Area Builder problems:

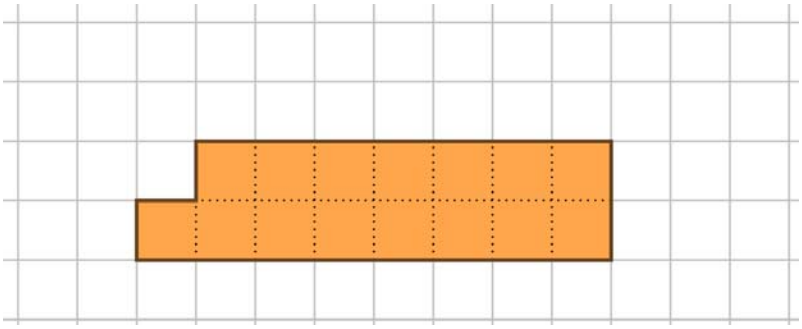
name:_____

https://phet.colorado.edu/en/simulation/area-builder

Play the game level 2:

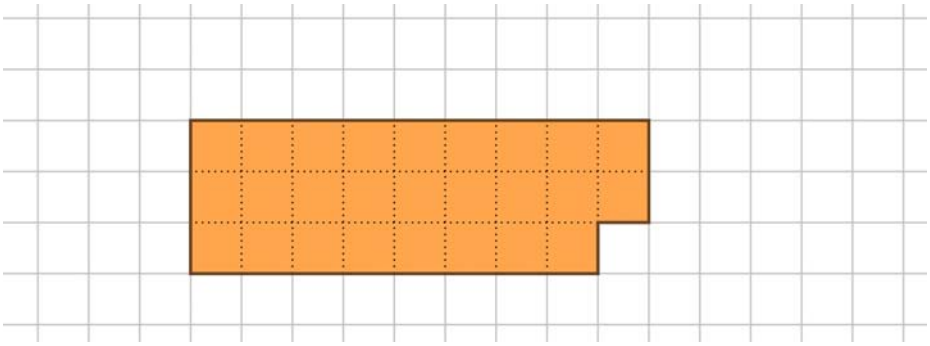
1. One of the level 2 challenges I got was to make a shape with area 15 and perimeter 16.

I made this shape that has the right area, but the perimeter is too long. How can I move some of the squares around to get a shorter perimeter?



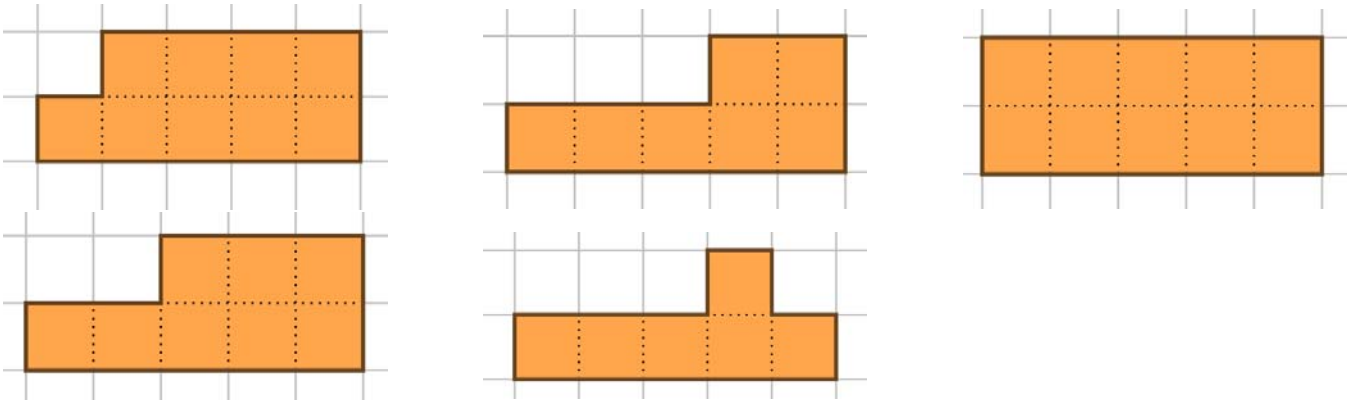
2. Another level 2 challenge I got was to make a shape with area 26 and perimeter 30.

I made this shape. It has the right area, but its perimeter is too short. How can I move squares to get a longer perimeter?



Explore:

3. I built these shapes in the explore tool. Figure out the perimeters and areas, talk to your partner, and then write an explanation of what all of these shapes have in common, and what you notice that might explain why it's the same for all of these:



4. What do you notice so far: can shapes have the same area and different perimeters? Can they have the same perimeter and different areas?

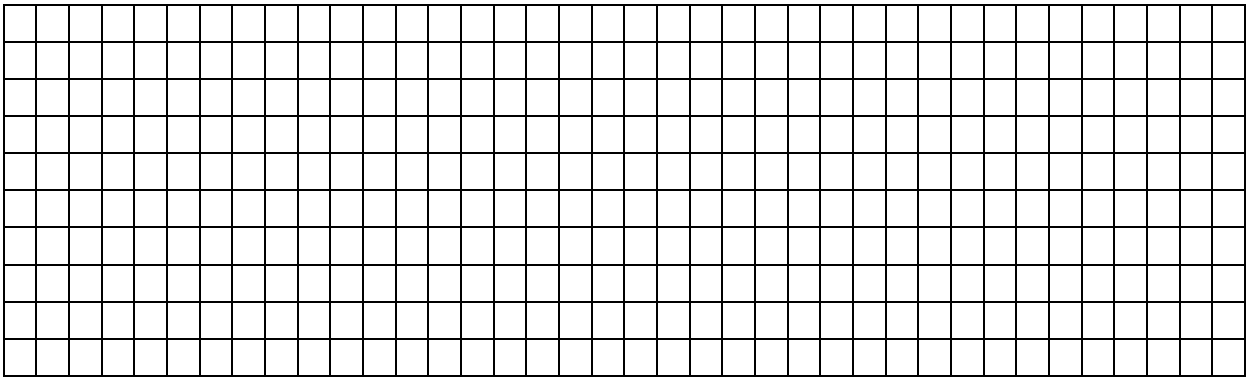
5. The big problem: If you have a shape made on a grid with a given area, how can you make the smallest perimeter? How can you make the largest perimeter?

a. Understand the problem: rewrite in your own words what the question is asking:

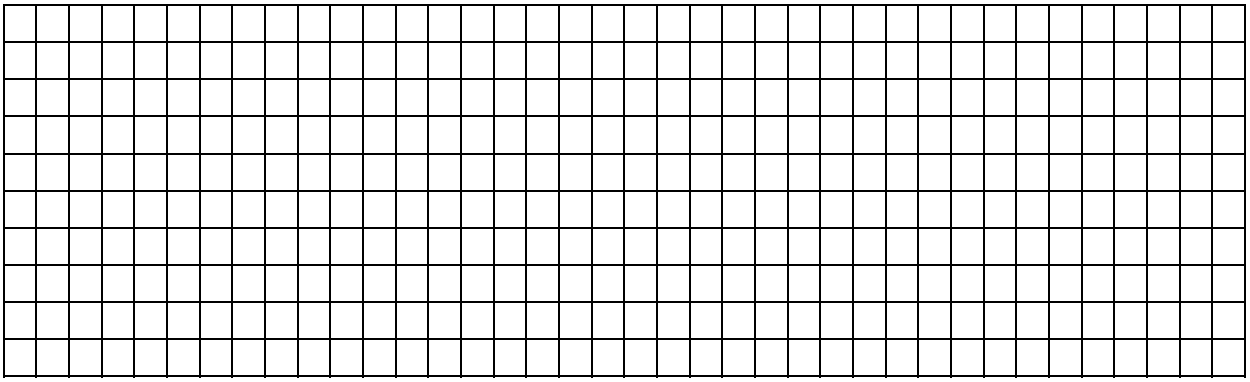
b. (Figure out a plan to get started, and do it)

Start with a smaller problem: solve a version of the problem where the area should be 12 cm^2. Solve a version of the problem where the area should be 16cm^2. Solve a version of the problem where the area should be 14cm^2.

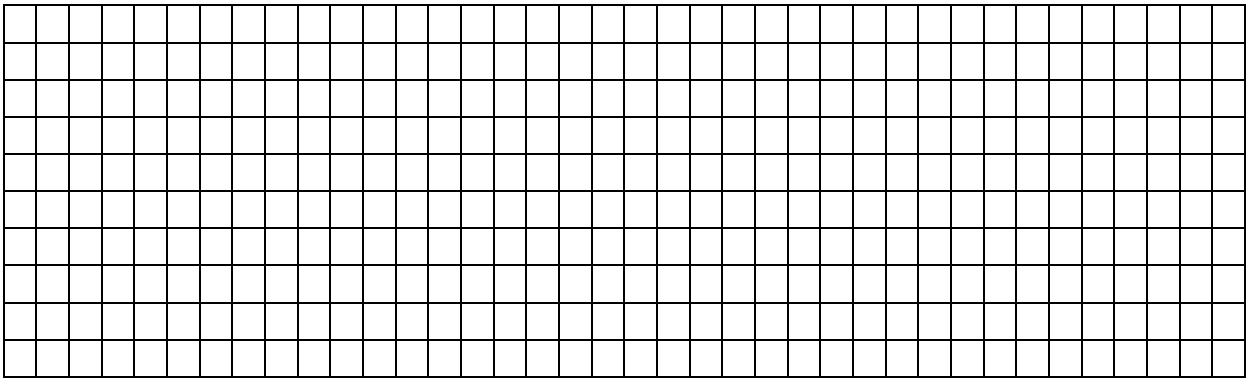
area 12 cm^2 smallest perimeter largest perimeter



area 12 cm^2 smallest perimeter largest perimeter



area 12 cm^2 smallest perimeter largest perimeter



5c. (Use your smaller steps and look for similarities)

Write down what you think the solution to the more general problem will be:

If you have a shape made on a grid with a given area, how can you make the smallest perimeter? How can you make the largest perimeter?

d. Think about your solution from another angle: can you think of reasons why your solution makes sense? Can you think of any examples where it wouldn't work? Explain your ideas