

Drawing to Scale: Designing a Garden

DRIVING QUESTION: How do you convert 1m to a measurement on a 0.05 scale plan map in real life? What about 30m? Now using the same scale, how can we show a 4x5 rectangle of 20 square meters on the map?

TEKS:

- Geometrical figures should be drawn, constructed, and described, along with how they relate to one another
- Use numerical expressions to solve difficulties in both mathematics and real life.
- Use proportional relationships to analyze and solve mathematical and real-world problems.
- Utilize numerical and algebraic expressions and equations to solve practical and mathematical issues.
- Identify and resolve angle measurement, area, surface area, and volume mathematical and real-world problems.

OBJECTIVES:

This lesson unit aims to assist students in evaluating the precision of two distinct approximations to a certain linear relationship. The purpose of this lesson unit is to evaluate students' proficiency in understanding and using scale drawings to construct a garden layout. This calls for the use of metric units and proportional reasoning.

MATERIALS:

- Garden Plan
- Mini whiteboard, pencil, an eraser.
- A large sheet of paper, two sheets of light, letter-sized cardboard, scissors, a sticky stick, highlighters.
- Plain paper, poster papers, marker
- Calculator, square paper

Designing a Garden

Imagine you are a garden designer. You receive this email from a customer:

Dear Garden Designer,

I have moved into a house with a small garden that needs a total redesign. Please design my garden for me. I have attached an accurate scale drawing of my garden to this email. I've listed below some features I want in the garden. I will email you later about some other things I also want. To start, please could you draw these features accurately on the plan, showing where you think they should go in the garden. Send me your plan with an explanation of your thinking.

Shed

I've ordered this shed. It is 2 meters wide, 3.25 meters long and 2.8 meters tall.



Decking for barbeques

I want some decking near the patio doors.

It should be big enough to seat at least six people.



Circular pond

I would like a circular pond.

I'd like its area to be about 7 m^2 .



Path and Borders

I would like some flower borders. These should not be more than one meter wide as I find wider ones difficult to look after.

I'd like a gravel path 1 meter wide to go from the shed to the house and from the garden gate to the house.

I will cover the rest with grass.



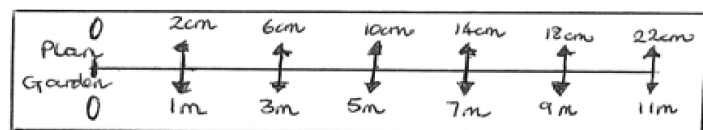
Use the sheet *Garden Plan* to draw the features from the email.

Record all your calculations and reasoning on a separate sheet.

Make sure to record the scale you use on the plan.

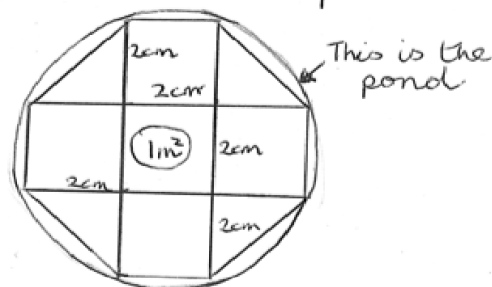
Sample Responses to Discuss: Bill

I've created my own rule for this garden.



I will cut this rule out, stick it on card, and use when drawing all the garden features.

Pond $1\text{m}^2 = 1\text{m} \times 1\text{m}$ square
 $= 2\text{cm} \times 2\text{cm}$ on plan



Sample Responses to Discuss: Hana

$$\text{Area of pond} = 7\text{m}^2 = \pi r^2$$

$$r = 3\text{m} \quad \text{Area} = \pi \times 3 \times 3 = \text{too big}$$

$$r = 2\text{m} \quad \text{Area} = \pi \times 2 \times 2 = 12 \text{ too big}$$

$$r = 1\text{m} \quad \text{Area} = \pi = 3.1 \text{ too small}$$

$$r = 1.5\text{m} \quad \text{Area} = \pi \times 1.5 \times 1.5 = 7\text{m}^2 \text{ Perfect!}$$

$$\text{Scale } 10\text{m} = 20\text{cm}$$

$$= 1:2$$

$$= 1.5:3$$

Radius is 3cm on plan.

Sample Responses to Discuss: Lisa

$$\text{Area pond} = \pi r^2 = 7$$

$$3 \times r \times r = 7$$

$$r \times r = \frac{7}{3}$$

r is about 1.5m

I will use a graph to quickly figure out all the plan dimension of the garden features.

