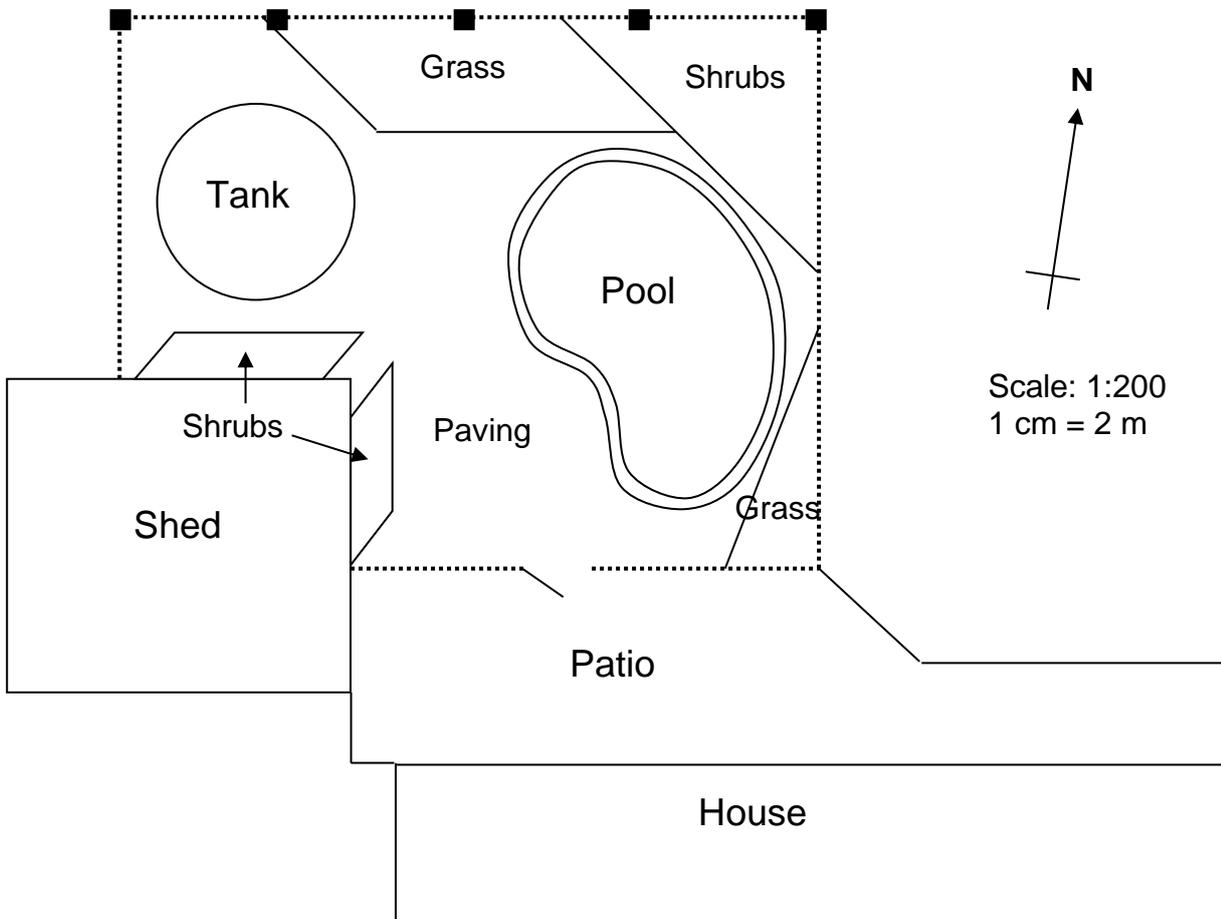


# Albert's Pool

Albert is a guinea pig breeder who has always wished he could be a maths teacher. He has drawn a design for a pool to go out the back of his house. His design is shown below. The house, patio, shed and water tank are already there. The area where the pool is planned to go is just bare flat ground at present. The dotted line is the planned pool fence. The area inside the fence will be paved except for the parts marked as grass and shrubs.



Your job is to work out how much the whole thing will cost. To enable you to do this, instructions and price lists for the various types of work are provided. You will need to do some measuring and calculating, however, in order to use the price lists.

## Q1. The cost of the pool

The basic price of a pool is determined by its perimeter. The perimeter is taken as the distance around the water eade. This is the inside one of the two lines around the pool. The relation between perimeter and price is given in the table below. The primeter should be rounded up to the nearest whole number before using the table.

Perimeter (m)	16	17	18	19	20	21
Price (\$)	10 900	11 300	11 700	12 100	12 500	12 900

Perimeter (m)	22	23	24	25	26	27
Price (\$)	13 400	13 900	14 400	15 000	15 600	16 200

Perimeter (m)	28	29	30	31	32	33
Price (\$)	16 800	17 500	18 200	18 900	19 600	20 300



This price includes:

- Council and engineer's fees
- Builder's insurance
- Excavation
- Removal of excavated soil
- Steel reinforced concrete pool shell
- Pebblecrete lining
- 350 mm paved surround to pool as shown on the plan
- Pump, filter and plumbing

The following features are optional extras

Item	Cost
Salt water chlorinator	\$850
Barracuda automatic pool cleaner	\$520
Underwater light	\$240
Rocks	\$100 per metre (measured around the perimeter of the pool)
Solar heating	\$1500 + \$30 per square metre of pool area

Albert wants a salt water chlorinator, a barracuda and solar heating. Find the cost of Albert's pool.

**Q2. The cost of the fencing**

Fencing costs \$55 per metre. The gate is \$200. Find the cost of the fencing and gate.

**Q3. Grass**

The cost of the grass areas is \$5 per square metre. Find the total cost of the grass areas.

**Q4. Shrubs**

Albert wants two shrubs per square metre for the shrub areas. He wants 3 times as many small ones as large ones. Small ones are \$8.50; large ones are \$16. He also wants 150 mm of mulch over the shrub areas to stop weeds from growing. The mulch is \$35 per cubic metre laid.

Find the cost of the shrub areas.

**Q5. Tank**

The tank stands 600 mm above the surrounding paving. Albert wants the top and sides of the tank tiled. The tiling costs \$40 per square metre. Find the cost of the tiling.

**Q6. Paving**

The remainder of the pool enclosure is to be paved. The cost of paving is \$45 / m<sup>2</sup>. Find the cost of the paving.

**Q7. Pièce de résistance**

Because of Albert's unusual and curious fascination with mathematics, he has decided to mount five geometric shapes along the top of the back fence. These are the black squares on the plan. The shapes are to be made of solid polycarbonate and coated with gold leaf. The shapes are:

- a cube with edge length 20 cm
- a rectangular prism 15 cm by 20 cm by 25 cm
- a cylinder 20 cm in diameter and 25 cm in length
- a triangular prism 25 cm long and whose ends are right-angled triangles with sides 9 cm, 12 cm and 15 cm
- a prism 25 cm long and with regular hexagons for ends. The hexagons have side lengths of 14 cm and areas of 509 cm<sup>2</sup>





Each shape costs \$6.60 per litre of polycarbonate and the gold leaf costs \$27 for a 16 cm by 11.5 cm sheet. The gold leaf is gold in extremely thin sheets. You stick it onto the surfaces of the shapes to make them look like they are made of gold. The sheets can be cut up as much as required. He needs to buy enough gold leaf to cover the surface of each shape plus 10% extra to allow for wastage. Find the total cost of the shapes.

**Q8. Find the total cost of the project**

Being a would-be maths teacher, Albert did his own calculations too. But being a guinea pig breeder, he found he could not afford what he calculated the cost to be. He could only afford \$26 000 for the whole project.

**Q9. Your design**

Your job is to redo Albert's design so that he can afford it. There are some things that can be left out of the design, like some of the geometric shapes, but there are other things which must be included. The must-include items are as follows.

- pool at least 16 m perimeter with the standard inclusions
- solar heating
- fence completely surrounding the pool (does not have to surround the water tank)
- at least one gold-plated shape with a minimum volume of 4 litres
- covering of the ground within the pool fence by a combination of paving, grass and shrub garden (the tank does not have to be covered)

The position of the house, patio, shed and water tank are fixed.

You should present your plan of the pool area at a scale of 1:100 (1 cm : 1 m). You should also present a detailed costing. You should make the pool and surroundings as good as possible within the constraints of the budget. Your total price should come to between \$25 000 and \$26 000.

