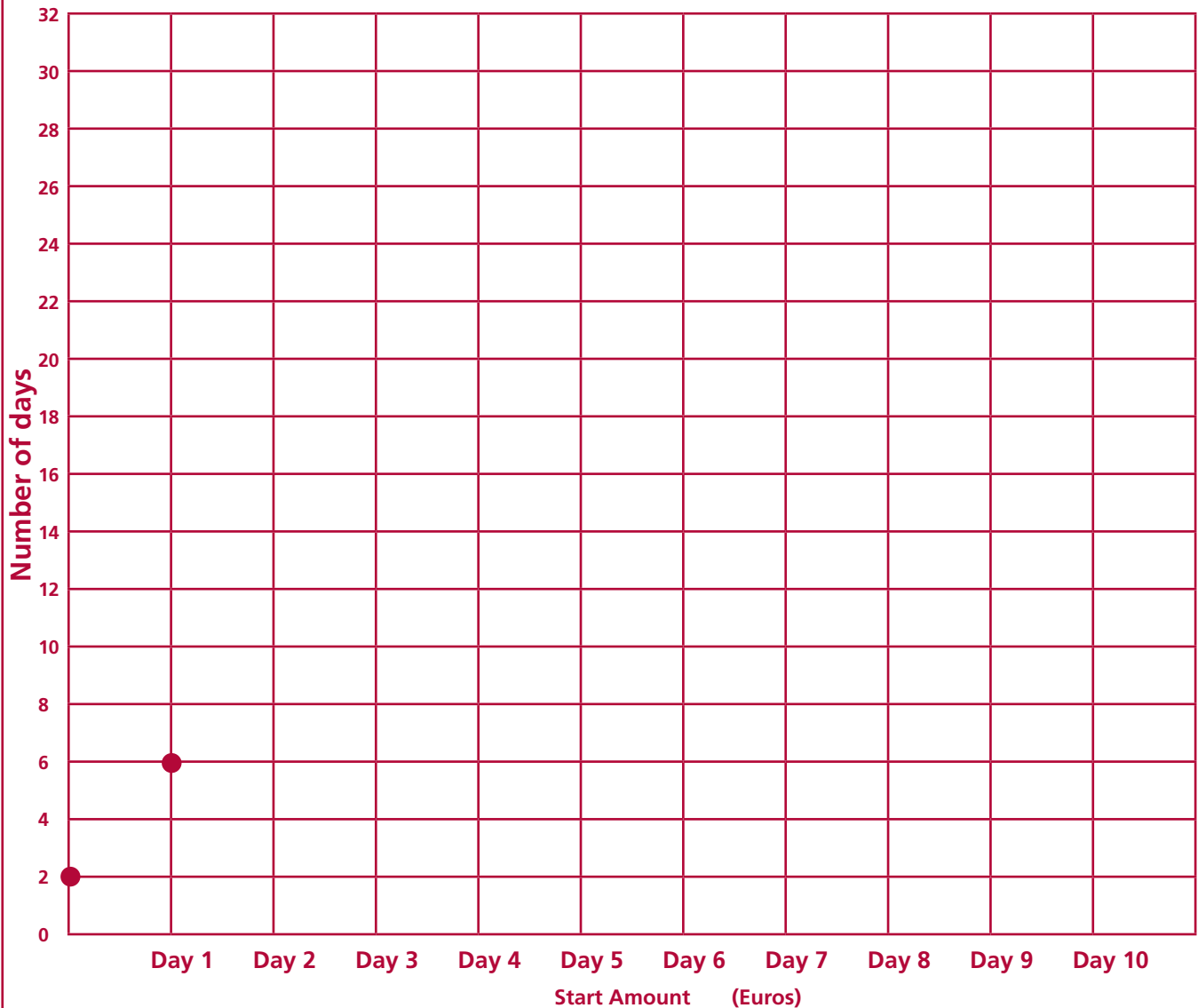
Student Activity 2B

Annie has a money box; she starts with €2 and adds €4 each day.

Create a table showing the amount of money Annie has each day over a period of 10 days.



1. Using the axes below, draw a graph to show how much money Annie has saved over 6 days



2. List two things that you notice about this graph

a. _____

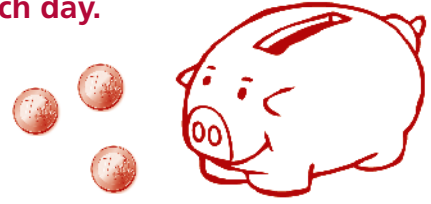
b. _____

3. Could you extend the line on this graph to find out how much money Annie has in her money box on day 10?

a. Amount on day 10 = _____

Student Activity 2C

Owen has a money box; he starts with €1 and adds €3 each day.



1. Draw a table showing the amount of money Owen has each day.
2. Draw a graph to show the amount of money Owen has saved over 10 days.
Hint: Think carefully about the following before you draw your graph:
 - a. Where will you put "Number of days" and "Amount of money" on your graph?
 - b. What scale will you use for the amount of money? (Will you use 1, 2, 3,... or will you decide to use 5, 10, 15, 20..... or perhaps a different scale?)

Student Activity 3A

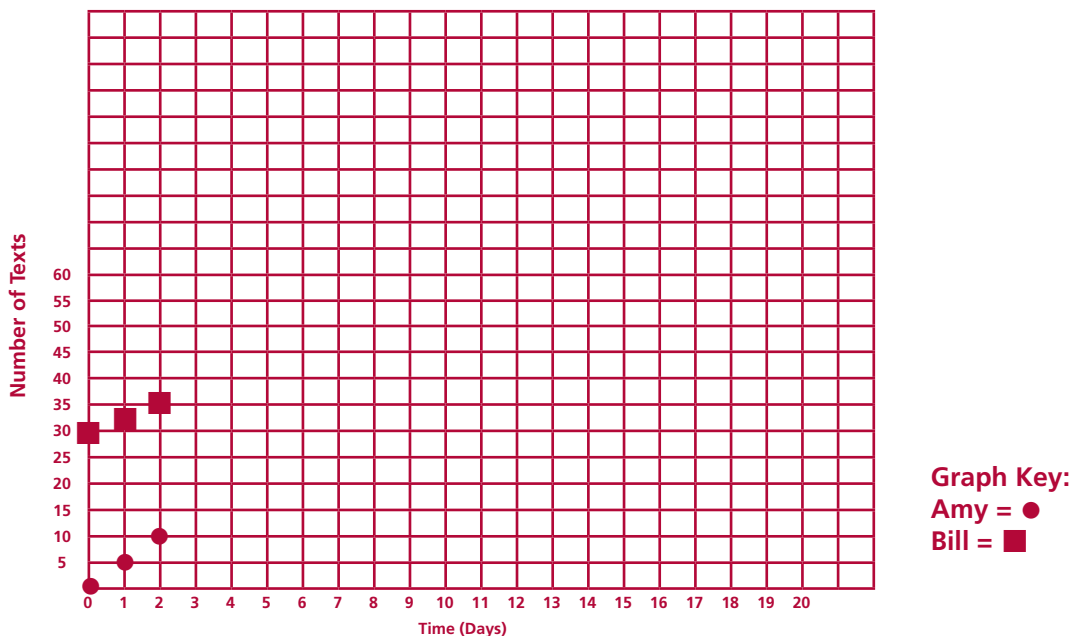
Using Graphs to represent information

Amy and Bill are discussing phone network offers. Bill says that on his network he begins each month with 30 free texts and receives 3 additional free texts each night. Amy says that she gets no free texts at the beginning of the month but that she receives 5 free texts each night. To see how many texts each person has over a period of time, complete the tables below.

Amy's texts	
Time	Number of free texts
Start amount	0
Day 1	5
Day 2	10
Day 3	
Day 4	
Day 5	
Day 6	
Day 7	
Day 8	
Day 9	
Day 10	

Bill's texts	
Time	Number of free texts
Start amount	30
Day 1	33
Day 2	36
Day 3	
Day 4	
Day 5	
Day 6	
Day 7	
Day 8	
Day 9	
Day 10	

- Who has the most free texts after 10 days? _____
- Using the graph paper provided, draw a graph showing the number of texts Amy has, and using the same axes draw a graph of the texts Bill has, for 10 days.



- What do you notice about each graph? _____

- Extend the lines of each graph to "Day 20". In your opinion, who do you think has the better deal on free texts Bill or Amy? Why? _____

- Will Amy and Bill ever have the same number of texts on a particular day? If so, which day? If not, why? _____

Student Activity 3B

Examine the situation below

Liam begins the month with 20 free texts and receives 2 additional free texts each night.

Jessie does not have any free texts at the beginning of the month but receives 3 free texts each night.

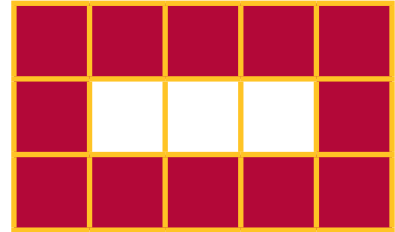
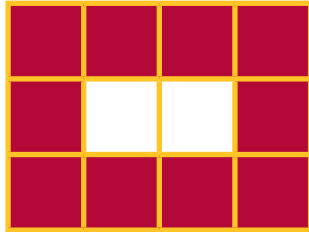
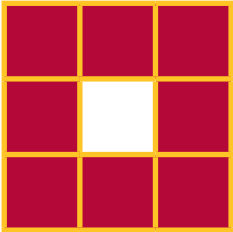
1. Draw a table showing the following information.
 - a. The number of free texts Liam has after 10 days
 - b. The number of free texts Jessie has after 10 days
2. Represent this information on a graph, (note: show Liam's and Jessie's number of free texts on the same graph)
3. Will Liam and Jessie ever have the same number of free texts on a certain day? If so, which day? If not, why not? _____

4. Who in your opinion has the better deal for free texts each month? Give a reason for your answer. _____

Student Activity 4A (Higher Level Material)

Finding Formulae

The figures below are made up of white and red square tiles. The white squares are in the middle row and have a border of red tiles around them. For 1 white tile, 8 red tiles are needed; for 2 white tiles, 10 red tiles are needed, and so on.



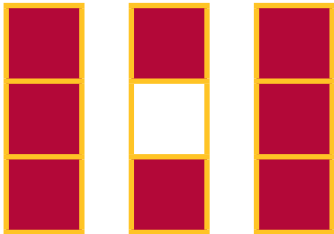
Using the information above, create a table or diagram which will show how the number of red tiles increases as the number of white tiles increases.

(Hint: Look at the way the number of red tiles change each time a white tile is added, can you see a pattern?)

Student Activity 4B (Higher Level Material)

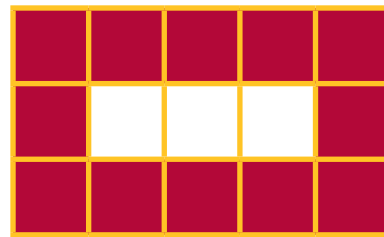
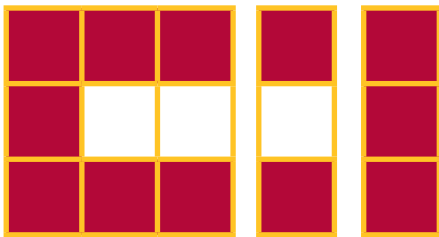
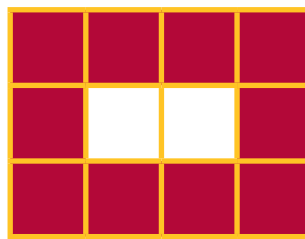
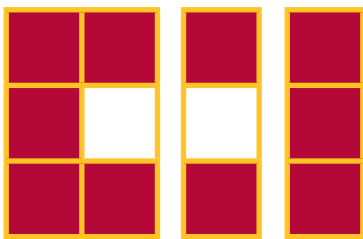
Breaking down the pattern and developing your own formula

Let's look at how each shape is built.



Complete the blank spaces below

To make the next shape in the sequence, I have to add ____ white tile(s) to the middle and ____ extra red tiles to the outside

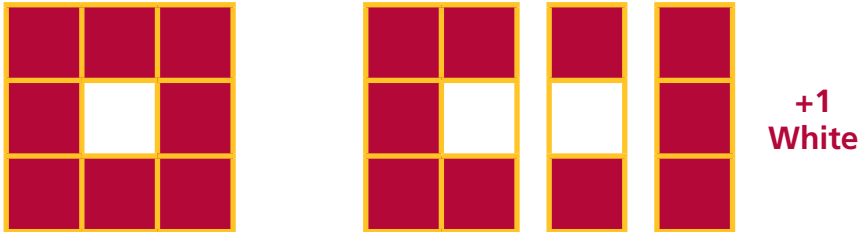


So each time I make a new figure the number of white tiles increases by ____ and the number of red tiles increases by ____; complete the pattern in the table below.

	Number of white tiles	Number of red tiles	
+1	1	8	+2
	2	10	

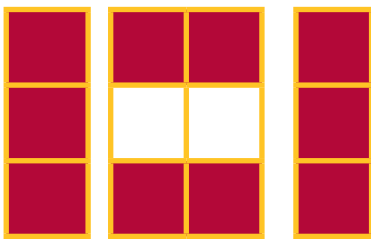
Student Activity 4B (continued)

Let the number of white tiles = n . We know from our first shape that the white tile is surrounded by 8 red tiles, and each time we add a white tile we must add two red tiles.

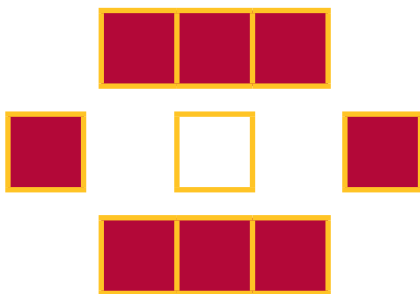


If n is the number of white tiles and there are the same number of red tiles above and below it (i.e. a total of $2n$) and two lots of 3 at either side (i.e. $+6$). Then the general formula (or expression) for the number of red tiles must be $2n + 6$.

(Remember we are calculating the total number of RED tiles, not the total number of tiles in the shape)



Using the logic above, can you develop another formula or expression based on the information below; (let the number of white tiles = n)



Hint: The number of red tiles above and below is 2 more than the number of white tiles and 2 extra at the sides.

- 1 How many red tiles will there be if there are 100 white tiles? (Check your answer using both equations, i.e. $2n + 6$ AND the one you have found above.) _____

Student Activity 5 (Higher Level Material)

Group Work: Graphing Functions

Set 1.

1. I have €36 to buy a gift. The amount of money I have left depends on the price of the purchase. (x-axis, price of purchase; y-axis, amount of money I have left).
2. A straight line, 36cm long, is divided into 2 parts A and B. The length of part B depends on the length of part A. (x-axis, length in cm of part A; y-axis, length in cm of part B).

For each of the sets assigned to your “expert” group:

- Find some data points that fit the given problem, e.g. (1, 35) or (10, 26) etc
- Organise the data into a table. Use the quantity identified as the x-axis for the left column and the quantity identified as the y-axis for the right column.
- Organise the data into a graph. Use the quantity identified as the x-axis for the horizontal axis and the quantity identified as the y-axis for the vertical axis.

IMPORTANT: Each member of the group will need a copy of each graph to share with the next group.

- Share and compare your graphs with other groups
- Identify similarities (things that are the same) and differences among the various graphs.

Student Activity 5 (continued)

Set 2.

- The amount of money collected for a particular show is dependent on the number of tickets sold. Tickets cost €8 each. (x-axis, number of tickets sold; y-axis, amount of money collected).
- The number of empty seats in a cinema that seats 350 people depends on the number of seats that are sold (x-axis, number of seats that are sold; y-axis, number of seats that are empty).

For each of the sets assigned to your “expert” group:

- Find some data points that fit the given ticket problem, e.g. (1,8) or (2,16) etc
- Find some data points that fit the cinema problem, e.g. (0,350) or (20,330) etc
- Organise the data into a table. Use the quantity identified as the x-axis for the left column and the quantity identified as the y-axis for the right column.
- Organise the data into a graph. Use the quantity identified as the x-axis for the horizontal axis and the quantity identified as the y-axis for the vertical axis.

IMPORTANT: Each member of the group will need a copy of each graph to share with the next group.

- Share and compare your graphs with other groups
- Identify similarities (things that are the same) and differences among the various graphs.

Set 3.

- The perimeter of a square depends on the length of a side (x-axis, length of side; y-axis, perimeter.)
- If I fold a paper in half once I have 2 sections. If I fold it in half again I have 4 sections. What happens if I continue to fold the paper? (x-axis, number of folds; y-axis, number of sections)
- The area of a square depends on the length of a side. (x-axis, length of side; y-axis, area of the square).

For each of the sets assigned to your “expert” group:

- Find some data points that fit the given problem.
- Organise the data into a table. Use the quantity identified as the x-axis for the left column and the quantity identified as the y-axis for the right column.
- Organise the data into a graph. Use the quantity identified as the x-axis for the horizontal axis and the quantity identified as the y-axis for the vertical axis.

IMPORTANT: Each member of the group will need a copy of each graph to share with the next group.

- Share and compare your graphs with other groups
- Identify similarities (things that are the same) and differences among the various graphs.