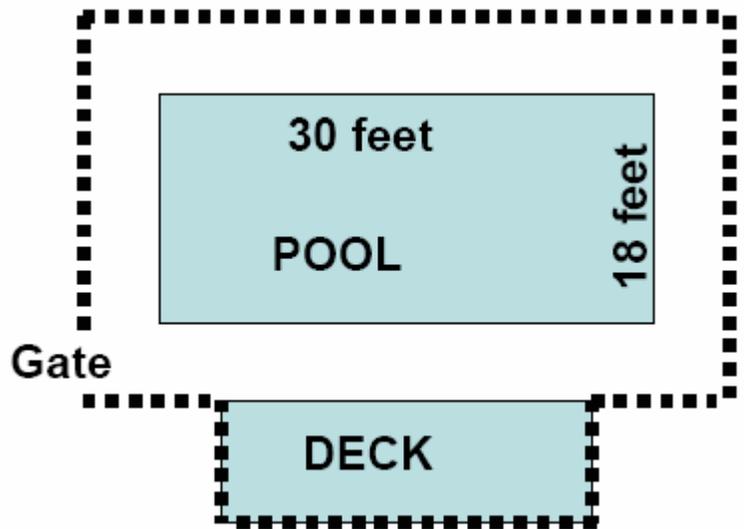


Tom wants to build a deck and have a walkway around his swimming pool. The deck is centered along the length of the 18 feet by 30 feet pool. Fencing will go around the walkway and the outside three sides of the deck as shown in the diagram. He was able to get bargain rates on 4 rolls of 40 foot fencing. Fence posts need to be spaced at most 6 feet apart, a post needs to be at each corner and at every place where a new roll of fencing is started. He also wants a 3 foot gate that will require fence posts on either side. He consults you for some options on possible designs with these restrictions:



- the walkway must be at least 3 feet wide all the way around the pool,
- the deck must be at least 200 square feet in area, and
- all dimensions must be in whole numbers of feet.

YOUR TASK

Come up with at least 2 designs and explain their benefits. In each design include a sketch with the following labeled on the sketch:

- 1) the width of the walkway,
- 2) the dimensions of the deck,
- 3) the number of posts required and where you would place them, and
- 4) the total length of fencing required.

DESIGN PROCESS AND REASONING

- 5) Describe your reasoning for each of your designs:
 - Why did you choose the deck design?
 - Why did you choose the width of your walkway?
- 6) Describe your walkway and deck design process:
 - How did you adjust your design from the first to the second design? Why did you do this?
 - How did you check your measurements?

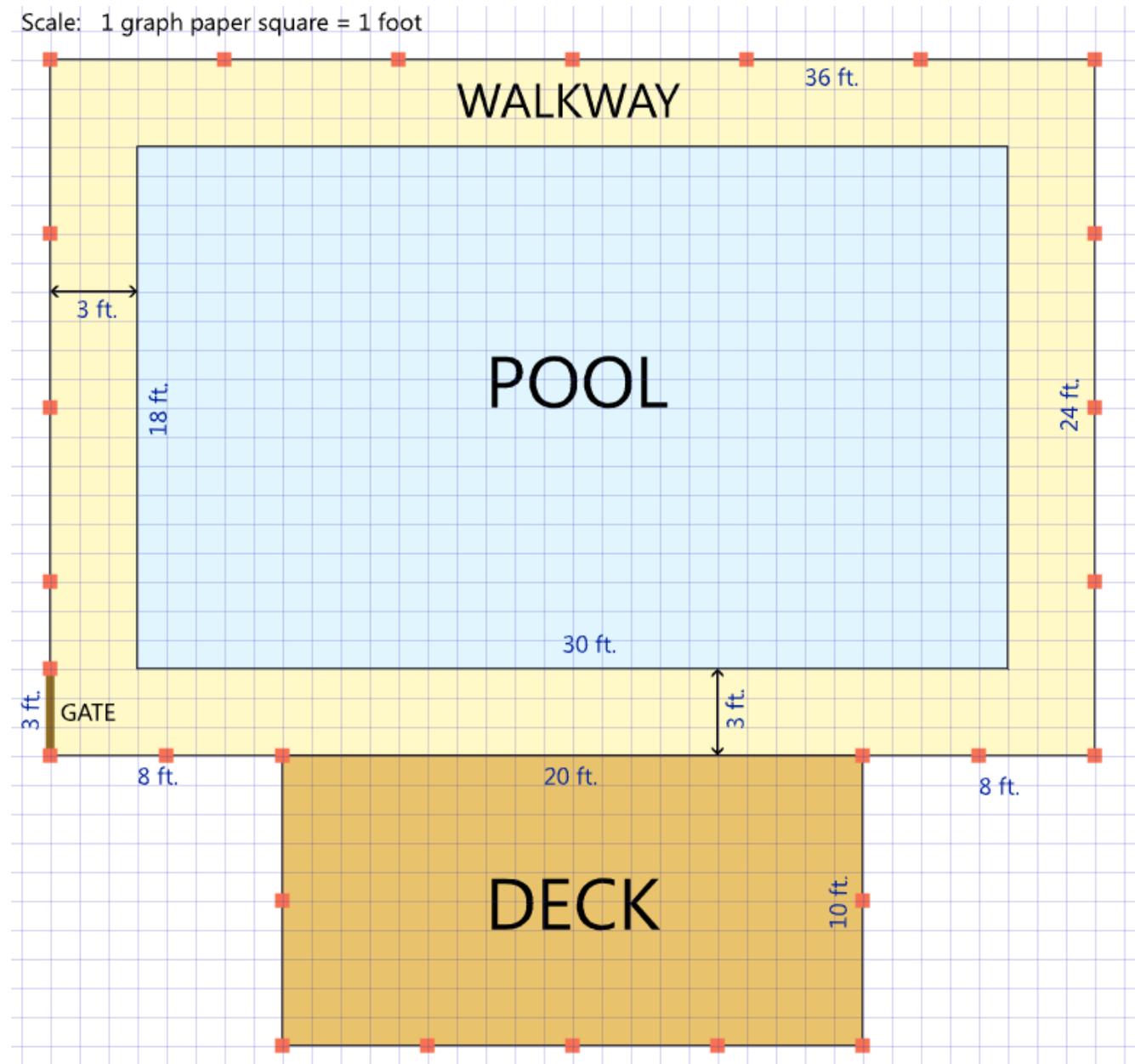
Your work will be evaluated on:

- your answer(s)
- your understanding of the problem
- your strategies used
- your communication
- your reasonableness/reasoning

Solutions

Note: This is an open response long problem, so there are many correct solutions and designs. This is just one example of a solution.

Design #1:



Number of posts required:

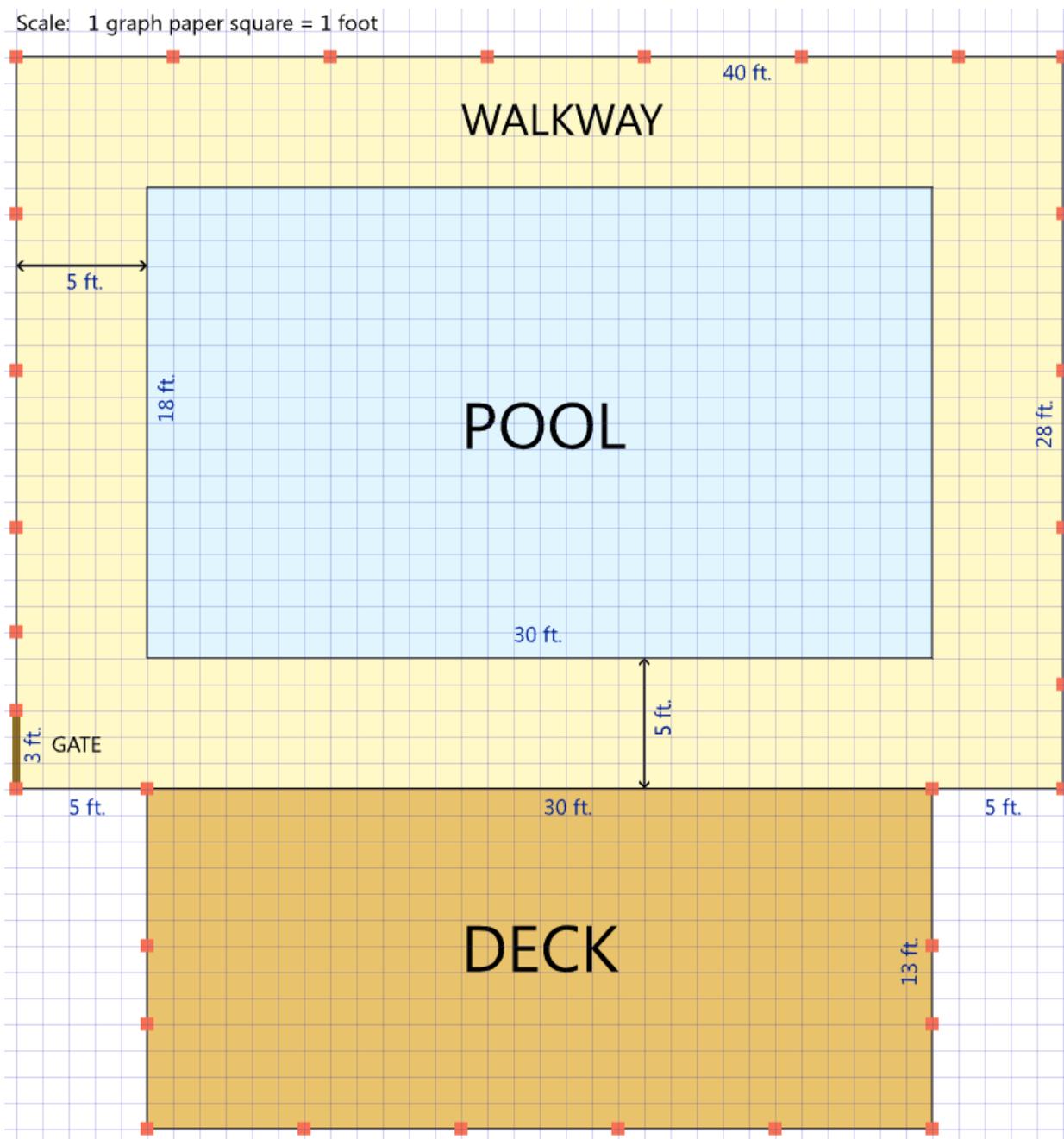
27 posts

Length of fencing required:

(starting at gate, and going up) $21 + 36 + 24 + 8 + 10 + 20 + 10 + 8 =$

137 ft.

Design #2:



Number of posts required:

31 posts

Length of fencing required:

(starting at gate, and going up) $25 + 40 + 28 + 5 + 13 + 30 + 13 + 5 =$

159 ft.

Answers:

For my first deck design, I just wanted to use as little fencing as I possibly could, because I didn't know if I would have enough or not. So I chose my walkway width to be as narrow as possible, within the rules. So that means the walkway had to be 3 ft. wide. For the deck, I made it as small as possible, within the rules. So that means it had to be 200 sq. ft., and so I just made it 20ft x 10ft, because those were easy numbers to work with.

I knew that I had $4 \times 40\text{ft} = 160\text{ft}$ of total fencing to work with. In my first design, I ended up using only 137 ft. of fencing.

In my second design, since I knew I had leftover fencing that I could use, so I decided to make things a little larger. I expanded the walkway to be 5 ft. wide. This gives a little more room for people to walk around the pool, which makes it safer. Also, it allows some room to place chairs and tables around the pool if desired. Also, I decided to make the deck larger in order to provide more room to sit there as well. The deck is now 390 sq. ft., which is almost twice the space that was originally required, but can still be fenced with the available rolls of fencing.

After these changes, I ended up using 159 ft. of total fencing, which meant that I just had 1 ft. of fencing leftover.

I checked my measurements by counting the squares on my graph paper. I made it so that each square represented 1 ft., which made it easy to measure. I made sure the deck was centered by checking that the space on the left and right sides of the deck were exactly equal.

I made sure that I put enough fence posts in place, and that no two fence posts are more than 6 ft. apart.