

The Lawn

Purpose:

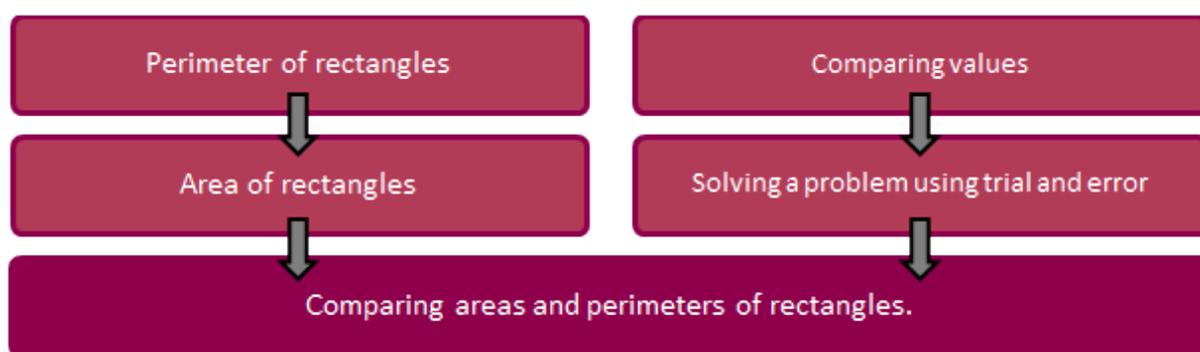
The purpose of this activity is to engage students in finding unknown quantities that fit within the given constraints.

Achievement Objectives:

GM4-3: Use side or edge lengths to find the perimeters and areas of rectangles, parallelograms, and triangles and the volumes of cuboids.

Description of mathematics:

This activity ideally follows exploration and learning in the following areas.



Perimeter of rectangles

Find the perimeter of a rectangle with height 2.4 and width 6.1 units.

Area of rectangles

Find the area of a rectangle with height 2.4 and width 6.1 units.

Comparing values

Is 4×60 the same or different to $53 + 68 + 40 + 89$?

Solving a problem using trial and error

If a and b are prime numbers, such that $a \times b = 10$, what values could a and b be?

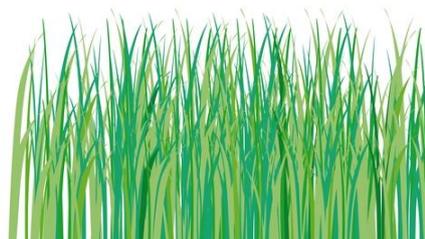
To solve this problem, the students may explore with numbers, or use algebraic representations. The approach should be chosen in sympathy with their skills and preferred method of solution.

Activity:

A rectangular lawn space has long sides twice the length of the short sides.

Its area, in m^2 , is the same number as the perimeter in m.

What are the possible dimensions of the field?



The procedural approach

The student is able to solve the problem, with guidance.

Prompts from the teacher could be:

1. Label the different sides of the rectangle.
2. Set up a table that has headings for the different sides, the perimeter and the area.
3. Try sensible values for the different sides and calculate the perimeter and area for each trial.
4. Find the values for the different sides that give the same value for perimeter and area.

T: I notice that you've said the answers are 6 and 3. What do these numbers mean?

S: 6 metres and 3 metres, I just forgot to put the metres.

T: So are the perimeter and the area both 18?

S: Yeah, 18. No, wait, the area is 18m^2 and the perimeter is 18m.

Area = Perimeter $B = 6$ $A = 3$

$B = 2A$

A	B	Perimeter	Area
1.5	3	9	4.5 X
$4\frac{1}{3}$	8	24	32 X
3	6	18	18 ✓

A 

T: I'm interested in the order of your trials.

S: I tried 4 and its area was too big so I went down to 3 and it worked.

Trail and Error

The conceptual approach

The student is able to solve the problem, within the context given.

Prompts from the teacher could be:

1. Consider how you calculate the perimeter of a rectangle.
2. Consider how you calculate the area of a rectangle.
3. Think about how you might choose values for side lengths to trial.
4. As you carry out trials, look for patterns or clues that would help to limit the choices trials could be.

The image shows a student's handwritten work on a grid background. At the top left, a rectangle is drawn with a horizontal side labeled "10m" and a vertical side labeled "5m". To the right of the rectangle, the calculations are written: $A = 50m^2$ and $P = 30m$. Below this, there are several trial-and-error calculations. One shows a rectangle with sides 10, 20, 10, and 20, with $P = 60$ and $A = 200m^2$. Another shows a rectangle with sides 4, 2, 4, and 2, with $P = 12m$ and $A = 8m^2$. A third shows a rectangle with sides 6, 3, 6, and 3, with $6 \times 3 = 18$. A speech bubble at the bottom left contains the following text:

T: I'm interested in the way you've set out your numbers.

S: My numbers represent the shape of the box. I used trial and error to find the answer. I figured out that to get area and perimeter the same it had to have a 3 and because I can't easily divide it by 2, I doubled to make 6.