Mount Eliza Secondary College

Mount Eliza
Secondary College

Year 8

Investigations

2009

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Year 8 Mathematics Syllabus 2009

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Cubes Assignment

Structure – Algebra

STRUCTURE - ALGEBRA			
Page	Topic	Task	Completed
189	Are you ready?	1,2,3,4,5,6,7	
	Investigations Using pronumerals Substitution (also with brackets)	Investigations - Garden Bed and 4 Arms	
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	Assignment - Investigation	Create your own task	

Rationale

Algebra plays a pivotal role when it comes to the Year 8 Mathematics Curriculum that is why we have chosen it to be the unit of work to present on.

The list above shows the unit work outline for the topic and how investigation tasks are linked within the curriculum. For Algebra the investigation tasks that were chosen are: Garden Beds and 4 Arms.

Lessons – Garden Beds

Lesson 1

As a reintroduction to Algebra students were required to complete the *Are You Ready?* This allowed them to refresh their memories on Algebra and redraw their previous learning on this area. This also gave me an indication at what levels the students have covered Algebra in previous years.

Lesson 2

The Garden Bed problem was posed to the students and positive discussion and interaction came out of the lesson. Nathan the tiler picked his plants and tried to find out the number of tiles (with assistance of the class) he needed to tile around two plants. This was a whole class discussion and the students acted out the scenario. They seemed to have enjoyed being a part of the problem. The acting out began with 2 plants and then it increased to 3, 4 and 5. When I suggested that we should go back to 1 plant the majority of the class said no. From there the students went back to their desks and worked with the blocks to reinforce what they had acted out, hence diagrams were drawn in their investigations booklet, and a table was formed.

Lesson 3

This lesson was scheduled in a computer room so we refreshed our minds on the previous lesson looked back out our table and looked for a pattern. Discussions and questions were posed and the class came up with a generalisation 'of double the number of plants and add 6'. This generalisation was tested for a different number of plants and it seemed to of worked. From there we moved on to the computer so it could be reinforced. Due to the fact we were in the computer room the students used the Casio class pad 300 software to put their data in a table and graph it. From there we discussed the properties of the graph and how it formed a linear function.

Lesson 4

From our discussions of the previous lesson and confirming the generalisation of the problem the students were required to write up the problem in their Investigations booklet. Under the following headings:

What was the problem?

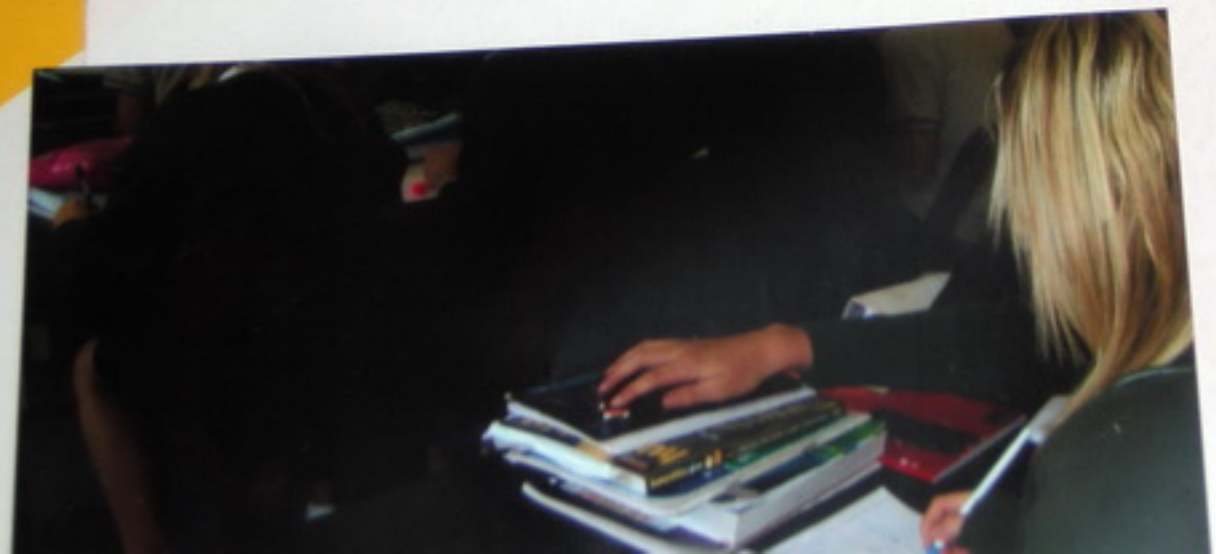
What we did?

What we found out?

Conclusion

Resources used

- Blocks
- Investigations booklet
- Garden Beds software
- Casio class pad 300 simulator software
- Garden beds lesson plan from Task centre website.



Lessons – 4 Arms

Lesson 1

As this was the fourth investigation for the year so students had become used to the routine and what was expected of them. Therefore they were required to complete 4 Arms in groups of 3or 4 of their own choice. The students used coloured blocks to visualise the problem. This allowed them to draw the diagrams in their booklets, sort the information by putting it into a table and look for a pattern which lead to a general solution.

Lesson 2

The general solution that the groups came up with was put to the test. To ensure that it was applicable to other situations. From there, the information was put into a graph, which the students plotted by hand into their booklets. From there they were able to draw conclusions and write up the problem under the following headings:

What was the problem?

What we did?

What we found out?

Conclusion

Resources used

- Blocks
- Investigations booklet
- 4 Arms lesson plan from Task centre website.

Assessment Tasks

Mt Eliza Secondary College
Year 8 Mathematics
Investigations, 2009

Name:
Date given:
Due date:

- It is important that you submit your work on the due date. Otherwise you will loose 1 mark for each day it is not submitted.
- If you are having trouble completing the task it is your responsibility to apply for an extension. This will only be granted under special circumstances.
- You must have a bibliography on your assignment. This is to ensure students have not "cut and paste" information from the internet the night before.
- Please attach this sheet with your assignment once submitted.
- Make sure you follow the assessment criteria to achieve the best possible result.
- **Due date at the beginning of class on the XX of XXX, 2009**

Task – Create your own investigation task card

During your mathematics classes you have investigated how a mathematician works. Using your skills as a mathematician you investigated patterns and made generalisations through investigations such as Garden bed and 4 Arms. Now it is your turn to create an investigation task card with the skills you have acquired.

In pairs, plan and present your investigation task card, you must include an explanation of the solution on a separate card.

Instructions

1. As a pair, brainstorm questions for your selected task. Use the four points below to prompt you (remember to submit your brainstorming sheet). Then begin writing your problem.

- When mathematicians become interested in a problem they ….
- Questions which help mathematicians learn more are …
- When mathematicians have a problem they …
- A mathematicians strategy toolbox includes …

2. Now that you have the problem for the task. You need to have a solution card that shows a clear understanding of the questions and the steps needed to solve the problem.

3. Each member of the pair is responsible for preparing the task card and the explanation of the solution to the problem. Decide who will do what and what the rules and guidelines are for layout, style, use of colour and type.

4. The pair together will present the task card with the solution on the due date. Submit a copy to your superstar math teacher. Maximum time allowed to present is 5 min.

Assessment Task Feedback

Student: _____ Class: _____

Assessment rubrics

Domain: Mathematics
Dimension: Structure

Tick box	Progression point/ Standard	Student response
	progressing beyond 4.25	Students use variables in general mathematical statements. They substitute numbers for variables (for example, in equations, inequalities, identities and formulas). Students use variables in general mathematical statements. They substitute numbers for variables (for example, in equations, inequalities, identities and formulas).
	achieved 4.25	Students use variables in general mathematical statements.
	progressing towards 4.25	Has some trouble putting the algebraic notation together to show the relationship.
	4.25 not shown	Is consistently unable to successfully adapt the algebraic sequences to show the relationship.

Domain: Mathematics
Dimension: Working mathematically

Tick box	Progression point/ Standard	Student response
	progressing beyond 4.25	Students develop simple mathematical models for real situations (for example, using constant rates of change for linear models). They develop generalisations by abstracting the features from situations and expressing these in words and symbols.
	achieved 4.25	Students develop simple mathematical models for real situations (for example, using constant rates of change for linear models).
	progressing towards 4.25	States the relationship. May have difficulty showing that the pattern continues for other lots of consecutive numbers.
	4.25 not shown	Shows little understanding that a pattern exists. Does not state the relationship.

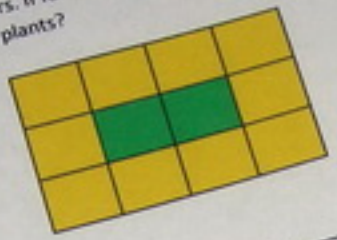
Comments:

Sample work

Scott the landscaper

Materials: 8 pavers of one colour and 16 pavers of a different colour

Scott the landscaper needs to pave around a specific number of plants. The number of plants can only be in even numbers. If for two plants Scott uses ten pavers. How many pavers does Scott need for 4, 6, 8, 50 and 100 plants?



Fill in the table below:

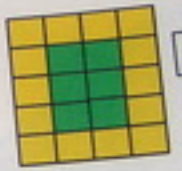
Number of plants	2	4	6	8	10	50	100
Number of pavers	10						

By Ryan and Ben Yr 8

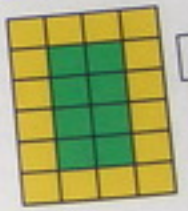
Scott the landscaper - Solutions

2 plants, 10 pavers

4 plants, 12 pavers



6 plants, 14 pavers



8 plants, 16 pavers

Fill in the table below:

Number of plants	2	4	6	8	10	50	100
Number of pavers	10						

The pattern from the table shows that the number of pavers goes up by two.

$(2\times1)+8=10$ $(4\times1)+8=12$ $(6\times1)+8=14$ $(8\times1)+8=16$ $(10\times1)+8=18$

$(50\times1)+8=58$ $(100\times1)+8=108$

A general solution for the number of pavers needed for any even number of plants is

(number of plants $\times1$) + 8 = number of pavers

By Ryan and Ben Yr 8

Stefan the Monkey

a)

Stefan the monkey is a world champion unicyclist. Stefan has always wanted to ride from Melbourne to Adelaide on his unicycle. The trip is 728m long and Stefan knows that it takes him three turns of his pedles to move a distance of one metre.

How many times will Stefan have to pedle to complete his journey?

b) fill in the missing slots in the bar below.

Pedals(P)	3	9	15	30	60	150	300	450			1250	2700		4500	6000
Metres(m)	1	3	5	10	20			150	200	400	750		1000		2000

c) write the answer to the following

M =

Assessment Task Feedback

Student: Ezra and Zack Class: 8B

Assessment rubrics

Domain: Mathematics
Dimension: Structure

Tick box	Progression point/ Standard	Student response
	progressing beyond 4.25	Students use variables in general mathematical statements. They substitute numbers for variables (for example, in equations, inequalities, identities and formulas). Students use variables in general mathematical statements. They substitute numbers for variables (for example, in equations, inequalities, identities and formulas).
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Comments: Well done gentlemen. Fabulous work. The Monkey idea is definetly an original 8/5/09.

Pizza slicing:

Jack the pizza delivery boy needs to know how many times to cut a pizza to get it into 12 pieces

Fill out the box below to help Jack

Pieces	P	2		6		10		
cuts	C	1	2	3	4		6	7

1 cut
☐ pieces

2 cuts
☐ pieces

Eric, Nathan and Jack

Pizza slicing:

Jack found out that everytime you cut the pizza you times the amount you cut by 2 for eg if you cut it 2 times there would be 4 pieces or cut it 4 times there would be 8 pieces.

P	2	4	6	8	10	12	14	16	18
C	1	2	3	4	5	6	7	8	9

Formula is P = C x 2

4 cuts
8 pieces

1 cut
2 pieces

Nathan, Eric and Jack

Assessment Task Feedback

Student: Eric Bedggood Class: 8B

Assessment rubrics

Domain: Mathematics
Dimension: Structure

Tick box	Progression point/ Standard	Student response
	progressing beyond 4.25	Students use variables in general mathematical statements. They substitute numbers for variables (for example, in equations, inequalities, identities and formulas). Students use variables in general mathematical statements. They substitute numbers for variables (for example, in equations, inequalities, identities and formulas).
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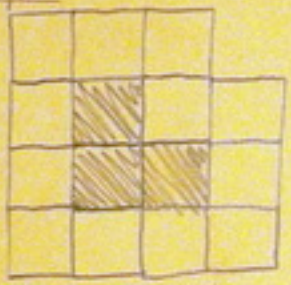
Comments:

Great work well done 27/4/09.

Garden Beds

Kade Ebert
8C

I've got some new garden beds that need to be tiled around the outside, the garden Beds are in the shape of an L
for example



1. Do two more but on each one extend both areas by one

2. Put your results in this table

Size of Garden Beds	3	5	7	9
Tiles Needed				

3. Figure out a formula, that will help with larger beds

Formula =

4. Now fill in this table using the formula

Size of Garden Beds	32	48	64	84	100
Tiles Needed					

5. Work out a backwards formula so that if I have alot of tiles I will know what size garden bed I can tile around

Backward Formula=

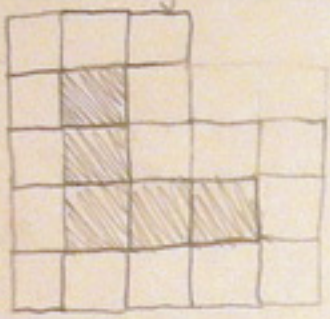
6. If I have 126 tiles what...size garden bed can I tile around

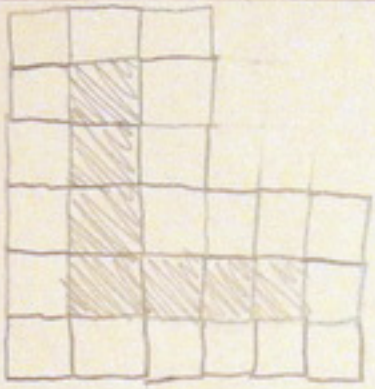
Garden Bed size=

Kade Ebert
8C

Garden Bed Answers

1. Two diagrams





2. My results

Size of Garden Beds	3	5	7	9
Tiles Needed	12	16	20	24

3. The Formula

Formula = T = B2+6

4. My results using the formula

Size of Garden Beds	32	48	64	84	100
Tiles Needed	70	102	134	174	206

5. The Backwards formula

Backwards Formula = B = (T-6) ÷ 2

6. If you had 126 tiles you could tile around a 60 square Garden bed

Working Mathematically

First give me an interesting problem.

When mathematicians become interested in a problem they:

- Play with the problem to collect & organise data about it.
- Discuss & record notes and diagrams.
- Seek & see patterns or connections in the organised data.
- Make & test hypotheses based on the patterns or connections.
- Look in their strategy toolbox for problem solving strategies which could help.
- Look in their skill toolbox for mathematical skills which could help.
- Check their answer and think about what else they can learn from it.
- Publish their results.

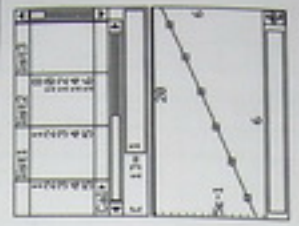
Questions which help mathematicians learn more are:

- Can I check this another way?
- What happens if ...?
- How many solutions are there?
- How will I know when I have found them all?

When mathematicians have a problem they:

- Read & understand the problem.
- Plan a strategy to start the problem.
- Carry out their plan.
- Check the result.

Graph: comparison between the number of plants against tiles



The problem: We had a amount of plants we had to find how many tiles we needed to surround the plants

What we found out was that for the amount of plants you double it and add 6

What we did: We put people on the ground in the place of the plants than we put people surrounding the plants they were

Conclusion
We came up with a generally formula it was p×2+6 tiles
p = plants

NAME

SUBJECT Investigations

YEAR

SCHOOL

GARDEN BEDS

MATERIALS

About five [5] yellow tiles to use as 'garden beds'
About sixteen [16] green tiles to use as 'borders'

A gardener wants to place a tile border around a flower bed.

1. Surround a flower bed of one square with tiles. How many do you need?

4 ARM SHAPES

MATERIALS

Seventeen [17] tiles – sixteen [16] of one colour and one [1] of another
Marker and cloth

A tiler wants to build a design in the shape of a cross with 4 arms.

Your challenge is to predict how many tiles are needed for any length of arm

1. Build a cross with an arm length of 1. How many tiles are needed?
2. Build a cross with an arm length of 2. How many tiles are needed?

Length of arm	1	2	3	4	5	10	12	100
Number of tiles	5	9	13	17	21	41	49	401

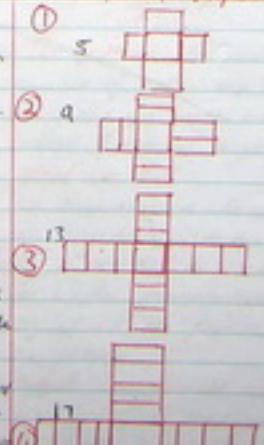
3. How many tiles for arm length 37 arm length 47
4. Predict how many tiles are needed for an arm length of 107
5. Can you predict how many are needed for length 1007 Can you explain how you worked it out?

Formula = T = (A×4) + 1

Garden Beds cont/d 4 Arm Shapes

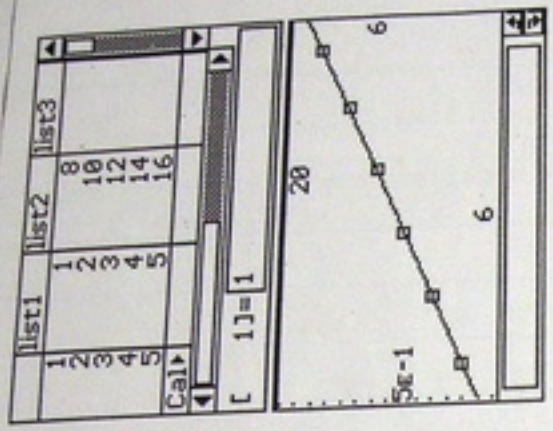
① The problem:
The problem consists of using the tiles, trying to find out how many tiles are needed for various amounts of plants.

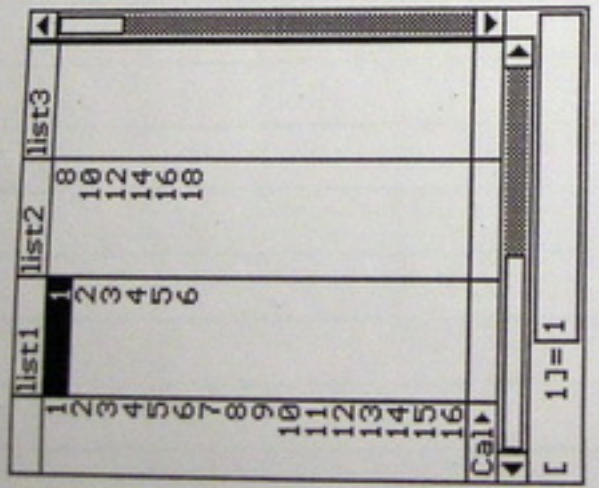
② What we did:
First of all, we selected an amount of plants. They we drew on the board a rough sketch of how many tiles we would be needing for each plant. We continued doing so until we found the pattern. To do our theories we did practicals. It will also



Garden Beds cont/d	Plants	tiles
2 Plants 10 tiles	2	10
	1	5
	3	12
	4	14
3 plants 12 tiles	5	16
	6	18
4 Plants 14 tiles		
5 Plants 16 tiles		
6 Plants 18 tiles		
1 Plant 8 tiles		

50 Plants → 106
80 Plants → 166
We double it and add 6
T = P×2+6





Garden Beds

23/3/09

The problem: We needed to find out how many tiles to put around certain amounts of plants.

What we did:
We demonstrated by using people as plants and tiles. We also went on the computer for a little while.

What we found out:
we found out that you double it and add 6, it meaning the amount of plants. If you write it in a list the amount of tiles goes up by 2.

Conclusion:
to get the ~~write~~ right amount of tiles you need to double the amount of plants and add 6.