Paving Problem

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Student Activity

7 8 **9** 10 11 12

TI-Nspire™ | Activity | Student | 30 min

Introduction

Three different landscape garden companies: Mow Town, M.T.Potts and Compost Happens specialise in paving. They are all currently working on a job that requires them to lay pavers around square garden beds of various sizes. Your task is to write a formula for each landscaper that determines the number of pavers required for each job.

Garden 1 – Mow Town Landscapers

Mow Town is an old fashioned landscape company that like to lay their pavers in a specific order.

Open the TI-Nspire file: "Garden Problem 1"

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There are two sliders on the page:

Garden = side length of garden bed.

Step = Demonstrates order in which pavers are laid.

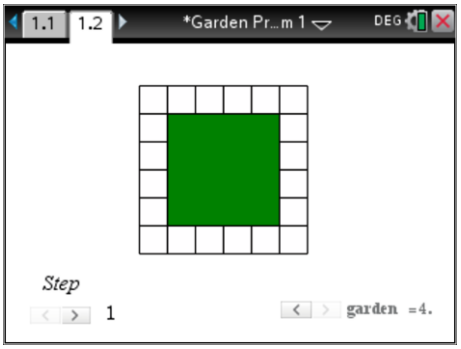
Colours:

Green = Garden bed

White = Where pavers will be laid

Yellow = Pavers currently being laid

Orange = Pavers laid previously



Start with a 1m x 1m garden (garden = 1) and step gradually through the laying process, then advance to the 2m x 2m garden (garden = 2) and step through the laying process. Continue with this procedure until you have a good understanding of how Mow Town lay their pavers, then answer the questions below.

Question: 1

How many pavers are laid first, regardless of the garden bed size? (Step 1)

Question: 2

Determine a rule that relates the garden size (x) to the quantity of pavers (y).

Question: 3

Explain what part of your rule addresses the quantity of pavers that are laid second. (Step 2)

Question: 4

Use your rule to determine how many pavers would be required for a garden bed that is 12m x 12m.

Question: 5

Mow Town have 40 pavers. What is the largest square garden bed that they can surround? Explain how you determine your answer.

Authors: Peter Fox

Garden 2 – M.T.Potts

Open the TI-Nspire file: “Garden Problem 2”

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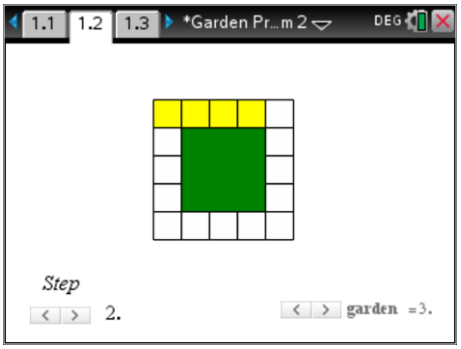
This document is set out the same as previous problem, however M.T.Potts have a different approach to laying their pavers. Your task is to once again explore, step by step, garden by garden, the method used to lay the pavers and an equation that reflects the approach.



Question: 6

How many pavers are laid first, and how is this related to the size of the garden?

Question: 7

How many times is the above (Question 6) process repeated?

Question: 8

Write and equation that relates to the approach applied by M.T.Potts landscapers and explain the relationship.

Garden 3 – Compost Happens

Open the TI-Nspire file: “Garden Problem 3”

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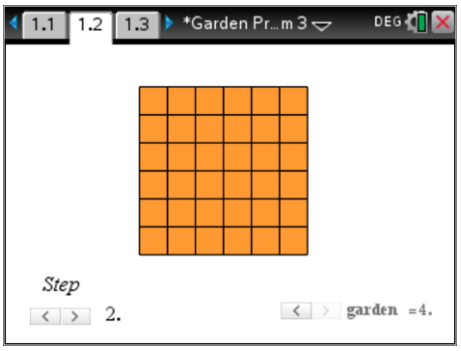
Compost Happens do not have a specific order associated with laying pavers however they have a unique method of determining the quantity of pavers required. Shown opposite is “Step 2” for the 4m x 4m solution.

Once again use the step and garden sliders to explore the approach taken by Compost Happens, specifically the method used to determine the quantity of pavers required.



Question: 9

Determine an expression for Step 2 of Compost Happens approach to estimating the quantity of pavers.

Question: 10

Determine the equation derived by Compost Happens for the quantity of pavers required and explain how the company establishes this estimate.

Connecting Rules

Question: 11

The three landscape companies each use a different equation that generates exactly the same results. Show that the three equations are actually the same.

Authors: Peter Fox

Open the TI-Nspire file: “A New Garden”

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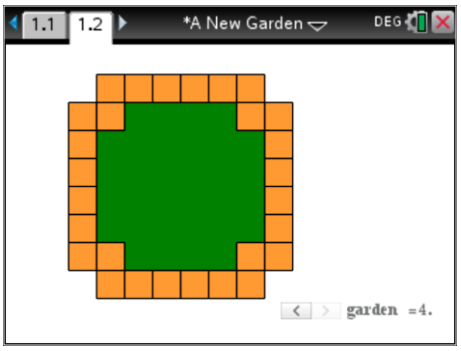
A new garden bed and paving structure has become popular. Use the garden slider to see how the pavers are set out for the different size garden beds.



Question: 12

The three landscape companies need to develop paving formulas for the New Gardens. Consider the approaches taken by Mow Town, M.T.Potts and Compost Happens and apply them to the new paving. Determine equations for each landscape company to use and show that the equations are equivalent.

Authors: Peter Fox